

'Superbugs' and the 'dirty hospital':
The social co-production of public health risks

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ABSTRACT

This dissertation examines the construction of antimicrobial resistance (AMR) as a public health risk. Its focus is on how AMR is co-produced among a network of medical professionals, scientists, and science journalists. The research advances three main arguments: first, narratives and definitions of health risk are not absolute or fixed, but constituted in the discourses and practices of global, national and local actors; second, the production of knowledge about the risk of AMR is not based on a linear process but one in which various definitions, interests, and practices are involved, and influence one another; and third, conceptualizing health risk as discursive co-production provides a more robust and nuanced understanding of how risks are defined and understood by stakeholders, particularly in relation to attributions of responsibility, blame, victimhood, and resource allocation. I argue that this represents a novel way of imagining and conceptualizing risk communication. The research involved the development of a novel methodology, which I call *ethnography of risk*, that brings together hospital ethnography, in-depth interviews, and qualitative analysis of media coverage and policy documents. The results of this study show that health risks are co-produced through processes of negotiation between different and co-existing types of knowledge, including situational and embodied experience, emotional memory, and expert assessments. Second, it argues that risks are multifaceted and constituted at the intersection of different perspectives, such that AMR is understood and addressed as a personal risk, a professional risk, a global risk, and a political risk. Third, it shows that stakeholders perform boundary work and blame shifting to justify why they preferred certain ways of knowledge over others. Fourth, various stakeholders reified, and in that sense co-produced, the deficit model of risk communication through narratives and actions that keep creating the conditions in which the supposed knowledge deficit is

circulated. Finally, AMR lacks a compelling narrative and is communicated as abstract, lost in a plethora of other, more urgent risks. These results open up new ways of conceptualizing health risks beyond the biomedical model and emphasize the need for studies in risk communication and health communication that critically examine the actors, sites and processes that produce and circulate risk knowledge.

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CHAPTER 1

INTRODUCTION

A nurse approached the senior resident during rounds in the hospital ward and asks if they can discontinue the isolation status for a patient so that ‘no contact’ precautions are no longer needed when entering the patient’s room.

-“If you don’t discontinue isolation then management will give me a hard time,” the nurse explained.

-“Why?” asked the resident, a young woman surrounded by medical students attending rounds in the hallway.

-“Well, because the little siblings are here and they’re not supposed to if the patient is under contact precautions,” the nurse replied.

-“I can’t reduce the prevention level just because of that,” said the resident pushing back her glasses as she turned away from the nurse.

-“No, right, of course,” said the nurse as the resident walked away. “I’ll figure something out.”

The nurse turned around and walked to the nurses’ station where the care facilitator -the nurse in charge of the floor- was typing on her computer.

-“I tried to talk to them about taking the patient out of isolation. I mean, she’s doing well, and her tests came back negative. But they want to wait for the results of the other test,” said the nurse to the care facilitator hoping she would help her and her patient, and continued her efforts to persuade the care facilitator: “The thing is, the mom has six children and there’s usually at least one in the patient’s room. Right now, there are two

because she had to pick up one from school. She has no one to look after the other children.”

-“And she brought them here?” asked the care facilitator as her eyes opened widely with surprise. “Well, our policy is clear, no young siblings in isolation rooms”.

-“Right, but what can I do if the mom shows up with them and there is no one to look after them? I don’t know what to do!” The nurse’s tone had grown increasingly desperate.

The care facilitator sighed as her face softened. She clearly empathized with the nurse and with the patients’ mother. And then she conceded: “OK, tell them to wash their hands frequently, no exceptions! And if they cough or have a runny nose, they have to wear a mask. It has to be as if they were never here!” Smiling, the nurse proceeded to enter the patient’s room to tell the mother the good news.

(Week 4, day 2)

Infection prevention protocols are designed to keep the risk of contagion at bay in the hospital. These protocols state what measures should be taken in each case to reduce the risk of spreading infection. They are clear guidelines, official biomedical discourse, that normally do not allow room for nuance. They are not intended to be open for interpretation. Doctors and nurses know and practice these guidelines, but as illustrated in the field note shown above, healthcare professionals are also involved in a continuous negotiation of institutional and professional standards, the reality of daily work in the ward and their own perceptions of risk. In general, public understanding and perception of risk is mediated by cultural understandings, embodied and situated experiences of risk, previous risk assessments, and affect. These aspects are usually not accounted for in risk communication

research and can only be observed and analysed by researchers who act as witnesses to conversations, rituals, and professional practices. In other words, risk communication research should examine how official biomedical discourses of health risks emerge through negotiation and dialogue with other discourses, experiences and understandings that shape how risks emerge and are understood and experienced. This dissertation takes up this challenge. Specifically, it examines how the risk of antimicrobial resistance emerges as an embodied and situated experience, as a negotiated practice between professional rules, norms and cultural understandings, as coproduced by a network of biomedical and other actors.

A “SILENT TSUNAMI”

Alongside vaccines, antibiotics are recognized as one of the greatest lifesaving medical interventions ever conceived. Combined with proper sanitation measures, antibiotics were introduced to control the spread of dangerous bacteria in the twentieth century, and largely curtailed its threat. But now this “miracle cure” (K. W. Hamilton, 2019) is losing its effectiveness against harmful organisms that are evolving antimicrobial resistance. Antimicrobial resistance (AMR) has been labelled as one of the most important contemporary threats to humanity (World Health Organization, 2017). From gonorrhea, tuberculosis, and *C. difficile* to Carbapenem-resistant *Enterobacteriaceae* (CRE) and *Candida auris*, multidrug-resistant infections are spreading around the globe (CDC, 2019b), causing an estimated 1.5 million deaths each year worldwide (O’Neill, 2016). Resistant infections are on the rise, in Canada – it’s estimated that they will kill nearly 400,000 Canadians and cost over CAD \$400 billion over the next 30 years (Council of Canadian Academies, 2019).

Antibiotics became widely available in the 1940s, and since then they have been easily obtainable by the general population, usually through a prescription from a physician. In many countries, however, they can be purchased without a prescription. While this has undoubtedly reduced public exposure to serious illness, it has also generated unintended risks stemming from both antibiotic overuse and under-dosing (Kimothi & Dhariyal, 2019; McKenna, 2010, 2017; S. Shah, 2016; Strathdee, 2019). Alexander Fleming, who discovered the first antibiotic, penicillin, noted this quandary when he warned about the risk of antibiotic resistance in his 1945 Nobel lecture: “There is the danger,” Fleming said, “that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant” (Fleming, 1945). In recent years spread of antibiotic resistant bacteria has accelerated, which cause infections that do not respond to different antibiotics and can ultimately lead to serious illness and death. Health authorities have described antibiotic resistance, and more broadly antimicrobial resistance¹, as a public health emergency caused by extensive antibiotic misuse, which has not been met with an equally prolific development of new antibiotics (O’Neill, 2016; World Health Organization, 2014). In addition, resistance to the few new drugs available is also being developed (Cassir et al., 2014).

Emerging health risks, such as AMR, bring a pervasive sense of uncertainty, and while some risks emerge abruptly and their impact is felt immediately, others go unnoticed and slowly grow with deep but hidden repercussions. This kind of risk can be understood as what Rob Nixon (2013) terms “slow violence,” a form of violence that occurs gradually

¹Antimicrobial resistance (AMR) is an umbrella term that refers to bacteria, parasites, viruses and fungi evolving resistance to antimicrobial treatments that used to be effective against the wide range of infections they cause. Antibiotic resistance –bacteria evolving resistance to antibiotics- is included in AMR.

and out of plain sight. Its destructive force is not immediate but delayed and dispersed not only across time but also space. Slow violence seems so diluted that it is typically not viewed as violence at all. It is not spectacular nor instantaneous –like the outbreak of a communicable disease or a pandemic–, but rather gradual and incremental. The disastrous repercussions of this type of violence are felt across time (p.2). AMR, as a form of slow violence, is not only slow growing but also going unnoticed. Violence is usually understood as visible and newsworthy, but slow violence such as AMR is not focused on one event and it is unlimited in time and space, thus obscuring its presence and impact.

In trying to make sense of the emergent risk of AMR, multiple narratives have been constructed by an assemblage of actors and institutions (biomedical experts, public health agencies, advocates, policymakers, media, etc.) that define the hazard, identify its causes, distinguish who is at risk, who is responsible, and delineate preventive measures. As a result, AMR has been a subject of considerable attention by risk communication theorists and practitioners. Risk communication is defined in traditional terms as the flow of information from experts to lay people to raise awareness of risks and influence risk avoiding behaviour (McComas, 2006). From this perspective, risks are treated as objective conditions defined by expert knowledge, and the goal of any communication effort is to influence public perception of risk and risk behaviour (ibid.). Cultural approaches to risk, however, contend that risks are a combination of material conditions and social constructs, defined by various actors through the production of specific discourses and practices. Public knowledge and perception of health risks such as AMR are affected by how these hazards are communicated: the sources that are invested with authority to define them and the narratives that shape how they speak (Beck, 1992b, 2009; Beck & Levy, 2013; Frewer,

2004). Risk narratives produced by scientists, biomedical experts, government, industry, and media organizations also influence policy-making processes, resource allocation and risk behaviours (Beck, 1992b; Frewer, 2004). News media, in particular, are important sources of scientific and health information (Nelkin, 1995) and contribute to the discursive co-production of public health risks (Briggs & Hallin, 2016).

Cultural theories of risk, however, do not fully account for the role of communication in the co-production of risk. The concept of *biocommunicability* (Briggs & Hallin, 2016) refers to the co-production of medical knowledge by media and medical professionals and provides a useful theoretical and methodological approach for addressing how risks are ‘brought into being’ through discourses and practices of communication. I argue that these networks of biocommunicability are broad and encompass more than just networks of medical and media professionals. They also involve scientists, policymakers, industry players and patients, all contributing to the production of medical knowledge, including health risks. Additionally, cultural theorists have been consistently criticized for lacking a clear methodology for a cultural analysis of risk (Tansey & O’Riordan, 1999). While scholars have employed various qualitative approaches to examine the social construction of medical knowledge, including specific illnesses such as atherosclerosis (Mol, 2002), heart disease (Wheatley, 2016), and outbreaks of infectious diseases (MacPhail, 2014), ethnography, the study of social practice *in situ*, is a novel approach to the study of risk.

The main research question guiding this dissertation is two-fold:

1. **How are public health risks co-produced by a complex network of media professionals, patients, healthcare professionals, scientists, and national and international public health organizations?**
2. **What are the implications of this approach for communicating the risk of antimicrobial resistance?**

Taking AMR as a case study I examine how this risk is co-produced as a global public health threat through what I call *ethnography of risk*. This methodology approaches risk from a feminist perspective, prioritizing embodied and situated experience. Official and expert discourses are considered key nodes in the network of biocommunicability of AMR, but they are not the only or most important ones. An ethnography of risk involves a combination of qualitative methods including hospital-based observation, in-depth interviews, media analysis and textual analysis of policy documents. Drawing on the concept of biocommunicability (Briggs & Hallin, 2016), the dissertation maps the network of actors, discourses and practices that co-produce the risk of AMR. I conceptualize antimicrobial resistance not as a health risk that people understand in different ways, but rather as a risk that has multiple dimensions, which ‘come into being’ through myriad practices and discourses by various social actors. In this sense, what we collectively understand as AMR is the sum of these many dimensions in which the risk is lived, experienced, talked about, and acted on.

First, I examine how the risk of AMR emerges as a personal and professional risk in a pediatric hospital through the routines and rituals performed by healthcare professionals. Second, I analyse news coverage of AMR, which provides definitions and the rhetorical tools to understand the risk, and the various journalistic and institutional practices that

shape news production. I also examine how news coverage of AMR is perceived by physicians and how they assess the impact of media coverage on how their patients understand risk. Third, I analyse how scientific knowledge of AMR is produced and institutionalized and how scientists understand this risk. I also discuss scientists’ perceptions of media coverage of AMR and of national and international infection surveillance and control policies. Finally, I examine public health policies and public awareness materials produced by health organizations in terms of how the risk of AMR is defined, how scientific knowledge and patient experiences are mobilized, how blame and responsibility are assigned, and the measures outlined to address the risk of AMR.

Through this analysis I chart a network of biocommunicability in which various social actors produce discourses and practices through which the risk of AMR emerges as (1) a personal risk; (2) a professional hazard; (3) a media story; and (4) a global challenge.

This dissertation advances three main arguments:

1. Narratives and definitions of risk are not absolute or fixed; rather, they are co-produced in the discourse and practices of various global and national health actors (i.e., members of the medico-scientific community, health organizations, government, media organizations, etc.) and are expressed in policies, public awareness campaigns, media coverage, and institutional practices that change over time;
2. The production of knowledge about risks is not a linear process but one in which various definitions, interests, and practices are involved, and influence one another. The concepts of biomediatization and cartographies of biocommunicability (Briggs

& Hallin, 2016) provide the theoretical and methodological basis for understanding the co-production of risk; and

3. Analyzing risks as a social and cultural co-production provides a more robust and nuanced understanding how risks are perceived by different stakeholders — particularly in relation to attributions of responsibility, blame, victimhood, and resource allocation— and how these understandings influence each other.

“SUPERBUGS” AND THE ANTIBIOTIC APOCALYPSE: THE RISK OF ANTIMICROBIAL RESISTANCE

AMR is a serious global public health risk. It is threatening to make antibiotics, one of the most important technologies of modern medicine, ineffective or altogether useless, and throw humankind into a post-antibiotic era, in which even a small scrape or routine surgery could become life threatening. AMR “threatens the very core of modern medicine” (World Health Organization, 2015, p. VII) and causes over 1.5 million deaths annually worldwide (Hall et al., 2018), making it the “greatest risk (...) to human health” (Howell et al., 2013, p. 28). Deaths from infections resistant to common antibiotics, antivirals and anti-parasitic drugs could increase more than ten-fold to 10 million deaths annually worldwide by 2050 (Interagency Coordination Group on Antimicrobial Resistance, 2019; O’Neill, 2016), including 400,000 in Canada (Council of Canadian Academies, 2019), more than deaths caused by cancer (O’Neill, 2016).

Antimicrobial resistance is an evolutionary defense mechanism that allows organisms to protect themselves against the power of antimicrobials to kill them. It is created by subtle genetic changes that alter organisms’ cell walls “to keep drug molecules from attaching or penetrating or forming tiny pumps that eject the drugs after they have

entered the cell” (McKenna, 2017, p. 26). However, resistance can also be transferred across bacteria. For example, the MRC gene that produces colistin²-resistance spreads not just by inheritance, but by transfer from one bacterium to another. Even people with no active resistant infections can carry the MRC gene, making them ideal potential hosts for colistin-resistant *E.coli* bacteria (p. 29). Furthermore, AMR is a complex health risk, a host of multiple hazards (bacteria, fungi, parasites, viruses) that can produce various types of infections.

While resistance is a natural mechanism of defence for the organism, it has become accelerated due to the excessive and suboptimal use of antimicrobials, particularly antibiotics, in human and animal health (Interagency Coordination Group on Antimicrobial Resistance, 2019). Today antibiotics are prescribed to treat different bacterial infections but they are also consistently prescribed when unnecessary (e.g., to treat viral infections) and are seldom taken by patients as indicated, usually not completing the dose (Centers for Disease Control and Prevention, 2015; Hall et al., 2018). Furthermore, since the 1940s antibiotics have been routinely used in farming, administering them in large doses to otherwise healthy livestock to promote growth and spraying them on crops to control pests. Currently over 63,000 tons of antibiotics are used annually on livestock around the world (McKenna, 2017), and it is estimated that this practice will increase by 67% by 2030 in the world’s most populous countries (Van Boeckel et al., 2015). Despite action plans and political commitments from countries around the world to tackle AMR, some are more

² Colistin is an old antibiotic discovered in 1949. For years, the medical community avoided its use, considering it clumsy and toxic. Disease organisms did not encounter colistin while the drug remained stored, therefore becoming the only antibiotic that still works against some multi-drug resistant bacteria, such as *Klebsiella*, *Pseudomonas*, and *Acinetobacter*. Colistin is now considered a “last resort” antibiotic. Despite physicians doubts about colistin, the farming industry in Europe and Asia adopted it as an inexpensive drug to promote growth in farm animals, and it was discovered in 2013 that colistin-resistant bacteria had been spreading around the world (McKenna, 2017, p. 29).

committed to use antibiotics judiciously than others, as economic interests also play an important role around the regulation of antimicrobial use or its failure. For example, despite the CDC’s strong objection to antibiotic overuse, citrus farmers in the United States were recently authorized by the Trump administration to profusely spray streptomycin and oxytetracycline, two antibiotics that are banned for agricultural use in Europe (Jacobs & Adno, 2019).

The increase in resistant organisms, such as the resistant fungus *Candida auris* that is plaguing hospitals around the world, has also been facilitated by the rise in global temperature due to climate change (Casadevall et al., 2019). Additionally, the spread of antimicrobial-resistant pathogens can be exacerbated by unpredictable disasters that lead to population displacement crowding, mass migration, unsafe water supplies (Kimothi & Dhariyal, 2019). Furthermore, war and environmental degradation can also lead to an increase in infectious diseases, moving the risk of AMR to the forefront (idem).

In this context, the World Health Organization (WHO) declared antimicrobial resistance among the top three threats to human health (2012), and has called for concrete action from governments to tackle AMR, including the promotion of antimicrobial stewardship, surveillance of resistant infections, investment in research, and raising public awareness of this risk (World Health Organization, 2015). The United Nations (UN) and WHO have been leading the political initiatives to contain the risk of AMR. Both organizations have been sounding the alarm about the threat that AMR poses to humanity over the past decade; however, most of their efforts have taken place in the past five years. In 2015, the WHO published a *Global Action Plan on Antimicrobial Resistance* (World Health Organization, 2015), highlighting the need for international cooperation, as well as

guidelines for individual countries to develop their own national action plans on AMR (World Health Organization et al., 2016). The *Global Action Plan* (2015) exhorted all member states to implement within two years “national action plans on antimicrobial resistance that are aligned with the global action plan” (p. 21).

In September 2016, the WHO held a historic high-level meeting to discuss how to manage the global threat of AMR. This was the fourth time that such a meeting had taken place to tackle a health issue. At this meeting, the 193 member states signed a document establishing a political compromise to invest heavily in curtailing the risk of AMR and improving antimicrobial use (United Nations, 2016), and to expedite the approval of new antibiotics³. UN member states committed to developing programs and policies according to each country’s priorities and to implement national measures to improve antimicrobial use in line with the global action plan, including engaging in national and international collaboration; mobilizing sustained funding and human resources to support the development and implementation of national action plans, research and development of new antibiotics, vaccines, and diagnostics; and ensuring that plans involve effective surveillance of antimicrobial use and sale. However, this declaration was only a voluntary commitment and thus each country could adopt the measures or not at their own discretion. Then, in 2017 the WHO published a global priority list of antibiotic resistant bacteria (World Health Organization, 2017), the twelve resistant bacteria⁴ that pose the biggest

³ For example, the Antibiotic Development to Advance Patient Treatment Act introduced in the U.S. Congress to allow de FDA to approve antibiotics based on small clinical trials.

⁴Priority 1 –Critical: *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacteriaceae*. Priority 2 – High: *Enterococcus faecium*, *Staphylococcus aureus*, *Helicobacter pylori*, *Campylobacter*, *Salmonella spp.*, *Neisseria gonorrhoeae*. Priority 3- Medium: *Streptococcus pneumoniae*, *Haemophilus influenza*, *Shigella spp.*

threat to humanity and which require the most investment in research and surveillance⁵. In 2018 the UN declared AMR a “global health emergency” (UN News, 2018) requiring immediate action, and in April 2019, the UN’s Interagency Coordination group on Antimicrobial Resistance published a report recommending immediate action, stating, “antimicrobial resistance will have disastrous impact within a generation” (2019, p. 1).

In Canada, regulation to tackle AMR has been slow as there is very limited data regarding resistant infections and their impact on Canadian society. However, a much awaited report assessing the socio-economic impacts of AMR in Canada (Council of Canadian Academies, 2019) was released on November 12, 2019, and its dire predictions are likely to fuel policy changes. The report, commissioned by the Public Health Agency of Canada, estimates that AMR will kill nearly 400,000 Canadians and cost over CAN \$400B over the next three decades (ibid.). Other studies had already determined that the rate of individuals colonized with resistant organisms has increased five-fold in Canada since 2014, and community-acquired methicillin-resistant *Staphylococcus aureus* (MRSA) has nearly doubled since 2012 (Public Health Agency of Canada, 2018b). In 2017, the Government of Canada unveiled a national framework to tackle the risk of AMR (Public Health Agency of Canada, 2017), which intends to provide a policy foundation to guide collective action against AMR. Based on this framework a Pan-Canadian Action Plan on Antimicrobial Resistance is still being developed and will probably be informed by the most recent report.

Despite the lack of a Canadian action plan to tackle AMR, some policy changes were implemented to reduce antibiotic use in animals and to increase infection surveillance

⁵The list was limited to resistant bacteria, thus it did not include other resistant organisms that are also of global concern, such as resistant tuberculosis, malaria, and HIV.

in hospitals. Many antibiotics commonly used in human medicine are also used in animals in Canada both for growth promotion and to treat infections, including tetracyclines, penicillin, macrolides, and sulphonamides (Council of Canadian Academies, 2019, p. 23). A policy change regarding antibiotic use in animals and new rules came into effect on December 2018, requiring farmers to have a veterinary prescription in order to treat their livestock with antibiotics (Public Health Agency of Canada, 2018a). A report by the Chief Public Health Officer of Canada (2019) highlighted the importance for antimicrobial stewardship and the need for standardized protocols of antimicrobial use across sectors, as well as coordinated action across provinces and territories. In response, the Canadian Medical Association (CMA) updated its policy on antimicrobial resistance (Canadian Medical Association & Association of Medical Microbiology and Infectious Disease Canada, 2019), but also criticized the government’s initiatives for tackling AMR at the provincial and federal levels as “wholly inadequate to address the scope of the problem and the risk it poses for the health of Canadians” (p.1).

All these reports and documents recommend specific changes that can be implemented at the federal, provincial, and local levels. For example, taking a One Health⁶ approach in all efforts to tackle AMR, delaying prescriptions and relying on diagnostic tests, prescribing antimicrobials with the narrowest spectrum possible and for the shortest effective duration, taking antimicrobials as prescribed, disposing of antimicrobials safely⁷, investing in awareness campaigns, supporting antimicrobial stewardship in healthcare

⁶One Health refers to “integrated strategies that span the human, animal/agricultural and environmental sectors” to address the “collective nature of AMR” (Canadian Medical Association & Association of Medical Microbiology and Infectious Disease Canada, 2019, p. 2). One Health is an increasingly popular approach for addressing AMR and it is central in international AMR policy documents (Kamenshchikova et al., 2019, p. 1).

⁷See for example Gilbert (2019) on environmental pollution with antibiotics.

practice, and the development and implementation of detailed and integrated action plans based on clear metrics of success.

Despite various international calls for action and efforts to raise public awareness there has been slow progress around the world in implementing plans and policies for tackling AMR (Chief Public Health Officer of Canada, 2019; World Health Organization, 2019b). It is important to restate that AMR is a fast-growing risk that has been described by the director of the UN Interagency Coordination Group on Antimicrobial Resistance as a “silent tsunami” (Jacobs, 2019). As resistant infections continue to rise in Canada (Council of Canadian Academies, 2019) and around the world (O’Neill, 2016), the need for improved antimicrobial stewardship, infection surveillance, and new diagnostic tools has become more critical (Canadian Medical Association & Association of Medical Microbiology and Infectious Disease Canada, 2019; Stern, 2019).

STRUCTURE OF THE DISSERTATION

I begin by reviewing in Chapter 2 the main theories of risk that inform this dissertation, i.e., cultural theory of risk and the theory of risk society. The chapter also reviews key scholarship on risk communication, and cultural understandings of hospitals, particularly as they are the “epicentre” of AMR. Chapter 3 presents the methodology for this study, which I call *ethnography of risk*. In this chapter I review the literature on ethnography and hospital ethnography in particular, and address some of the ethical considerations of ethnographic research. I also outline the other components of the methodology, including in-depth interviews, media analysis, and textual analysis. The next three chapters present the findings of this study according to the different sites in which AMR becomes an embodied and situated experience. In Chapter 4, I focus on the hospital

as a site where the risk of AMR operates both as a professional and personal risk, as well as an embodied experience, through various institutional and cultural understandings of contagion and practices and rituals of infection prevention and control (IPAC) that shape the daily work of doctors and nurses. I also explain how various levels of responsibility are expressed and negotiated in these practices, including antibiotic prescription, antimicrobial stewardship rounds, isolation practices. I examine how hospital workers’ feelings, embodied experience, and perceptions of risk are negotiated in relation to protocols and guidelines. In Chapter 5, I turn my attention to the risk of AMR as media discourse through a critical analysis of health news and how this coverage is implicated in the co-production of risk. I examine how risk messages of AMR have permeated the public sphere through news coverage of ‘superbugs’ and, drawing on a series of in-depth interviews with health journalists, I identify the occupational and institutional practices and activities that shape news coverage of AMR. Chapter 6 examines how the risk of AMR is enacted by two additional social actors’ discourses and practices that inform, build on, and contest biomedical and media discourses of antimicrobial resistance. First, I draw on interviews with Canadian scientists doing research on AMR to understand how they define this risk and the way in which they create and circulate knowledge about it. Second, I examine how the risk of AMR is constituted in reports, websites and action plans by the WHO and Canadian health authorities. I examine how the risk of AMR is defined, how blame and responsibility are distributed, and how expert and lay knowledge are mobilized. Finally, in Chapter 7, I review the main findings of the study, the implications for communication of risk, limitations of the study findings, and present some future avenues for research.

CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

In this dissertation I argue that public health risks are not cohesive, unified concepts, but rather a collection of definitions, understandings, practices, beliefs, and experiences. I draw on two constructionist theories of risk, cultural theory (Douglas, 1966, 1992) and risk society (Beck, 1992b, 2009), to conceptualize antimicrobial resistance as a socially co-produced public health risk, a consequence of modernization, with global repercussions but local understandings and interpretations. I also draw on Briggs and Hallin's (2016) concepts of biocommunicability and biomediatization to examine how risks are constituted through the activities of social actors that co-produce and circulate medical and scientific knowledge. I begin the chapter by reviewing the main theories that inform this dissertation, then I review the literature on risk communication, communication of AMR, media coverage of AMR, and finally consider the hospital as the "epicentre" of AMR.

RISK THEORY AND RISK COMMUNICATION

Risk has been conceptualized in various ways, ranging from objectivist to constructivist approaches. Scholars have identified five main approaches to risk: techno-scientific, cognitive psychology, cultural theory, risk society, and governmentality. While the techno-scientific perspective defines risk as an objective reality that can be explained, predicted and controlled by science (Bradbury, 1989, p. 2), approaches borrowing from cognitive psychology tend to focus on the difference between expert assessments and individual perceptions of risk. Both the techno-scientific and different cognitive

perspectives, such as the psychometric paradigm and social amplification of risk framework (SARF), are realist to the extent that they consider risk an objective reality to be measured and controlled (Lupton, 2013). These “realist” approaches to risk offer important contributions regarding affect heuristics and how psychological factors affect individual perceptions of risk. However, they are also fundamentally based on an understanding that risk communication is designed to reduce a ‘knowledge deficit,’ thus ignoring the contingent nature of scientific knowledge and the myriad ‘expert’ definitions that can be generated for any risk (Slovic et al., 1979). The psychometric paradigm considers public responses to risk as problems to be managed and controlled, and underplays the social and cultural contexts in which risk perceptions are formed and the collective nature of risk decision-making (Lupton, 1999a). Similarly, SARF focuses on how risk communication can be used to amplify or attenuate risk messages for the ‘correct’ transmission of information (as intended by the actor generating the message) and, thus, dismisses social factors as ‘distortions’ that distract people from rational decision-making about the risks they face (Frewer, 2003; Kasperson et al., 2003).

Cultural approaches to risk (cultural theory, risk society and governmentality), on the other hand, are constructionist in orientation, conceptualizing risk as the outcome of a combination of material conditions and sociocultural processes (Fox, 1999; Lupton, 1999a, 2013), and processes of risk identification and assessment as dependent on values and cultural understandings (Bradbury, 1989, p. 2). This cultural approach seeks to understand how risk perceptions are influenced by social and cultural context. These theories argue that individuals rely on previous experiences, peer opinions, values, and expert knowledge when assessing risk, and they examine how these multiple ways of knowing are negotiated.

Therefore, cultural theories of risk provide a more nuanced and complex framework to examine risk than objectivist theories of risk. In this dissertation, social processes, values, embodied experience, and interpretations are considered as constitutive of risk definition, practices and narratives, and therefore play a crucial role in the construction of AMR as a specific public health risk.

Cultural theory of risk

The cultural theory of risk analyses how and why social groups form judgements about risk, how they build or lose trust in the institutions that create and/or manage risk, and how social structures influence risk perceptions (Douglas, 1992; Tansey & O’Riordan, 1999, p. 71). Cultural theory argues that people do not evaluate risk in a vacuum; instead they are influenced by the organizations and peer groups to which they belong and the authorities which help administer their lives (Douglas, 1992, p.58; Tansey & O’Riordan, 1999, p.71); thus, risk perception and risk behaviour are considered historically and culturally specific and, despite recognizing the particularities of individual preferences, this theory seeks to predict the cultural biases in social understandings of risk and risk management (Tansey & O’Riordan, 1999, p. 74). This assumes that people belonging to the same cultural group will share an interpretative framework for understanding reality in general, and risk in particular, and assign meaning to particular events (Douglas, 1992, pp. 135-137; Tansey & O’Riordan, 1999, p. 73). This approach, however, does not consider how class, race and gender differences impact people’s perception and interpretation of risk. Although people belonging to the same cultural group will share some meanings and understandings, intersectionality (Crenshaw, 1990) also plays an important role on how individuals experience risk.

Cultural theory analyses why certain risks become politicised, prompting debates regarding the right to know, justice, blame and responsibility (Tansey & O’Riordan, 1999, p. 71), while other risks are tolerated and considered within social norms and values. Moreover, it also questions the apparent depoliticization of risk, which is evidenced by the subtle process of making the relation between the hazard and risk management decision seem ‘natural’ (Tansey & O’Riordan, 1999). Consequently, the debate about what is to be considered a risk includes not only safety issues, but also issues of power and justice. This approach calls attention to the political and moral aspects of risk, which technical assessments and psychometric studies do not address, and the social construction of risk in contexts with different value systems and trust building processes (p. 73). This, however, does not mean that cultural theory denies the objective reality of risk. In fact, Douglas recognizes that “the dangers are only too horribly real (...) This argument is not about the reality of the dangers, but about how they are politicized” (Douglas, 1992, p. 29).

According to this approach, cultural beliefs and worldviews determine how people experience and interpret risk. It argues that individuals do not make independent choices, particularly about big political issues; rather they are primed with culturally learned assumptions that are also embedded in institutions that manage decisions, filter possibilities, and favour some options over others (Douglas, 1992, p. 58). It therefore assumes that groups assign symbolic meaning to events in the social and natural world to create order and coherence (Tansey & O’Riordan, 1999); they selectively credit or dismiss risk information based on whether it supports or confronts their cultural norms, so that lay perceptions of risk reflect and reinforce people’s worldviews (Douglas & Wildavsky, 1983, pp. 185, 194; Lupton, 1999a, pp. 2–3). In that sense, risk definition is a political process,

and while some risks become politicized and emphasized, others remain ignored (Tansey & O’Riordan, 1999, p. 71). For example, in the case of health risks, the evaluation of expertise, reliability of scientific studies, professional integrity, and credibility of risk messages, will depend on the social context in which those judgements are made so that the same scientific evidence and the same risk management strategies can be interpreted differently by various cultural groups (p. 72).

Douglas (1992) argues that social groups have consistent forms of explaining misfortune (taboo, sin, blaming, etc.) but notes that while notions of impurity in tribal societies served to assign blame for the protection of the group, in industrial societies risk and blame are used for the protection of the individual (p. 28). Furthermore, Douglas argues that threats to social order are reflected in ideas about health and illness, so that if society is at risk, so is the body:

The whole universe is harnessed to men’s [*sic*] attempts to force one another into good citizenship. Thus we find that certain moral values are upheld and certain social rules defined by beliefs in dangerous contagion (...) as we examine pollution beliefs we find that the kinds of contacts which are thought dangerous also carry a symbolic load (...) some pollutions are used as analogies for expressing a general view of social order (Douglas, 1966, p. 3).

Douglas (1966) explains that ‘dirt’ and ‘pollution’ are ‘matter out of place’; meaning that they break socially accepted boundaries or classifications, “for example, bathroom equipment in the dining room or shoes on the kitchen table” (Nettleton, 2013, p. 49). In that sense, Nettleton argues that contemporary anxieties about global threats such as communicable disease outbreaks, AMR, and climate change —from which no nation is safe— are reflected by discourses and understandings of immunity. In that sense, risk acts as a mechanism for assigning blame, so that ‘risky groups’ are singled out as ‘the Other’ that poses a threat to one’s physical body or to the collective social body (Lupton, 1999a, p.

3). Definitions of risk also serve to define identity —self and Otherness— and risk judgements are not limited to safety but involve issues of power, justice, blame, responsibility, and legitimacy (Douglas, 1992; Lupton, 2013, pp. 52, 54, 55; Tansey & O’Riordan, 1999). In this context, risk communication serves as a means through which particular definitions and blaming activities either validate culturally specific worldviews and organizational structures or challenge them. If we consider the example of debates about genetically modified organisms (GMOs), cultural theory argues that the political issue has become not the level of biological risk GMOs pose to consumers, but the moral questions regarding the appropriateness of applications of biotechnology to food production and the process by which decisions are made.

In exploring the social context in which risk definitions are generated and decisions are made (organizations, peer groups, authorities, how bonded the individual is to the group, etc.), Douglas (1992) developed a model with four types of risk behaviour based on two axes: group (strength of allegiance to a group) and grid (extent of regulation within or without the group). The grid dimension monitors behaviour in general but also has symbolic action: in high grid situations, symbolic action is routinized, and in low grid it is personalized. From this typology emerged four social environments: individualism (low grid, low group); fatalism/isolates (high grid, low group); egalitarianism (low grid, high group); and hierarchy (high grid, high group). With this typology, Douglas sought to explain how individual perceptions of risk and risk behaviour are less dependent on individual psychology and more on the social context in which they construct their understandings of self, others and the world (Fox, 1999, p. 15). Douglas applied this typology of risk-taking behaviour to her analysis of risk perception of AIDS and concluded

that scientific knowledge about health tends to compete with cultural values, which slows its diffusion and acceptance:

If scientific information does not diffuse smoothly and quickly, it is because of its value in the cultural struggle (...) In no other topic does the cultural contest reach so deep into the consciousness of the citizen as it does in regard to health and hygiene and risk of infection (p. 110).

Douglas criticizes the cognitive psychological approaches to risk arguing that they expect individuals to suppress their moral outrage when in fact emotion plays a key role in processes of risk decision-making (Douglas, 1992; Douglas & Wildavsky, 1983).

Furthermore, she contends that psychometric studies of risk are based on the concept that humans are risk-averse but inefficient in handling information, and therefore unintentional risk-takers; this led to the assumption that cultural bias is not relevant to lay risk assessments and to the conclusion that a misguided public needs more information about risk in order to make the right decisions. The problem, however, is not that laypeople are unable to understand technical risk assessments, but that many other aspects they care about are set aside (Douglas, 1992, p. 40). Both individuals and the community can be risk-seeking or risk-averse during interactions (mutual scanning, judging, blaming, excusing, retaliating); thus the refusal to accept expert advice on how to deal with particular risks is a matter of preference, and cultural theory seeks to understand those preferences (Douglas, 1992, p. 103).

Despite acknowledging the importance of culture in individual interpretations of risk, Douglas conceptualized cultural factors as a barrier to the diffusion of scientific knowledge. In this sense, her cultural theory of risks aligns with the psychometric paradigm in that expert knowledge is viewed as superior and objective while cultural understandings are conceptualized as an obstacle or distraction. The cultural theory of risk

then, ultimately positions individuals as needing more scientific information and their culture in the way of bridging this gap. I contend that cultural understandings of risk, embodied and situated experiences of risk, are not barriers to the transmission of expert knowledge of risk, but are in fact constitutive of risk definition in much the same way as expert/scientific discourse is. Furthermore, while Douglas does not put into question the validity and objectivity of expert knowledge, I argue that expert assessments, such as biomedical discourses on risk, are also culturally situated and socially produced. Therefore, what we understand as “expert knowledge” is also determined by culture, social structures, power relations, etc.

Some scholars have taken issue with Douglas’ view of risk as a function of cultural belief systems because (1) it does not account for individual free will; (2) it is static, not designed to illustrate processes of change; (3) it is a relative rather than an absolute analytical tool; and (4) it is applicable to social environments and institutions rather than to societies, and is technically incapable of distinguishing whole social systems (Renn et al., 1992; Tansey & O’Riordan, 1999). Furthermore, there is disagreement among cultural theorists on individual attitudes toward various institutional contexts. Douglas supports the stability hypothesis, which contends that people seek consistency between the different social environments (Center or Border) in which they operate. Others, like Rayner (1992) support the mobility hypothesis, which asserts that individuals move from context to context changing the nature of their arguments as they do. Renn et al. (1992) have expressed similar concerns, arguing that individuals can be members of more than one social group and that being a member of one group does not imply that they cannot understand and accept the views of other groups. Tansey and O’Riordan (1999) argue that

cultural theory lacks a clear methodology and suggest applying methods used in anthropology for detailed case studies that could ground the theoretical discussion around cultural theory of risk (p. 84).

Despite the limitations of the cultural theory of risk, it made a valuable contribution to how we theorize risk by highlighting the key role of social experience, politics, values, beliefs and affect in the formation of perceptions of risk. By focusing less on measuring the objective reality of risk in favour of exploring its articulations and social construction, cultural theory permits a deeper analysis and broader understanding of the social role of risk. Particularly interesting is the notion of risk as a blaming mechanism to protect a specific worldview and how this leads to the othering of individuals who do not share the same value system. More recently, Kuhlemann (2019) examined why some risks are attractive and others, which are considered ‘messy’ problems, are ignored. The first kind, which she calls ‘sexy risks’ have a sudden onset and experts are easily identifiable; whereas, ‘unsexy risks’ are difficult to understand and solve, they emerge gradually and are difficult to observe (p.8). ‘Unsexy risks’ are underestimated because of the gradual buildup and because expertise is elusive (ibid.). AMR can be understood as an ‘unsexy risk’, and tackling it may require involving experts and non-experts (Nijsingh & van Bergen, 2019). ‘Unsexy risks’ can also be understood as a form of ‘slow violence’ (Nixon, 2013), which occurs gradually and remains out of sight despite having disastrous repercussions that extend over large geographical areas and over long periods of time.

Critical theory of Risk Society

The theory of risk society (Beck 1992, 1996, 2009) is a broad, constructivist account of modernity that understands risk as a side effect of successful industrialization

and modernization (2009, p.4). As Beck (1992b) and Giddens (1997) argue, the progress and control that characterized modernity have been replaced in late modernity by uncertainty and unease. The main proponent of risk society theory, Ulrich Beck (1992), contends that we are in the midst of a second stage of modernity. Whereas ‘early’ or ‘first’ modernity was characterized largely by socio-economic conflicts between labour and capital (Beck 2009, p.73) in this second stage of modernity (or ‘late modernity’) the threats to the social and political order are not produced by conflict between labour and capital, but by the consequences of industrialization, i.e. risk (Beck, 1994 pp .6-7). We are facing unprecedented risks and hazards as direct consequence of scientific and industrial development (Beck, 1992b, pp. 13, 21; 2009), including new health risks caused by pre-existing pathogens, that have (re-)emerged or become exacerbated due to human activity (Peretti-Watel et al., 2019). The risks created by modernity are almost impossible to calculate and have unimaginable consequences, making any attempts to manage their impact inadequate (Beck, 1992a; Giddens, 1997, p. 130).

In the risk society, risks are conceptualized both as objective conditions and social constructs. The material aspects of risk can be objectively measured but public perception and understanding of what is deemed threatening or hazardous is constructed by multiple social actors and thus varies depending on historical and cultural contexts (Lupton, 1999a, 2013, p. 79). However, risks only exist when there is recognition and awareness; therefore definitions of risk will always be susceptible to change, magnification, dramatization or minimization, i.e. to processes of social construction (Beck, 1992b; Beck & Levy, 2013, p. 17). Risks are defined through complex claims-making activities of social actors, and the resulting definitions are not fixed but contextual. Therefore, the existence and urgency of

risks fluctuate with different values and interests, and the ‘riskiness’ of a particular hazard is also defined in relation to other risks (Beck, 1992b, pp. 29–30).

In late modernity, our focus shifts from being mostly concerned with natural risks to being concerned with anthropogenic ones, raising issues of blame, responsibility and ethical developments of technology (Tansey & O’Riordan, 1999). Beck refers to this second phase of modernity, or the modernization of modern society, as *reflexive modernization* (Beck et al., 2003, p. 1). Modernity starts a process of radicalization and transforming itself for a second time; a transformation of its key institutions and also of the very principles of modernity (ibid.). In this context, social institutions that seemed absolute now become contingent, including the concept of the nation-state, the power of the legal system, national economies, parliamentary democracy, etc. (p.3). Reflexive modernization is producing a new kind of capitalism and labour, a new kind of global order and relationship with nature, a new kind of subjectivity, of everyday life, and of state (ibid.). The shape of this new modernity, however, is still being negotiated, as some structures and identities overlap with those of the first modernity (p.2).

Second or late modernity is characterized by globalization, which undermines the economic foundations of the first modernity, by disrupting relations between local and global, domestic, and foreign, and destabilizing national borders and the certainties of the nation-state (p.6). There is also a shift from the instrumentalist relation to nature that characterized the first modernity to one which recognizes nature not as “the outside” but as part and parcel of society (p.7). Beck argues that the global ecological crisis has facilitated this shift; I argue that so does the global exacerbation of AMR. In the second modernity, there is a process of “self-confrontation with the consequences of risk society which cannot

(adequately) be addressed and overcome in the system of industrial society” (Beck, 1996, p. 28). Thus, the institutionalized answers of the first modern society to the problems it produced (e.g., more science, more technology, more economic growth) are not persuasive or adequate anymore as the main institutions of late modernity – government, industry, medicine and science have become the main generators of risk (Lupton, 1999b). However, Beck contends that it is not clear what should take their place either (Beck et al., 2003, p.7).

Modern risks are pervasive and not limited by time (they will affect future generations) or space (they cross borders); managing risk today requires international cooperation. Furthermore, scientific progress is not necessarily achieved by reducing risks but by making them more evident. Security is displacing freedom and equality as the most important values, resulting in the tightening of laws; citizens are both suspicious and suspect, and therefore subjected to surveillance ‘for their own safety’ (Beck, 2009). Given their global nature and the fact they are caused by different processes and actors, no one organization, institution, government or group can be held accountable for the hazards of the risk society, and compensation becomes impossible as their effects are incalculable (Beck, 1992b, pp. 20–25, 75). For example, global environmental degradation and accelerated spread of zoonoses are risks that emerged as a direct consequence of the success of industrialization (Beck, 1992b, p. 21; Shah, 2016).

Despite the unlimited and unpredictable nature of risks, nation-states continue their efforts to control hazards by imposing tighter, high-level security norms and controls, while novel threats are spreading and slipping through all the laws, technology and political arrangements meant to contain them, thereby endangering political authority (Beck, 2009, p. 28). Additionally, national and international governments and supranational agencies

(e.g. UN, WHO, CDC, etc.) are expected to react and take action in the face of unpredictable and uncontrollable risk, a contradiction that remains hidden by old patterns of rationality and control (Beck, 2009).

Reflexive modernization has led to the demystification of science and the demonopolization of scientific knowledge claims (Beck, 1992b), which not only multiply but also contradict one another and frequently lose their validity, leading to what Beck calls “reflexive scientization” (Beck, 1992, p.166). Scientific ‘truths’ are constantly questioned and redefined. For example, faced with the evolution of antibiotic-resistant bacteria as a consequence of antibiotic over-use, government authorities, the scientific/medical community, and the public broadly have engaged in a process of reassessing the benefits and risks of antibiotics, current prescription practices and patient expectations. Furthermore, various social actors are implicated in defining the nature of the risk and deciding how to manage it. Despite this, modern risks cannot be perceived by the senses, so dependency on expert knowledge increases (Beck, 1994, p. 30), and scientists and experts maintain their definitional power (Beck, 2009, pp. 29-36). Lay citizens are subjected to expert definitions and decisions over which definition is best. Beck thus points to the existence of a hierarchy of knowledge in which expert knowledge is considered superior and “members of the highest group have the right to define the way things really are” (Beck, 1992b, p. 241; see also Becker, 1967).

Risk scholars have argued that lay perceptions of risk, however, seldom correspond to those of experts (Sandman, 1987); instead people understand risks, including health risks and causes of disease, through complex processes that are deeply influenced by personal and social factors (Nettleton, 2013, p. 37). This perceived misalignment between expert

and lay risk assessments is also expressed in media coverage as the scale of the risk and the degree of media concern about them often do not coincide (ibid., p.51) and lower risks – *sexy risks*– receive much more attention and debate (e.g. the side-effects of vaccines, the risk of Ebola in North America, health impacts of consuming genetically modified foods) than higher or more prevalent risks (e.g. AMR, road accidents). I content that this expert/lay divide and the perceived gap of knowledge can be reconceptualized in a more productive manner by understanding knowledge and perceptions of risk as fluid, in constant negotiation between expert discourses and cultural ways of knowing and personal experience.

New fears, anxieties, behavioural norms, and conflicts emerge when humanity is confronted with global risks. Perceptions of risk stigmatize, so that groups or persons labelled as ‘risky’ become marginalized and excluded. Risk also deepens class differences: “poverty attracts an unfortunate abundance of risks. By contrast, the wealthy (in income, power or education) can purchase safety and freedom from risk” (Beck, 1992b, p. 35). In that sense, global modern risks also act as cause and medium of social transformation (Beck, 2009). Risks are not equally distributed as some people are more directly and negatively affected than others (Beck, 1992b, p. 35, 1994, p. 29); therefore, there is enormous power in controlling risk definitions as they influence policy decisions that may determine the extent and type of hazard, the elements of the threat, measures to be taken, attributions of responsibility, the identification of groups that are affected, and the claims and compensation that may be owing to them (Beck 1992, p. 54, 227).

Risk Communication in the Risk Society

Throughout Beck’s writings mass media are described as key sites of reflexive modernization. First, media discourses and representations contribute greatly to the construction of risk (Beck & Levy, 2013, p. 15); second, expert knowledge about risk is not only expressed but can also be challenged in media discourses; third, these narratives can encourage processes of social challenge by validating particular definitions and ways of knowing, while discrediting others (Cottle, 1998, p. 5). In this context risk communication emerges as a ‘technology’ for restoring trust in traditional institutions, and as having a crucial role in the struggle over definitions of risk and their urgency (Beck, 2009, pp. 46, 194).

Risk communication is also involved in what Beck defines as *staging* (2009, pp. 140-144), i.e. the deliberate production of the real probability of a risk by creating the belief that a given threat is possible and can happen anytime and anywhere. An example of this is the impact of media coverage of outbreaks of infectious diseases on public perception of the risk, so that outbreaks in one region of the world are covered in news media and discussed in social media as imminent threats to other regions without evidence of it⁸. Media constructions of catastrophe usually relate the event to a planetary sense or pain, the possibility of being directly affected, and the vulnerability of the foundations of the civilized world (Beck, 2009). These ‘cosmopolitan events’ (pp. 55-56) are highly mediatized, symbolic, material and communicative experiences that transcend social boundaries and can potentially overturn the global order.

⁸ For example, Kilgo and colleagues (2019) examined the role of news media and social media in spreading panic during the 2014 Ebola outbreak in Africa. They analyzed English language newspaper coverage of the outbreak and content on the social news platform Reddit. They found that both produced panic-inducing news stories outside of Africa, but Reddit did so to a greater degree than the newspapers.

Media can put a spotlight on the latest technologically induced hazards (Cottle, 1998, p. 8). For example, media coverage in the UK of genetically modified food was found to have amplified the perception of risk associated to the consumption of GMOs (Frewer et al., 2002). Similarly, the coverage of a now discredited study that linked the MMR vaccine to cases of autism fuelled controversy around vaccination, affecting public perception of risk (Dixon & Clarke, 2013). Media, however, do not act in isolation nor go unchallenged in this process; public relations officials and experts engage in information management and risk communication strategies to refute scientific knowledge and compensation claims (Cottle, 1998, p. 9). Thus, media are not only a site of risk definition but also the site of contestation among experts, scientists and other social actors who do not share the same definition of the risk, what caused it, or how to manage it.

Beck refers to “mass media” and “news media” in most of his writings (even the latter ones when social media were already ubiquitous, for example (Beck & Levy, 2013), and explains that they have definitional power through their “agenda-setting function and the fact that certain issues are largely ignored” (Beck & Levy, 2013, p. 17). The media landscape, however, is complex and referring to “mass media” and “news media” does not capture its diversity. Beck’s simplification ignores digital media—including online news media, social media, and user generated content—and their specific characteristics—such as audience fragmentation and political echo-chambers. Despite traditional news media losing some of their definitional influence in the last decade due to the increasingly fragmented nature of the contemporary media environment, news organizations started publishing content across media platforms since the 1990s (Westlund, 2013), including websites, mobile applications, and social media (pp. 8-9). Although some news

organizations produce specific content for online and mobile platforms, most repurpose news from their legacy platforms (print, radio, television) and publish them online and in mobile applications (p. 15), thus reproducing the same definitions and narratives online, which are later shared and distributed amongst other social media users, including journalists who promote their own news stories in their Twitter accounts (Russell et al., 2015). Regarding health and risk messages, health institutions, authorities, news organizations, and the public all share health information on websites, blogs and social media (see for example Kata, 2010, 2012; Moorhead et al., 2013). In fact, social media can be useful tools for risk communication allowing public health offices, governments, and journalists to disseminate personalized messages immediately thus making outreach more effective (Moorhead et al., 2013).

The theory of risk society refers to the destabilization of scientific knowledge, yet Beck argues that risk makes us more dependent on experts. In this context, media are conceptualized as sites where expert definitions and discourses compete, as stages for scientific knowledge to be disseminated. Therefore, expert, and scientific ways of knowing maintain their definitional power while media consumers are understood as dependent on these expert definitions and not having their own experiences and cultural understandings of risk. Media messages, however, are not consumed in a vacuum and neither are media consumers empty receptacles (Gauntlett, 1998); media consumers interpret and negotiate media messages according to their cultural context, values, beliefs and personal experience. Similarly, media messages are not representations or translations of expert knowledge, instead I argue that they are implicated in risk definition processes, and they are negotiated with expert knowledge and cultural understandings of risk.

Despite its limitations, the theory of risk society provides a good analytical framework for understanding how risks come to be known and understood, particularly risks that can be considered forms of slow violence. Although Beck’s primary focus has been on environmental degradation as a result of modernization (Cottle, 1998, p. 6), industrial development has caused a wide array of interrelated risks, including risks to population health. Specifically, environmental degradation can lead to loss of biodiversity, which in turn can promote zoonoses (Kilpatrick & Randolph, 2012; Mills et al., 2010; Ostfeld & Holt, 2004). Thus risk society theory can also be relevant for public health risks (see for example Beck & Levy, 2013), including but not limited to the rise of antibiotic-resistant infections.

Risk and governmentality

Some scholars have studied risk from a Foucauldian perspective, focusing on the ways in which experts construct and mediate discourses of risk in neo-liberal, late modern societies (Lupton, 1999). This heavily constructivist approach moves beyond the culturalist perspective to argue that hazards themselves are socially constructed, and then invoked discursively to support risk assessments and risky behaviour (Foucault, 1991; Fox, 1999). Thus risk is a phenomenon that is *brought into being* by discourses, institutions and practices around it (McComas, 2006); things become hazardous as a result of our evaluation of risk, i.e. the likelihood of an adverse result from an incident, which can be based on personal experience of danger or on a particular discourse of risk assessment (Fox, 1999).

The Foucauldian concept of governmentality supposes an extension of state power operating over individuals ‘at a distance’ (Rose & Miller, 2010), through interactions

among state and extra-state agents, such as experts, journalists, and social movements, which play a crucial role in the volatility of moral politics (Hunt, 1999). Governmentality is a form of power that demands from individuals both the ability to self-govern and the monitoring of others. Governmentality scholars consider risk a “dispositive for governing social problems”⁹ (Aradau & Van Munster, 2007, p. 91), a product of liberal government, which emphasizes the maintenance of order through self-discipline, rather than coercive action (Lupton, 1999; McComas, 2006). Therefore, risk leads to a permanent state of population surveillance and systematic pre-detection that seeks to anticipate and prevent undesirable events by extracting ‘risk factors’ and correlating them (Castel, 1991). In that sense, risk is a mechanism of disciplinary power to monitor and manage populations (Aradau & Van Munster, 2007).

CO-PRODUCTION AND CIRCULATION OF SCIENTIFIC AND MEDICAL KNOWLEDGE

The production of scientific and medical knowledge has been studied from various theoretical approaches. The objectivist view, in which Western medicine is premised, maintains that scientific knowledge is an objective representations of reality discovered through observations of the natural world (Marcum, 2008, p. 185). According to this perspective, scientists first generate knowledge about the physical world through research, and then communicate it to media and specialized audiences, through articles published in peer-reviewed journals and media outreach (issued by publishers, universities or scientists themselves) (McInerney et al., 2004, pp. 48–49). These other actors and institutions then “translate” scientific knowledge for non-expert audiences, who then generate relevant

⁹ A *dispositif* was defined by Foucault as a broad range of heterogeneous elements –including discourses, institutions, laws, regulatory decisions, administrative measures, scientific statements, philosophical and moral propositions- that can be understood as rationalities and technologies of government (Aradau & Van Munster, 2007, p. 97).

policies and practices (e.g., health policies to prevent and control resistant infections). Part of this unilateral transmission of knowledge from experts to lay audiences includes the creation of a particular language to refer to, discuss and regulate the scientific discovery, risk, or technological development (McInerney et al., 2004). For example, resistant bacteria were first referred to as “superbugs” in the scientific literature, influencing the way that AMR would be broadly understood and talked about (Perencevich & Treise, 2010, p. 49). Scientific knowledge, however, is not an absolute category but is rather premised on best available knowledge, and it continuously revises its premises in light of new evidence (Hansson, 2017; Michaels, 2008). In that sense, scientific knowledge is contingent and can generate controversy among researchers. For example, while most scientists agree that AMR is a serious health risk, a controversy remains regarding whether antimicrobial resistance affecting humans is caused by antimicrobial use in humans and animals, or whether use in animals is not related (Phillips, 2003).

Despite the claims of objectivity that scientists usually express about scientific knowledge, scholars in philosophy of science and in science and technology studies (STS) have examined the production of scientific knowledge as deeply influenced by and constitutive of meaning-making processes, structures of power and values, therefore understanding scientific knowledge as embedded in socio-political contexts and as a political agent (see for example Hacking, 2001; Jasanoff et al., 1998; Jasanoff & Kim, 2009; Latour, 1993; Latour & Woolgar, 1986; Shapin & Schaffer, 2011). STS scholars understand scientific knowledge as constituted by social practices and initial studies referred to it as “socially constructed.” Traditional constructivist approaches in STS scholarship consider the social construction of scientific knowledge as the process by

which scientists make sense of their observations (Latour & Woolgar, 1986, p. 32). Scientific knowledge is first produced in the experimental process (Latour & Woolgar, 1986), but it only becomes intelligible to others when it is communicated (e.g. through lab notes, poster presentations, conference presentations, peer-reviewed publications, etc.). Therefore, the construction of scientific knowledge begins not only with the physical phenomena studied and the data gathered, but with routines and practices in the laboratory which impact how scientists interpret data and communicate their results, i.e., by the language and other discursive technologies they use.

Jasanoff and others argue, however, that social construction inevitably suggests that social reality is ontologically prior to natural reality or that social factors alone determine the natural world, or even that the social and natural worlds are not equally implicated in the production of knowledge (Hacking, 2001; Jasanoff, 2010, pp. 19–20). Instead, they propose to use the language of co-production to avoid social and technoscientific determinism in research. STS scholars have sought to challenge the assumption of science as a separate and autonomous realm with no connections to social life, and by doing so they critically examine how science is implicated in reproducing power structures, in validating certain ways of knowledge over others, as well as how social and institutional structures, discourses and practices affect the production of scientific knowledge. The concept of co-production has been used in STS studies to address and make sense of the profoundly disorganized and uneven processes through which the production of science and technology become intertwined with social structures and practices (Jasanoff, 2010, p. 2). In other words, knowledge, and objects both constitute our way of life and are products of it. Jasanoff (2010) points out that scientific knowledge does not simply mirror reality but

“embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions – in short, in all the building blocks of what we term the *social*” (p. 3, emphasis in the original).

According to STS scholars the co-production of knowledge takes place through four processes. First, the making of identities, e.g. experts, non-experts, vulnerable groups, etc. Second, the making of institutions, e.g. as stable repositories of knowledge and power, or as sites of reaffirmation of cultural beliefs and practices. Third, the making of discourses, such as providing the language for new phenomena, linking knowledge to practice, standardizing and persuading. And fourth, the making of representations, i.e. how scientific knowledge is represented in social terms to be understood by various communities, as well as socio-cultural influences on representations of scientific knowledge (Jasanoff, 2010, pp. 6, 39–41). Furthermore, this process has two sides, epistemological and material. The first one refers to how we know the social and natural world around us, how society is organized and how ideas are expressed. The material aspect is concerned with objects that are involved in the organization of the social and natural world (ibid.). Some studies about the material aspects of scientific knowledge include Latour and Woolgar’s (1986) classic laboratory ethnography in which objects play a key role in the production of scientific knowledge; Daston’s (2000) examination of scientific objects as social objects, product of epistemological, esthetic and instrumental expressions; and Mol’s (2002) ethnographic study of the ontological function of medical practice and disease.

Scholars in sociology of health and illness also adopt a social constructionist approach to the production of knowledge and emphasize the relative nature of medical

knowledge, as inseparable of social and cultural processes and settings in which they are known and experienced (Lupton, 2012, p. 166; Nicolson & McLaughlin, 1988), including modes of organization, practices, technologies, race and gender, division of labour, and power relations (Findlay, 1993; Nettleton, 2013). Therefore, what counts as legitimate medical knowledge and practice is a product of social processes instead of being produced by natural objects and organisms.

The sociology of health and illness also argues that socio-cultural factors influence people’s perceptions and experiences of health and illness, which cannot be presumed to be simply reactions to physical bodily changes (Nettleton, 2013, p. 5). This does not mean that people do not suffer from various diseases, which cause pain, social and psychological distress; instead, sociologists argue that all knowledge –including medical and scientific knowledge– is socially contingent (ibid., p. 13). Sociologists of health and illness have also problematized the doctor (expert)/patient (layperson) divide in the production of medical knowledge and criticized it as too simplistic; instead these scholars have conceptualized patients as playing an influential role in medical debate (Arksey, 1994; McLaughlin, 2005). I argue that patient experience is a key player in the production of scientific knowledge, through their lived and embodied experience of disease.

This social constructivist approach to knowledge has been criticized for being relativist, i.e. if all knowledge is contingent, then all knowledge –including the constructionist approach– is relative and lacks validity. Arguing, however, that all knowledge is socially contingent does not mean that knowledge becomes worthless. Nettleton argues instead that constructionist sociologists seek to establish an alternative understanding of how knowledge is produced (Nettleton, 2013, pp. 28–29). As an artefact

of social processes, medical knowledge can create categories of people and reinforce power structures that perpetuate inequality. In that sense, Lupton (2012) argues that researchers should examine the ways in which “disease categories and treatment practices are developed and institutionalized to the exclusion of others” to “provide space for the resistance to dominant forms of knowledge” (p. 166-167). Furthermore, public health discourse constructs the body as dangerous, problematic, and threatening to society (Armstrong, 1993; Petersen & Lupton, 2000) and it is fixed on controlling bodies, but it has broadened its scope from containing infectious disease to also exhorting people to be responsible for maintaining personal bodily health (Lupton, 2012, p. 33).

STS scholars, sociologists of health and illness, and health anthropologists have focused their research on various medical practices, technologies, clinical trials, patient experience, etc. Media messages, particularly science and health journalism, however, have seldom been considered as part of process of knowledge production. Therefore, media coverage of health and science events has been used by STS scholars as evidence that their object of study is current or relevant, but not as objects of analytical reflection (Briggs & Hallin, 2016, p. 5). From this perspective, “communication is assumed to start with pre-existing medical objects (such as disease categories) and subjects (such as clinicians, researchers, and patients) and create words and images to portray them” (Briggs & Hallin, 2016, p. 4). This definition of science and health communication positions it in a subordinate role vis-à-vis medicine and public health (pp. 4-5). Lupton (2012), however, argues that media messages should be studied as constitutive of medical knowledge, given that “the mass media portray aspects of medicine, health care, disease, illness and health risks in certain ways” that impact public understanding of them as “many people first learn

about new medical technologies and therapies, or the latest research into the link between lifestyle factors and health status, via the mass media” (p. 15).

News coverage of science and health has been traditionally conceptualized as reproducing scientific information generated by experts, and as conveying instructions to lay audiences who lack appropriate science literacy (Briggs & Hallin, 2016, p. 4), conforming to the deficit model of science communication (Bucchi, 2008, pp. 57–59). Constructionist scholars, however, have argued that scientific knowledge is produced through the discursive activities of multiple social actors, including scientists, policymakers, media, etc. According to Briggs and Hallin (2016), scientific knowledge does not just inform media messages by flowing from the laboratory to the public but is actually influenced by health and risk messages, media coverage, policy-making processes, institutional practices and individual experience. Various studies have shown that although media coverage of scientific topics is influenced by the scientific literature, it does not merely reproduce research findings but locates them in a context that makes the story more resonant with audiences (McInerney et al., 2004, p. 69; Perencevich & Treise, 2010). Briggs and Hallin (2016) go further by arguing that media are actually implicated, with various other social actors, in the co-production of medical knowledge. They call this process “*biomediatization*”, i.e. the co-production of medical knowledge by various actors (e.g., journalists, patients, PR consultants, etc.) “through complex entanglements between epistemologies, technologies, biologies, and political economies” (p. 48).

Analyzing this co-production of medical knowledge requires going beyond linear understandings of information transmission and “translation” of scientific knowledge for the public, to recognizing that “the practices of health journalists, public health officials,

clinicians, researchers, patients, and others are imbricated” (Briggs & Hallin, 2016, p. 207). Expert knowledge and how it is communicated is also shaped by the routines and practices of other social actors and the way in which they understand scientific knowledge. For example, Briggs and Hallin (2016, p. 57) explain how the way in which health officials communicate risk messages is very much determined by journalists’ routines and practices, which impact decisions regarding when to call press conferences or send press releases, when to expect journalists to call for information, how to frame the message, and what information to give and when.

In this dissertation I draw on Briggs and Hallin’s (2016) concept of biomediatization as both a theoretical framework and methodological resource to analyze the social co-production of antimicrobial resistance as a public health risk and its implications for risk communication. Mobilizing the concept of biomediatization allows me to examine the co-production of AMR not as a linear process, a flow of scientific knowledge from the lab to the public, but as a combination of material conditions (the bacteria, the actual infections, the tools of infection prevention) and various discourses and practices that circulate among and through social actors and sites, modifying understandings of AMR, its communication and management. Additionally, Briggs and Hallin (2016) refer to *biocommunicable cartographies*, which they employ as conceptual and analytical tools in their analysis of news stories. These maps are defined as the projection in any particular news story of a “specific process of knowledge production, circulation and reception” which identify networks of actors with specific roles in producing, circulating, and receiving knowledge (p. 24). The authors explain that these cartographies are cultural models woven into media stories, clinical interactions, health

education campaigns and beyond (ibid.). In this dissertation I draw on the concept of biocommunicable cartography to chart a map of some of the many actors, discourses and practices implicated in the co-production of the risk of AMR, to examine these various ways of meaning-making and knowing and their interaction.

LITERATURE REVIEW

Risk communication

Risk communication is broadly defined as the flow of risk information among academics, experts, regulators, interest groups and the public, related to the characterization, assessment and management of risk (Leiss, 1996, p. 86; McComas, 2006, p. 76). Expert risk assessments and public risk perceptions do not always coincide—in many cases, in fact, they are at odds. As Sandman (1987) argued, “the risks that kill you are not necessarily the risks that anger and frighten you” (p. 21). Yet, risk perceptions influence attitudes and behaviour in profound ways, making it crucial to develop effective strategies that take into account public concerns and values (Frewer, 2004, pp. 395-396). This process, however, can become controversial as different interests and competing worldviews influence the construction and flow of risk messages (Leiss, 1996, p. 90). I argue here that a reconceptualization of this “gap” between expert and lay risk perception is necessary, as risk perceptions—both expert and non-expert assessments—are not absolute but constantly negotiated within and across expert discourses, personal experience, and cultural understandings. In the rest of this section I review the main models of risk communication.

There are three main models of risk communication: (1) the deficit model, a one-way flow of information from experts to lay audiences; (2) the inclusive model, which

incorporates public concerns, values, and social context in the development of communication strategies; and (3) the participatory model, which seeks active cooperation with the public in creating a communication strategy (Abraham, 2009; Leiss, 1996, pp. 90–91). Risk communication campaigns, however, do not necessarily follow just one model but usually mix components of the deficit, inclusive and participatory models. Despite the complexity of certain risks, current health risk communication practices continue to be predominantly informed by the psychometric paradigm (Abraham, 2009, p. 604). In the rest of this section I will review the evolution of these risk communication models.

Risk communication emerged in the late 1970s as an attempt by risk managers in government and industry to bridge the gap between expert and lay perceptions of risk (Frewer, 2004, p. 392; Leiss, 1996, pp. 88–89; Sandman, 1987, pp. 21–22) by reframing risk messages to make ‘serious hazards’ more outrageous, and ‘smaller hazards’ less outrageous (Sandman, 1987, p. 22). Informed by the psychometric paradigm¹⁰, the deficit model of risk communication assumes that the public has a deficient understanding of science and technology that needs to be corrected with more technical information and, therefore, focuses on the accurate expression of risk estimates and changing public views and perception of risk (Frewer, 2004, p. 392). Public perceptions of risk are considered to be ‘false’ or ‘irrational’, while expert analyses are regarded as ‘objective truth’ (Frewer, 2004, p. 392; Leiss, 1996, p. 88).

¹⁰ According to the psychometric paradigm risks are objective conditions, measurable through empirical analysis, and individual responses to risk can be assessed in order to develop predictive models. Risk communication is considered a mechanism to reduce a perceived ‘knowledge deficit’ in lay people; thus ignoring the contingent nature of scientific evidence and the multiple ‘expert’ definitions that it can generate (Fischhoff et al., 2000; Lupton, 2013; Slovic, 1987; Slovic et al., 1979, 2004).

The deficit model led to the decline of public trust in the institutions responsible for producing and managing risk. This model reinforced by the perception that risk managers were ignoring the values and concerns of the public. Informed by the social amplification of risk framework¹¹ (SARF), an inclusive model of risk communication was developed in the 1980s and 1990s that sought to build public trust in risk managers (Frewer, 2004, p. 392; Leiss, 1996, pp. 89–90). This inclusive model emphasises source credibility, message clarity, effective use of communication channels, and focused on the public’s needs and perceptions. The key difference with the deficit model is that risk messages are understood here as acts of persuasive communication, taking into account the characteristics of the public and the validity of their risk perceptions (Leiss, 1996, p. 90).

In the mid-1990s risk communication moved away from instrumental techniques of persuasion to focus more on the social relations between different actors involved in risk management (Frewer, 2004, p. 392; Leiss, 1996, pp. 90–91; Löfstedt, 2004, pp. 5–6). As a result, participatory models of risk communication were developed to promote building of trust in institutional actors through consistent commitments by those institutions to engage citizens, listen to their concerns, and incorporate their views as part of their ongoing practices and routines, and not just in response to episodic crises (Leiss, 1996, p. 90). The operating assumption is that increased public trust in the institutions that produce and manage risk increases acceptance of expert assessments of risk (Frewer, 2004, pp. 393–394). Instead of a one-way transmission of expert knowledge, the participatory model

¹¹ SARF focuses on issues of public trust in risk management and stigma, and how risk communication can be used to amplify or attenuate risk messages. The framework’s focus on risk communication is mostly limited to ensuring the ‘correct’ transmission of information (as intended by the actor generating the message) and, thus, dismisses social factors as ‘distortions’ that distract people from rational decision-making about the risks they face (Frewer, 2004; Kasperson et al., 2003; Kasperson et al., 1988; Renn et al., 1992).

involves key stakeholders in decision-making processes and makes a continued effort to communicate uncertainties to increase public confidence in regulatory processes relating to risk management (Frewer, 2004, pp. 393-394; Löfstedt, 2004, pp. 3-4).

This open and arguably more transparent model of risk communication addresses public concerns –such as distribution of risk and allocation of resources- as much as the messages the source wants to communicate (Frewer, 2004, pp. 394-396). Regulators take into account social and environmental values and use the precautionary principle more frequently (Löfstedt, 2004, pp. 10-11), while scientists are given a less prominent role in risk management, as their findings are constantly challenged by the media, stakeholders, and public (*ibid.*). This approach to risk communication was developed after episodes in which scientists dismissed local, non-expert knowledge and made largely uninformed decisions that negatively affected the public. For example, Wynne (1996) examined the interactions of Cumbrian sheep farmers and experts when the latter established temporary restrictions on where sheep could graze due to radioactive contamination. The farmers accepted the restrictions at first, but then the measure was extended once expert predictions failed, thus gravely affecting the farmers. In this study, Wynne showed that local, indigenous knowledge can be highly complex and developed, but Western understandings of what is valid scientific knowledge leads to the dismissal of lay knowledge, thus increasing the negative impact of expert decisions (p. 73-78).

In all three models of risk communication (and despite the influence of constructivist approaches to risk) there is an underlying assumption that the risk itself is an objective, measurable reality and that the ways in which the risk is represented, communicated and managed are socially constructed. My dissertation will argue, however,

that risks are themselves social constructions with both material and discursive components. From what is considered a risk and who is deemed at risk or risky, to the ways in which multiple social actors experience the risk and the political struggles around it, all affect the definition of the risk, which remains in constant flux. Understanding how health risks are co-produced and the role of various players in this process impact how these risks are communicated. Health promotion efforts and infection prevention and control measures could be more effective if cultural understandings of risk are more seriously considered.

Risk communication of AMR

AMR is a slow-growing risk that has only recently been recognized as a global health threat and a priority by international health organizations and various governments (World Health Organization, 2016). Most people, however, remain unaware of the increase of antibiotic resistance around the world, unless they or an acquaintance becomes directly affected by a resistant infection. Most of those who have heard of antibiotic resistant do not fully grasp what it is but rather hold various misconceptions, including the idea that it is the human body that evolved resistance instead of the bacteria, that AMR is a personal problem and not a community one, and that it is mainly a nosocomial condition caused by poor hygiene in medical institutions (McCullough et al., 2016, pp. 27–31). However, resistant infections are a common occurrence that can happen to “children in day care, athletes playing sports, teens going for piercings, people getting healthy at the gym” (McKenna, 2017, p. 24), to anyone anywhere.

Health education, including public health messages, serves to legitimize ideologies and social practices by making statements about how individuals should conduct their bodies, including what food they should eat, how frequently they should exercise, and the

sexual expression of their bodies (Petersen & Lupton, 2000). These risk communication efforts are based on the deficit model, and Lupton (2012) argues that “state-sponsored health education campaigns in the mass media are conducted to warn the public about health risks, based on the assumption that knowledge and awareness of the danger of certain activities will result in avoidance of these activities” (p. 33). With the scientific discovery of microbes in the late 18th century, external signs of cleanliness were no longer considered enough, and washing became a key aspect of risks prevention by eliminating microbes (Lupton, 2012, p. 35). “To be clean now meant to be free of bacteria, protozoa and viruses” (ibid.), a notion that still predominates in scientific and biomedical knowledge. Lupton argues that in Western societies “there is a particular obsession” with cleanliness, an ironic anxiety about germs and dirt as now we “are exposed to far less risk from deadly bacteria and viruses than in previous generations” (ibid.). Patton (1985) made a similar observation when stating that despite this relative safety “the fear of germs – codified during the Lysol and plastic-packaged 1950s– verges on a mass psychosis. Germs are bad guys: foreign, unnegotiable, dangerous” (p. 51).

National governments and international health organizations have sought to provide individuals with scientific information about the risk of AMR through public health communication campaigns. These messages reinforce the biomedical discourse of the objectivity of science, and thus negate any cultural mediation in their production. These efforts seek to generate awareness of the risk as most people around the world are unfamiliar with the language used to communicate AMR, and they do not know what antibiotic resistance or antimicrobial resistance are (Mendelson et al., 2017; World Health Organization, 2015; World Health Organization et al., 2016). In that sense, these

communicative strategies fail to acknowledge that individuals do not merely absorb information from the media, but instead filter and sort media messages through their own cultural understandings, values, and experiences. Furthermore, media framing of AMR in military terms (i.e. “attacking” the body, “fighting” against it, having a limited “arsenal” of antibiotics, etc.) negates the symbiotic relationship we have with bacteria and creates the perception that all bacteria are harmful or that antimicrobials are essential (Mendelson et al., 2017).

Efforts by public health organizations to communicate the risk of AMR are currently underway, as raising public awareness is considered a key aspect of its management (O’Neill, 2016). It is therefore an ideal moment to analyse how these messages construct the risk of antimicrobial resistance and the emergence of the “superbug” as a potential mobilizing concept. Guidelines for health risk communication are premised on the deficit model of risk communication and combine various strategies such as early disclosure, transparency, active listening to public concerns, and advanced planning, all with a view to promoting openness and fostering trust (Abraham, 2009). Additionally, communication campaigns consider potential opposition to how decisions are made regarding the allocation of resources and how the risk is being managed from those who feel affected by the distribution of risk and resources. Such considerations require an understanding of the broad political and socio-cultural contexts in which communication about risk occurs (ibid.). Furthermore, certain techniques are recommended to lower or heighten public risk perceptions to match expert assessments of risk, such as precautionary advocacy and outrage management (Sandman, 2007 cited in Abraham, 2009).

In the case of AMR, one of the major challenges to risk communication is changing public beliefs and getting people to care, as many still believe that AMR is not personally relevant or consequential (Nisbet, 2017). Additionally, people believe that science will find a solution to AMR and therefore do not consider changes in policy or health care practice to be necessary (Nisbet, 2017). Most people also remain convinced that antibiotics are harmless medications that can be prescribed to treat most diseases (Kodish, 2018, p. 746). Additionally, Mendelson et al. (2017) argue for the need to agree on simple, unambiguous terminology for AMR, as studies have found that citizens find the language of AMR too scientific and specialized making it hard to understand and difficult to engage with.

Davis et al. (2017) analysed public awareness campaigns for AMR developed by health agencies with global agenda-setting power, including the WHO, and found that these risk messages position the individual as morally responsible for the preservation of antibiotics by exhorting the public to forgo antibiotic treatments (immediate individual benefit) so that vulnerable others can have access to them (p. 3). The authors also identify several challenges to public risk communication about AMR, including the tendency to resort to the deficit model of communication that privileges expert knowledge and blames people who resist it, and difficulty building trust in risk managers (pp. 5-6); they also note that successful risk communication of AMR should address misconceptions about antibiotic-resistant infections, for example the belief that it is the body –and not bacteria– that becomes resistant to antibiotic treatments (p. 3). Another challenge is that public health risk messages outside of clinical settings may depend greatly on online communication and media technologies, thus only reaching those with access to such technologies while perpetuating social, cultural, economic, and linguistic inequalities, particularly in

developing nations (ibid.). The authors recommend going beyond a dialogical model of communication to address the complex mediation of risk messages and their unintended consequences, such as the amplification of social inequality and the loss of public trust (p. 8). However, one of the most worrisome problems with health promotion campaigns is the lack of evidence regarding their impact at the global level. While these campaigns have increased general awareness of AMR they have limited impact in developing antimicrobial stewardship and responsible antimicrobial use (Kodish, 2018, p. 750). Knowledge about antimicrobials continues to be low among populations around the world and antibiotic use remains suboptimal in most parts of the world (pp. 749-750), as antibiotics are still regarded as “miracle drugs that can be used for prevention or treatment of any ailment” (p. 750).

Media coverage of antibiotic resistance

News media and social media play an important role in shaping how we come to know and understand public health threats, by providing some definitions of the risk, labelling and stigmatizing the views and actions of individuals or groups implicated in their emergence, assigning blame for undesirable consequences, and framing ideal or preferred solutions and distribution of resources (Capurro et al., 2018; Caulfield et al., 2019; Greenberg et al., 2019; Nerlich & James, 2009; Nisbet et al., 2003). News coverage of health threats also provides the language and symbolic resources to make sense of those issues (Briggs & Hallin, 2016). Through the use of personal narratives, i.e. storytelling that describes cause-and-effect relationships between events, and specific framing news media can affect risk behaviour (Capurro et al., 2018; Shelby & Ernst, 2013) and generate public sympathy for patients and support for particular health policies (Rachul & Caulfield, 2015).

News coverage of diseases also correlates with public perception of the severity and prevalence of the illnesses (Young et al., 2008), and repeated exposure to misinformation and “fake news” can influence belief and perceptions of health threats (Jolley & Douglas, 2014).

Communicating the risk of AMR in the news can be challenging because it is not a simple story. Unlike viral infections, antibiotic resistance is not an acute health crisis but rather a slow growing one, and it refers to dozens of infections caused by a multitude of pathogens. Even though there can be outbreaks of resistant infections, for example an epidemic in 2013 that killed more than 58,000 infants in India who were born with infections resistant to most known antibiotics (Harris, 2014), or the rise of *Candida auris* infections in hospitals across the globe (Richtel, 2019; Zafar, 2019), most cases of resistant infections are isolated and do not follow an outbreak narrative (Wald, 2008). AMR does not have a “patient zero”, the infection does not spread neatly across geographical areas, and there is no redemption story with scientists and medical investigators solving the crisis (cf. Ungar, 1998). Studies on risk communication of antibiotic resistance have mostly focused on news coverage of “superbugs” with a focus on how print and broadcast media describe the causes, incidence, and measures of control and prevention. These studies have assessed media coverage from the perspectives of the information deficit and social amplification of risk models of risk communication, i.e. analysing whether enough accurate, expert information is given to the public (for example Antonovics, 2016; Bie, Tang, & Treise, 2016; Desilva, 2004; Singh et al., 2016), or how media coverage amplifies feelings of anxiety and risk (see Brown & Crawford, 2009; Nerlich & James, 2009; Washer & Joffe, 2006).

Methicillin-resistant *Staphylococcus aureus* (MRSA), the archetype of the ‘hospital superbug’, became the focus of media and political attention in Britain since the mid-1990s. Washer and Joffe (2006) found that the initial coverage of MRSA reproduced the same rhetoric as the medical literature, i.e. explaining it as an infection resistant to antibiotics. However, since 1997, media began describing it as a “killer superbug” (p. 2145). Apocalyptic predictions are now a common trope in the coverage of antibiotic resistance, including the anticipation of both natural devastation and personal tragedy (Brown & Crawford, 2009, p. 514). The feeling of doom is emphasised by focusing on the ability of bacteria to evolve, or mutate, in a short period of time, thus quickly becoming resistant to new antibiotics (Brown & Crawford, 2009, p. 513; Washer & Joffe, 2006, p. 2145).

In order to manifest an apocalyptic narrative, the coverage of AMR resorts to the reification of resistant bacteria as “superbugs” (Nerlich & James, 2009; Washer & Joffe, 2006) and depicts them as having human-like qualities, being “clever” and outsmarting the scientific community (Brown & Crawford, 2009, p. 508; Washer & Joffe, 2006, p. 2145). Additionally, the bacteria’s ability to move across space and corporeal boundaries is also recurrent in media rhetoric, highlighting its ubiquity and uncontrollability (Brown & Crawford, p. 514). These depictions of antibiotic resistance as clever, ever-present, and threatening shape and emphasize feelings of imminent danger and human vulnerability. Furthermore, media discourses reinforce the feeling of being “at war” with bacteria, i.e., a conflict between nature and medical progress (Washer & Joffe, 2006, p. 2146).

Nerlich and James (2009) argue that the ‘catastrophe frame’ is a rhetorical tool used to alert the public and policymakers about the urgency of the situation and need for action,

which can lead to securing funding for more research and policy implementation; however, it can also induce fear, promote misinformation, and generate undesired behavioural changes (pp. 583-5). Furthermore, Washer and Joffe (2006) found that the British press exacerbated the feeling of threat and invincibility of the “superbugs” and, unlike outbreak narratives that offer the promise of medical solution, like Ungar’s (1998) ‘mutation-contagion package’,¹² the coverage contradicted expert knowledge by suggesting, for example, that alternative therapies to boost the immune system could be effective against resistant infections, potentially leading to loss of trust in medicine (p. 2149).

More recently a study examined two decades of coverage of antimicrobial resistance in the German press (Boklage & Lehmkuhl, 2019) and found a similar trend, describing the overall tone of the coverage as alarmist. The authors warn that apocalyptic media messages can increase skepticism of scientific expertise. Similarly, a study examining Australian media representations of AMR found that the use of military metaphors, anthropomorphising of bacteria, and doomsday framing were common rhetorical tools across media platforms (Bouchoucha et al., 2019). Moreover, Collins et al. (2018) found that in newspaper coverage of AMR in the UK resistant organisms are anthropomorphised but antibiotics are also depicted as instilled with agency.

De Silva et al. (2004) examined the coverage of antibiotic resistance in the Canadian press and compared it to U.S. coverage. Their research was based on the psychometric paradigm and examined news stories in terms of the causes, magnitude, and

¹² Ungar’s (1998) ‘mutation-contagion package’ is a set of topics and frames that emerges in media coverage of outbreaks of communicable diseases. This package is composed by depictions of microbes as outsmarting humans, isolated microbes being disturbed by human activities, rapid spread of infections, and the idea that we are waiting for the next plague. The ‘mutation-contagion package’ is rapidly followed by a ‘containment package’, in which biomedicine and doctors’ triumph and are finally able to contain the threat.

management of resistance. They found that Canadian and U.S. media seldom mention the causes of resistance or how to reduce exposure, thus leaving the public without crucial information about this health risk and what actions they can take to limit exposure to it. Only a third of the press coverage in North American newspapers mentioned some of the causes of antibiotic resistance, including over-prescription of antibiotics by physicians, use of antibiotics in livestock and agriculture, and use of antimicrobial products. Furthermore, only 20% of the articles mentioned risk reduction measures and focused on the need to take antibiotics only to treat bacterial infections and the importance of completing the full course of the prescription. More recently, I (2020) examined coverage of AMR in four elite North American newspapers and found that this risk is communicated through inaccurate definitions and oversimplified accounts of the causes, populations at risk, and preventive measures. Additionally, the news coverage seldom expressed reflexivity about modern medical and industrial practices that exacerbate AMR.

Washer and Joffe (2006) found a similar trend in British news coverage of MRSA, which seldom explained how bacteria evolve resistance to antibiotics or the role of physician overprescribing practices. Furthermore, Chan et al., (2010) showed that the British media blamed “dirty hospitals” and the government for the rise of MRSA but did not explain the evolutionary process that leads to resistant bacteria, the human actions that accelerate that process, or preventive measures (p. 321). Similarly, a 2014 study of the Swedish press found that the most commonly reported cause of antibiotic resistance was antibiotic over-prescription, while risk-reduction measures at the societal level were more commonly reported than the individual level (Bohlin & Höst, 2014). At the societal level hospital hygiene and efforts at reducing antibiotic prescription rates were the most

frequently reported measures, while at the individual level it was fostering rational expectations for receiving antibiotics (p. 9). Another characteristic of media rhetoric about antimicrobial resistance is that the word ‘evolution’ –the mechanism through which resistance is acquired– is seldom used (Antonovics, 2016; Singh et al., 2016). These characteristics of the news coverage, which deviate from how scientists would communicate AMR, show cultural understandings also mediate journalists’ perceptions of risk, and that professional practices –for example criteria of newsworthiness– are also mediated by socio-cultural context and personal experience.

Bie et al. (2016) conducted a comparative analysis of press coverage of “superbugs” in India, the U.K. and U.S. in terms of the psychometric categories of dread, controllability, familiarity, and uncertainty. Their results show that coverage in the U.K. and U.S. is similar in communicating a higher level of dread, emphasizing the consequences of resistant infections and using emotionally loaded words, while conveying a higher level of controllability compared to coverage in the Indian press. Their study shows how different aspects of the same health risk are emphasized in different countries depending on economic power and the level of available health care (p. 68). Collins et al. (2018) found in newspaper coverage of AMR in the UK that responsibility for inappropriate use of antibiotics was multidirectional, and identified a tension between blaming doctors-as-prescribers or patients-as-users and the collectivisation of the general public as an unspecified ‘we’. Furthermore, they found that livestock farming and pharmaceutical industry were rarely reported as social actors with responsibility in the AMR crisis. Another recent study on newspaper coverage of AMR and antimicrobial stewardship in the UK found that when covering sepsis the newspapers preferred personal

narratives which can generate greater public interest, which are rarely included in articles about AMR (Rush et al., 2019). However, the articles usually did not balance messages about crucial early antibiotic treatment in sepsis with the need to reduce unnecessary prescribing. The authors suggest integrating media discourses about AMR and sepsis to improve public understandings of the importance of antimicrobial stewardship (ibid.).

News about health topics are also prevalent in social media as most journalists use these platforms to disseminate their work (Bruns, 2017). Additionally, social media are frequently used to search and share health information (De Choudhury et al., 2014). For example, most viewed videos about AMR on YouTube are professionally produced and generate audience discussions in the comments section on social and political accountability (Djerf-Pierre et al., 2019). People also take to social media to express concern about AMR and discuss this public health risk. A study showed that after health organizations publish data on AMR, discussions about antibiotics on Twitter are rapidly amplified but last only a short period of time, thus reducing their public impact (Dyar et al., 2014). Another study found that discussions of AMR on Twitter are influenced by news sources, health professionals, and governmental health organizations, with users preferring to recirculate content posted from these official sources (Andersen et al., 2019).

Most studies of news coverage of antibiotic resistance show how these narratives have emphasized expert knowledge while seeking to increase public scientific literacy, following a deficit-model approach of risk communication. By focusing only on the reproduction or “translation” of expert knowledge in media accounts of AMR, these studies assume that news media are simply conveying expert knowledge but not involved in the production of health knowledge. Additionally, these studies do not examine expert

knowledge as socially constructed and, therefore, as existing among many other definitions, perceptions, and interpretations of risk. In chapter 5, I examine how AMR is reported by Canadian newspapers in terms of how they define the risk, how expert knowledge is characterized in the news coverage and if it is ever challenged, and who is blamed for causing the risk. Through this analysis I will account for the role of news media in the co-production of the risk of AMR, and how particular definitions of AMR are constructed, negotiated, reinforced, and/or resisted. I also examine how expert knowledge is situated in media discourse of AMR, and whether blame is distributed through narratives of self-care and individual responsibility.

THE HOSPITAL AS THE EPICENTRE OF AMR

AMR has traditionally been understood as a nosocomial condition and as a result of faulty hygiene and deficient infection control protocols in healthcare settings. As such, AMR has been thought of as mainly affecting patients who have long hospital stays, those in long-term care centres, and those with compromised immune systems. However, AMR is no longer limited to hospitals but has expanded to the community, particularly affecting young, healthy people (McKenna, 2010). AMR, fulfilling its role as a modern risk, is a pervasive and invisible hazard that has made the community risky. The “dirty hospital” is the “symbolic epicentre”¹³ of AMR. There is a long association of MRSA, the resistant infection *par excellence*, and hospitals (Chan et al., 2010; Washer & Joffe, 2006). Although

¹³ Understood as the site where all the anxieties regarding the risk of AMR coalesce. The hospital is the site that evokes the greater fear of resistant infections as resistant organisms are perceived to be ubiquitous and bodies are perceived as porous and vulnerable to them, particularly diseased bodies. Furthermore, hospital workers, especially nurses who have the most contact with patients (Hoyle et al., 2017), are sources of anxiety as they are perceived as carriers of resistant pathogens.

AMR is not exclusive to hospital settings, the association between “superbugs” and the “dirty hospital” as a ‘hotspot’¹⁴ persists.

The hospital is the symbol of modern medicine, a place where medical workers and medical technology heal the sick. However, the hospital is also a place of risk, where one can get sick. Hospital-acquired infections are a common occurrence, and these can be resistant to one or various antibiotics. Therefore, the hospital is also the place where AMR materializes in the form of patients arriving with resistant infections or of patients and health care workers acquiring these infections in the hospital, for example after undergoing surgery or by caring for an infected patient. Even hospital waste can contribute to the spread of AMR (Gbaguidi-Haore et al., 2018). Therefore the hospital is also an artefact of the risk society, a site where modern technology and expertise fail and therefore generate risk, where the sense of risk is pervasive and risk reduction practices become standard (e.g. hand washing, wearing surgical masks, gowns and gloves, using disinfectant wipes, etc.).

To reduce the risk of hospital-acquired infections, hospitals have IPAC protocols and routines that ensure cleanliness of the environment and the body to stop the spread of viruses and bacteria. For example, routines of hand hygiene, putting patients in isolation and donning of personal protective equipment are mandatory for hospital workers and visitors, and (at least in theory) protocols must be rigorously followed, since it is understood that if one person breaks infection prevention protocols, then everybody is at risk of contagion. However, IPAC compliance primarily depends on the individual as

¹⁴ Defined as sites where transmission is amplified through particular characteristics of the population and/or environment within dense relational networks (H. Brown & Kelly, 2014, p. 283). Farms could also be considered hotspots for AMR as sites of human-animal interaction that facilitate the transmission of cross-species resistant infections.

prevention measures such as hand hygiene and donning of PPE are personal, individual actions (Cole, 2014) and prevention protocols are not always fully followed.

Outside of our medical understanding of pathogenicity and hygiene, notions of dirt or pollution are related to matter being out of place, altering the order of things and routine hygiene practices are a reaction to this contradiction in our classification of order (Douglas, 1966, p. 44). Ritualistic behaviour for preventing the spread of germs is considered standardized, practical, technical, rational and scientific, particularly in hospital settings (Macqueen, 1995, p. 117). Therefore, outbreaks of bacterial infections in hospitals are deemed to result from the carelessness of health care workers, and lead to the stigmatization of patients who become “a danger” to others (ibid.). In that sense, doctors and nurses are in a dual position in which they pose a risk to their patients but are also at risk of infection by the nature of their job (risky/at risk). Hospital workers are commonly blamed for the spread of AMR infections: doctors are blamed for overprescribing antibiotics and nurses are blamed for not following basic hygiene routines and therefore for transmitting or facilitating the transmission of resistant infections¹⁵.

Hygiene routines in hospitals are perceived as rational behaviour based on “germ theory” and designed to reduce the spread of infection; however, after doing ethnographic research in a hospital, Macqueen (1995) found that cultural understandings of dirt and pollution have greater influence in health workers’ behaviour to prevent hospital-acquired infections than their rational and scientific understanding of germ control. Medical theory and its application to infection control did not correspond to everyday work in a hospital, and many of the preventive measures to restrict the spread of transmission were ritualistic

¹⁵ There is research, however, showing that in hospital settings physicians are less compliant with hand hygiene practices than nurses (cf. B. Brown et al., 2008; Dioso, 2014; Randle et al., 2010)

and performative behaviour that had no impact in containing the transmission of bacteria (ibid.). Furthermore, the prevalent biomedical logic of germ control has often overlooked the cultural aspects of preventive behaviour, leading to the blaming and stigmatization of infected patients and hospital workers (Macqueen, 1995, p. 124). A more recent study found that nurses perceive themselves as sources of risk and thus extend the hygiene routines, similar to cleansing rituals, performed in the hospital to their homes to minimize their role in the spread of infection (Jackson, 2016). In fact, prevention rituals in hospitals reveal a local culture or local way of doing things (Vermeulen, 2004, p. 2071).

The risk of contagion and the need to comply with IPAC measures are communicated in hospitals to healthcare providers, patients, and visitors, who are expected to comply rigorously. Additionally, many hospitals have also adopted as part of their IPAC efforts antimicrobial stewardship¹⁶ programs, through which physicians are encouraged to consider the global risk of AMR when prescribing antimicrobials (Fishman, 2006). The concept of governmentality is useful to understand how the risk of contagion is communicated by hospital management to employees through messages that reinforce the expectation of monitoring one’s behaviour to avoid risk, and to detect signs of risky behaviour in others (Aradau & Van Munster, 2007, p. 107). From a governmentality perspective, risk leads to a permanent state of population surveillance and systematic pre-detection that seeks to anticipate and prevent undesirable events (Castel, 1991). In this context, any level of risk becomes unacceptable, and thus the main priority is to avoid risk at all costs (Dean, 2010). Governmentality scholars understand risk as emerging through

¹⁶ Good antimicrobial stewardship involves selecting an appropriate drug and optimizing its dose and duration to cure an infection while minimizing toxicity and conditions for selection of resistant bacterial strains (Fishman, 2006, p. S55).

risk messages that reproduce and normalize the imperative of self-care and the responsibility to monitor the behaviour of others (Lupton, 2013). Furthermore, risk messages reinforce the perception that surveillance is necessary for the protection of the population and the minimization of risk (Foucault, 1991; Lupton, 1999; McComas, 2006). Therefore, risk messages can be understood as a technology of governance to regulate populations. In the hospital, risk messages seek to regulate the behaviour of hospital workers and visitors, and to legitimate and normalize infection prevention measures. Some scholars have also argued that in hospitals governmentality is actually combined with disciplinary power, through the presence of auditors that monitor workers behaviour, with professional implications for those who do not comply (Martin et al., 2013).

AMR is a “modern risk” (Beck, 1992b) because, although antimicrobial resistance is a natural occurrence, its exacerbation is human-made. The rate at which this process has accelerated since the 1990s is an unintended consequence of our modern medical and industrial practices, i.e. high rates of antibiotic consumption in humans and industrial farming. Additionally, it is an uncontrollable risk that makes medical technologies useless and threatens to throw humanity into a post-antibiotic era in which any surgery could be too dangerous, common wounds potentially deadly, and cancer treatments impossible. AMR transcends borders and is exacerbated by international travel, and its damage extends over time (i.e. losing effective antibiotics will affect future generations). AMR challenges expert knowledge and practices and exposes human vulnerability.

The concept of biocommunicability allows us to examine the process through which various actors construct health and risk knowledge, how their practices and routines affect what we understand as AMR. Analysing the social co-production of AMR through

the concept of biocommunicability would permit to examine it not as a linear process, a flow of information from the lab to the public, but as a network of numerous actors, discourses and practices in constant flux, interacting and influencing each other.

What we understand as the risk of AMR is co-produced by healthcare providers, who encounter the risk of contracting resistant infections on a daily basis, who care for patients affected by them and decide treatment options knowing that each new antibiotic prescription breeds more resistance, and who negotiate this dual position of being at risk and risky to others within highly regulated medical institutions; by scientists, who record their observations in lab reports and peer-reviewed papers, and who seek to draw attention to their publications; by media organizations that decide whether or not to publish news stories about this risk, whose coverage is affected by the communicative practices of media relations officers at universities, by what journalists interpret as their role, and by institutional practices; by policymakers who decide whether to regulate or not regulate antimicrobial use, to assess or not assess the extent of the problem of AMR, to regulate or not regulate various industries. Finally, the risk of AMR is also defined by individuals who live with resistant infections, whose experience is frequently at odds with what medical experts recommend, who have endured drastic changes in their lives as a result of their illness. These are the multiple narratives and practices implicated in the social co-production of the risk of AMR that this dissertation examines.

CHAPTER 3

METHODOLOGY: ETHNOGRAPHY OF RISK

Two female residents were signing their informed consent forms when one said, “It’s weird to know you’re always being watched.” The other turned to her and said smiling, “We’re always being watched.” (Week 1, Day 2).

The theory of risk society and the cultural theory of risk are useful for understanding risk as socially constructed and context specific. These theoretical approaches, however, do not provide clear empirical applications or methods to allow for examination of the social construction of risk. Some scholars recommend the application of anthropological methods for detailed case studies to ground the theoretical discussion around cultural approaches to risk (Tansey & O’Riordan, 1999, p. 84). The concepts of biocommunicability and biomediatization (Briggs & Hallin, 2016) are useful for understanding the social construction and communication of health risks, while also charting the network of biocommunicability for any given risk. Medical risks enter the public agenda through a network of media, health professionals and other social actors who co-produce the definition and narratives about health risks (p. 5). In turn, the risks become enacted through professional and institutional practices and individual risk behaviour. Briggs and Hallin suggest charting biocommunicable cartographies (p. 24) to assess how health knowledge is produced, circulated, and received, identifying networks of actors and their roles in producing and circulating knowledge.

In this dissertation I examine various actors and narratives that co-produce what we know as the risk of antimicrobial resistance (AMR). There are several actors that can be identified in this network of biocommunicability of AMR, and in this study I focus on five

of them: (1) healthcare professionals who encounter AMR as a professional hazard; (2) journalists who report on the risk and put it in context for non-expert audiences; (3) scientists researching the very evolutionary principles of AMR; (4) global health organizations and public health offices seeking to raise awareness and promote antimicrobial stewardship; and (5) individuals who live with resistant infections that have a profound impact on their lives. I examined how some of these different actors define the risk; the various narratives of AMR that they produce, mobilize and circulate; how the risk is enacted through professional practices; and how these risk messages influence perception of risk and risk behaviour for some of these actors. Many other actors are involved in the social co-production of AMR –for example farmers and agriculture industry, unions of healthcare workers, pharmaceutical industry, etc.–, all of which play a role in the network of biocommunicability of AMR; however, in this study I focus only on the five aforementioned stakeholders due to time and accessibility constraints. Future research could expand the scope of analysis to include other important actors in the network of biocommunicability of AMR.

I adopted a feminist approach in designing the methodology of this study. Feminist methodology seeks to eliminate sexist bias in research and respect, understand, and empower women’s perspectives and lived experience. Many feminist scholars have advocated the use of qualitative methods based on standpoint epistemology as a means of reducing power imbalances and giving voice to participants (O’Shaughnessy & Krogman, 2012, p. 493). The standpoint approach in feminism states that knowledge and ignorance are inevitably bound with power and situated in particular historical and material contexts; thus, the knowledges developed and accessed by different groups tend to represent their

interests and values (Harding, 2001). Feminist epistemologies “accept women’s stories of their lives as legitimate sources of knowledge” (Campbell & Wasco, 2000, p. 778). In terms of methodology, feminist research adopts an ethics of care through the process of researching and sharing those stories (ibid.). Feminist standpoint epistemologies are frequently invoked in qualitative research as a justification for giving voice to women’s experiences, which are specific to a particular historical and material context, and placing them at the center of the research (O’Shaughnessy & Krogman, 2012, p. 498). Donna Haraway (1988) questioned the aspiration to objectivity through feminist methodology by arguing that it is not possible to capture all points of view and experiences, as these are also in constant flux, so feminist research seeks to capture local knowledges. Haraway proposed the idea of *situated knowledge*, “partial, located, critical knowledges” (p. 584), through which feminist research captures specific and situated ways of knowing and feeling that are in dialogue with other forms of knowledge. In this process it is also crucial to acknowledge the researchers’ own positionality, i.e. their assumptions, beliefs, and intersectionality (ibid.).

There are four defining features of feminist methodology which I incorporated to this study: (1) include both quantitative and qualitative techniques, (2) collecting data from groups of participants as opposed to just from individuals, (3) minimizing the hierarchical relationship between the researcher and her participants to facilitate trust and disclosure, and (4) recognizing and reflecting upon the emotionality of women’s lives (Campbell & Wasco, 2000). I conducted an *ethnography of risk* to analyse how the risk of AMR is constituted and defined socially. The dissertation zeroes in on the construction of this risk in a healthcare setting. The primary field site for the study is a pediatric hospital in Canada,

where I conducted non-participatory observation in the wards and in-depth interviews with both medical and non-medical staff. Additionally, I conducted interviews with scientists, journalists, and patients living with resistant infections; finally, I conducted a media analysis of AMR news coverage in North America and a textual analysis of policy documents and websites published by both the WHO and Government of Canada. Similar methodological approaches have been used by other researchers (see for example MacPhail, 2014; Mol, 2002; Tranter, Donoghue, & Baker, 2009; Wheatley, 2016). Below I first review the literature on hospital ethnography and then I explain each element of the approach used in this dissertation. This research was approved by the hospital’s Research Institute’s Ethics Board (clearance 18/95X) and Carleton University’s Research Ethics Board (clearance #109523 and #109020).

HOSPITAL ETHNOGRAPHY

Medical beliefs and practices are embedded in the cultural and social contexts that shape them (van der Geest & Finkler, 2004, p. 1996). Ethnography is a method through which the researcher becomes immersed in a specific cultural context to better identify behaviours, values and beliefs that might otherwise remain undetectable (Hansen & Machin, 2019, p. 62). Whereas other methods consider official communications and personal narratives (such as interviews) as absolute, ethnography treats these as among a set of possible versions of the world (Dingwall, 1980, p. 873). In that sense, many scholars have referred to ethnography as a method for making intelligible that which remains otherwise, “overlooked, camouflaged, hidden, not known, or not particularly noticed” (Pigg, 2013, p. 133), allowing the researcher to find out what people actually do rather than what they say they do (Hansen & Machin, 2019, p. 62; Vermeulen, 2004, p. 2073). The

ethnographer’s observations of the studied culture generate new understandings of it through analytic techniques to avoid selective attentiveness. Bloor warns, however, that “this pursuit of immersive understanding should not be conflated with the quest for an essentialist authenticity” (2007, pp. 182–183). Ethnography does not seek to uncover the objective truth about a culture but rather to reveal different aspects of cultural beliefs and behaviours that can be held up to analytical scrutiny. Ethnographic studies are written accounts and thick descriptions of these worlds that bring versions of these worlds to others (Emerson et al., 2007, p. 352).

Sociology of hospitals emerged as a field of study in the 1950s and 1960s, focused on Western hospitals’ relationships, culture and conventions, and emphasizing their separation from everyday life (Street & Coleman, 2012). The first hospital ethnography, “Life in the ward” was published in 1962 and examined the hospital as isolated from everyday life, as a cultural island (Long et al., 2008). This study conceptualized the hospital as an exotic Other. Many ethnographic studies in hospitals adopted a symbolic interactionist perspective. Particularly significant is the work of Strauss and colleagues on negotiated orders (Strauss, 1981, 1997; Strauss et al., 1963). These studies sought to conceptualize the ordered fluidity of hospitals and address the question of how social order is maintained when there is constant change. Strauss et al. (1963) proposed that, in highly dynamic social organizations like hospitals, social order is continually reconstituted. Many symbolic interactionist studies focused on how individuals define, interpret and incorporate institutional regulations to their daily activities, while negotiating their individual agency (Allen, 2000, p. 329; Maines & Charlton, 1985, p. 303; Strauss et al., 1963, pp. 162–163). Strauss and colleagues (1963) noted that interactions and negotiations in the hospital are

influenced by implicit and explicit hierarchies. Similarly, Freidson (1976) noted that negotiation processes are not freely conducted but can be restricted by power relations, for example among doctors, nurses and hospital administrators, as well as the material reality of the space where the negotiations occur. In their hospital ethnography, Haas and Shaffir (1991) used a symbolic interactionist approach to examine the professionalization of medical students. Their study showed that students adopt a “symbolic-ideological cloak of competence” (p. 55), including how to communicate authoritativeness through “body language, demeanor and carefully managed projections of self-image” (p. 80).

More recent hospital ethnographies argue that hospitals are permeable and hospital culture is reinterpreted differently in different cultural contexts, thus shaped by everyday society (Street & Coleman, 2012; van der Geest & Finkler, 2004, p. 1998; Zaman, 2005). In fact, Street and Coleman (2012) argue that the polarization of the “hospital as island” versus “hospital as mainland” debate overlooks the nature of the hospital as both bounded and permeable at the same time, a paradox that is crucial to the constitution of the hospital as such (p. 4, 7). Hospital ethnographies examine the permeability of the hospital by focusing on the movements of patients, workers, visitors and on the social relationships, inequalities and cultural values embedded in them (Street & Coleman, 2012, p. 7).

The goal of ethnography in a hospital setting is to participate in people’s professional lives for an extended period of time, watching, listening and asking questions with the goal to capture, describe and analyse as a “naïve” outsider the daily intricacies of hospital work, which can be imperceptible to hospital workers (Iedema et al., 2006; Tranter et al., 2009; Wind, 2008). Scholars have argued that biomedicine, and the hospital as its main institution, are sites where the “core values and beliefs of a culture come into view”

(van der Geest & Finkler, 2004) and this culture is what hospital ethnographies reveal. As a method, ethnography allows one to collect and analyse data that captures the complexity of the hospital as a site of multifaceted relations, portraying the richness of the hospital (Long et al., 2008, p. 72). Stacy Leigh Pigg explains that “ethnography is to listen and to be in situ, a practice that opens up a space for the questioning of received certainties through a responsiveness to multiple viewpoints and contested perspectives. We call this reflexivity” (2013, p. 127).

Studies on spatial relationships in STS emphasize the importance of the materiality of space, not just as a background but as constitutive of social and cultural action (e.g. Latour & Woolgar, 1986). Thus, the materiality of the hospital is part of the production of social interactions and biomedical knowledge. Street and Coleman (2012) contend that “the fragile balance of the hospitals as a simultaneously bounded and permeable space is maintained through alignments between multiple and often incongruous practices of ordering, which might be medical, bureaucratic, religious, economic, or kinship-based” (p. 10). The researchers note that ethnographers should attend not only to the material and technological aspects of the hospital space but also to the “experiential, emotive, and imagined qualities of space” (ibid.).

NON-PARTICIPATORY OBSERVATION

Participant observation has been a key characteristic of ethnography, i.e. living in a community for a substantial period of time, participating in the daily lives of people in order to investigate, experience and represent the social life and social processes that occur in that setting (Emerson et al., 2007, p. 352; Wind, 2008, p. 79). Participant observation places the researcher both as insider –through participation- and outsider –an observer,

maintaining sufficient analytical and intellectual distance to interpret what she is witnessing (Wind, 2008, p. 79-80). The ethnographer’s degree of participation will vary depending on where the fieldwork is being conducted, the specific activities taking place, and the characteristics of the observer. Participation can range from none to complete participation (Wind, 2008). In order to maintain analytical distance ethnographers must take on the role of “enquiring stranger” (Roberts, 2009, p. 294), thus disentangling their agency from the situation they’re observing; as well, they are to engage in practices of reflexivity by developing self-awareness of their own biases and how they can affect data collection and analysis (Kingdon, 2005) as well as reflecting on the impact of the researcher on the scene.

In the past couple of decades, however, there has been a more critical assessment of participant observation in ethnographic studies of hospitals. In hospital settings there are typically three roles available to the researcher: patient, health worker, or visitor (van der Geest & Finkler, 2004; Vermeulen, 2004; Wind, 2008). This has led some scholars to consider participant observation in hospitals an oxymoron (van der Geest & Finkler, 2004; Wind, 2008) given that most qualitative researchers cannot do medical or nursing work. Therefore, in most cases none of these roles is adequate for the ethnographer, and so the researcher would openly assume the role of researcher (Wind, 2008, p. 83). There are some exceptions to this situation, for example the various hospital ethnographies conducted by nurse researchers (see for example Shah, Castro-Sánchez, Charani, Drumright, & Holmes, 2015; Tranter et al., 2009).

Vermeulen (2004) argues that in a hospital setting the ethnographer should not identify with any of the three roles but she should be perceived as a neutral, impartial

onlooker, in order to move across groups without being associated with one group by others (p. 2072). He explains this mode of non-participant observation as follows:

The researcher who is neither the parent of a child on the ward nor a staff member, does take part in the social life of the ward, but he does not participate in the ‘work’, the medical procedures and the decision-making while these are precisely the activities around which the social life of the ward is centred. Observation does not go hand in hand with participation in the work that is done on these wards (...) During the fieldwork I wore street clothes, not a staff uniform of any kind (...) I attended meetings such as those held at changes of shift, treatment consultations and, very importantly, conversations between staff members and parents (2004, pp. 2072-2073).

Identifying as a researcher and engaging in non-participant observation in a hospital ward carries inevitable consequences. Ethnographers usually find that their sitting and observing is in awkward contrast with the problem-solving and urgent nature of medical work (Pigg, 2013). Wind (2008) describes her own experience doing hospital ethnography and how hospital workers can perceive the researcher’s routines as unnatural or unusual, even trivial:

Hanging around, asking weird and sometimes even dumb questions, drinking coffee, taking notes, chatting. These activities do not look like work and they definitely do not look like academic research. In a hospital setting these activities are seen at best as trivial, and at worst as time wasting or even interfering with the real work of health workers (p.83).

Pigg, however, rejects the idea of observation as unproductive “just sitting around” and argues for a revalidation of sitting and observing as the keystone of ethnography: “being with people, being in a particular somewhere with a particular set of people, being with different sets of people, in various places” (Pigg, 2013, p. 127). There are benefits and challenges of both participant and non-participant observation in clinical settings. Taniya Roberts (2009) explains that participant observation in clinical settings has the benefit of being immersed in the situation which gives the researcher greater understanding of the

observed behaviours, greater awareness of morale, and credibility among participants. The drawbacks of participant observation, however, include challenges faced by the researcher when trying to write fieldnotes in a clinical setting that is almost always busy. In such cases the researcher can attempt to remember her observations and record them later, and thus risks losing the details that give richness to the data. Additionally, with participant observation the researcher can be perceived by participants as a threat or a spy, thus affecting the nature of the observations (p. 292-293). On the other hand, Roberts argues that with non-participant observation the researcher can follow an observation plan and record fieldnotes more easily. However, she also points to some challenges with non-participant observation, such as being too inconspicuous and thus altering participants’ behaviour and avoiding biases in the collection and interpretation of the data (p. 293).

Another challenge when doing non-participant observation is that it can be argued that it is impossible to fully comprehend the experience of others. Wind (2008), however, contends that ethnographic research in hospitals can only attempt to share relevant experiences and remain reflexive (p. 86). In that sense, Tranter et al. (2009) argue that it is important to gain the trust of nurses and other workers while remaining reflexive and ask questions constantly to participants regarding the meanings they assigned to the same observed encounters (p. 34). Additionally, the ethnographer does not work in a vacuum and hospital workers themselves are observing the researcher and trying to make sense of her and engage with her (Wind, 2008). In response to this challenge, and contrary to the idea of non-participatory observation, Wind proposes the concept of negotiated interactive observation (NIO): a negotiated interaction between ethnographer and hospital workers, and doing *fieldwork* as opposed to just being in the field, i.e. “fieldwork is more about

intent and a mental state than it is about presence at a specific location (...) It is about being open and sensitive towards the quality of the lives of people, their experience, feelings, sociality, and moral [*sic*]” (p. 86).

Knowledge production is situated and stems from fieldwork and social relationships among participants and with the ethnographer, thus Wind (2008) contends the researcher needs to be explicit about how she negotiated her way in the field. In their classical examination of hospital organization, Strauss and colleagues (1963) argue that there is a negotiated order in hospitals that allow these institutions to maintain order in the midst of constant and inevitable change. The authors contend that hospitals are organized by institutional policy that fixates what the hospital is, but there is a second, implicit level of organization in daily negotiations among doctors, nurses, aides, administrators, and patients (p. 148). Furthermore, these negotiations are influenced by implicit and explicit hierarchies in the hospital that enable and constrain interactions and negotiations, for example, only the head nurse negotiating patient care with physicians, or aides constantly negotiating daily activities with nurses (pp. 162-163). These negotiations can lead to tacit agreements or understandings, whereas institutional policies and rules, which are fixed and established after formal process, limit the extent to which informal negotiations and understandings can take place (p. 168).

In order to examine how healthcare professionals in the hospital understand the risk of AMR and negotiate their position as being both at risk of acquiring an infection but also of potentially transmitting infection to patients, I observed and analysed the routines and practices of risk prevention of doctors and nurses, from how they interpreted these protocols and other risk messages, to the instances in which individuals did not follow

IPAC measures and, arguably, accepted the risk of infection while putting others at risk. Additionally, to examine how physicians understand antibiotic stewardship I observed prescription behaviour and witnessed discussions about antimicrobial use. These kinds of behaviours, which are part of the ‘hospital culture’, could only be captured through ethnographic research, which allowed me to witness doctors’ and nurses’ daily work and identify cultural practices.

THE FIELD SITE

The pediatric hospital where this study was conducted is a 167-bed tertiary care pediatric hospital and university teaching hospital in Canada. The hospital is associated with the faculty of medicine at a local university, which means that there are third- and fourth-year medical students doing their six-week long pediatric rotation at all times. The hospital also offers a three-year residence program as well as fellowships in various specialties. All physicians in the hospital hold faculty positions at the university, and many of them are researchers with the hospital’s affiliated research institute. I conducted ethnography in this hospital in order to examine how the risk of AMR is co-produced through prevention practices and discourses that affect healthcare providers’ daily work and how they negotiate their own risk of infection in the ward. Spending time with healthcare professionals as a witness to their daily routines was crucial to capture the complex negotiation between risk prevention and risk-taking and how this negotiation shapes medical practice in hospitals. These rich data would not have been captured if I had limited my methodology to interviews alone. Interviews were, by contrast, helpful for clarifying practices, conversations, and routines that I had seen in the wards and to make sense of them. Interviews were also the occasion for physicians and nurses to explain the

reasons behind key actions and comments related to the risk of AMR. During my field work I specifically observed and examined:

- the routines followed by doctors, nurses and other hospital staff regarding prevention of AMR and antibiotic stewardship;
- how doctors, nurses and hospital staff negotiate their dual position as being risky to their patients and at risk of acquiring a resistant infection;
- how doctors and nurses interact with the antibiotic stewardship mobile application Spectrum and their perception of the app in regulating and policing their work;
- how these actors deal with issues of blame and how they perceive other actors' role in creating and expanding AMR (pharmaceuticals, farming, patients, government, etc.).

The choice of conducting this study in a pediatric hospital was based on two factors. First, the hospital is affiliated with a research institute, which I reasoned could facilitate access to the field site as well as institutional cooperation in terms of supporting my field work. Second, a researcher at Carleton University facilitated my first contact with a researcher at the institute, who ended up guiding me in contacting the research ethics board and finding the primary investigator who would ultimately be my collaborator and de facto PI of this study in the hospital. The choice of a pediatric hospital, however, had some implications for the research project. First, because pediatric patients are considered a highly vulnerable population, ethical concerns and patient privacy were a constant worry for the hospital team even though I was not observing patients or visitors. These concerns led to many discussions and were part of a lengthy process in order to access the field site. Second, during my observations in the ward I became aware of the fact that pediatricians

prescription practices tend to be more conservative than in non-pediatric medicine, thus antibiotic prescriptions without confirmation of a bacterial infection are standard practice because children’s health can deteriorate very quickly, and particularly so for infants. Finally, pediatric hospitals do not have as many patients with resistant infections as adult hospitals, which probably resulted in fewer instances of discussions of AMR. Despite these particularities of pediatric hospitals, which were considered during the process of data collection and analysis, the hospital has a robust program for antimicrobial stewardship and the same infection prevention and control measures that are standard for all Canadian hospitals.

I was embedded in the inpatient unit doing observation for 10 weeks (September 17 to November 23, 2018) and in the Hematology Oncology unit for 6 weeks (November 26, 2018 to January 4, 2019), followed by 8 weeks of in-depth interviews with 6 doctors and 5 nurses. Given the impossibility of participatory observation in the hospital I opted to undertake non-participant observation, identifying myself as a researcher and witnessing doctors’ and nurses’ work by ‘hanging out’ in the ward. But as much as I was observing participants, they were also observing me, and they were curious about my research and wanted to interact with me. Thus my presence in the wards became close to what Wind (2008) calls negotiated interactive observation, i.e., I was in the ward observing participants but also being open to interacting with them (from answering questions about my research to exchanging pleasantries and laughing at jokes), while being mindful of the impact that my presence could have on them. 211 doctors, nurses and pharmacists agreed to participate in the study and signed informed consent forms.

I conducted over 300 hours of observation, during which I stood in the hallways and observed doctors and nurses in the ward, followed medical teams as they performed rounds, observed meetings and discussion among doctors, nurses, residents and medical students, and took notes. Occasionally I would ask questions to my participants when a clarification was needed. While I was allowed to follow the team on rounds (after asking for individual consent from all members), my ethics clearance did not allow me to be present if a patient or their family participated in the meeting. On such occasions I would step away; however, most times either parents did not want to participate or were not available, and most patients who were able to attend did not feel up to it. While observing in the wards I would take notes to generate thick descriptions of the setting, actors, and interactions, about participants’ behaviours and conversations, and my own reflections on what I was witnessing. Fieldnotes have been described as a form of representation of just-observed events, persons and places, and as such they are inevitably selective (Emerson et al., 2007, p. 353). Despite being descriptive accounts, fieldnotes are not simply a recording of ‘facts’ that ‘mirror’ reality, but “descriptive writing [that] embodies and reflects particular purposes and commitments, and it also involves active processes of interpretation and sense-making” (ibid., p.353).

My badge opened the doors to the inpatient unit. Three hallways illuminated by potent white lamps, make a U-shape with the nurses’ station in the middle. The walls are covered with different posters and signs with directions, warnings, and general information. The unit is busy and loud most of the day with dozens of people coming and going, medical teams rounding, specialists going in and out of patients’ rooms, nurses and physicians discussing cases and care, laboratory technicians pushing carts with blood

samples, kitchen staff bringing food to patient rooms, telephones ringing, and the speakers in the ceiling from where hospital-wide messages can be heard. On rare occasions the unit quiets down and it is possible to hear nurses and medical students typing, the beeping of monitors, children laughing or crying, and worried parents pacing up and down the hall. The inpatient unit is located on two floors, each floor has 18 patient rooms and between 2 and 4 beds per room. The unit has a maximum capacity of about 80 patients, however, due to the need to keep some patients in isolation, the unit is never at full capacity. The oncology unit is much quieter as it has a fraction of the patients the inpatient unit has, and a smaller team of nurses and physicians. The layout of the unit is similar as the inpatient unit, but the lights are lower, and the walls are decorated with bright colours. Patients’ doors are always closed, and the medical team does rounds in a meeting room instead of doing it in the hallway. Although specialists, therapists, lab technicians, and kitchen staff also circulate in the oncology unit, they do so less frequently, and all adopt a quiet tone upon entering the unit.

There are two shifts of doctors and nurses, and three medical teams at all times in the inpatient unit and one in the oncology unit. These teams comprised one pediatrician or oncologist and between two to six residents and medical students. Sometimes there would also be a pediatrics fellow, who is below the staff doctor in the hospital hierarchy but above the senior resident. The fellow is a physician who has already completed her residency program in pediatrics and is undertaking sub-specialty training. Fellows can act as general pediatrics attending doctors, but in these wards, they assist the attending doctor and supervise the residents. Additionally, each floor of the inpatient unit and oncology unit had a team of between six and ten nurses, a head nurse coordinating the work on the floor, and

occasionally nursing students. Pharmacists, therapists, teams of specialists, lab technicians, healthcare aides, and cleaning personnel would also walk in and out of the wards constantly throughout the day. Some days there were also nursing students, who followed nurses during their shift. There were also one or two cleaning staff on each floor. Nurses, care facilitators, nursing students and healthcare aides changed on a daily basis. The staff pediatrician changed on a weekly basis. Residents and medical students rotate every 2, 3 or 4 weeks so that the medical team is constantly being reconfigured. The cleaning staff remained unchanged.

I started the observation period in the inpatient unit where I spent six weeks on the first floor and four weeks on the second floor. I went to the ward between 3 to 5 days per week. I arrived on the floor at 8:30 in the morning and left the wards around 4:00 in the afternoon. I started the day by asking for consent from nurses and the medical team. I stood in the hallways observing the nurses as they came in and out of patients’ rooms, carried equipment, talked to doctors, typed information into their patients’ charts, and occasionally held informal conversations among themselves. I observed residents and medical students going from the computer area to patients’ rooms and then back to the computers. They raced every morning to examine patients before rounds. Rounds started at 10:00, usually led by the senior resident but most of the times with the staff doctor also attending. During rounds the residents and medical students visit all the patients in their care and discuss their cases. First, they would get their portable computers and find an available nurse and stand with her outside the patients’ room. The senior resident would invite the patient (or their parent or guardian) to join the hallway meeting. First, the resident or medical student caring for the patient would present the case; then the nurse would go over how the night went

and the patient’s vital signs in the morning; next, the resident or student would continue going over new tests results; then the parents would be asked if they had any questions or comments; finally, the team would discuss treatment and the need for further investigations. Usually a pharmacist would join the team on rounds, and they would go over all the medication and doses for the patient. Then the resident or student in charge would explain the plan for the day and give the parents the opportunity to ask more questions. At all times, the staff doctor and senior resident could interject with a question or comment, but they would let medical students and junior residents make the decisions and learn as much as possible. When a pharmacist or dietitian were present, they would also contribute to the conversation when relevant.

After rounds the team would sit by the computers and quickly go over the plan for each patient, and inform the care facilitator of any discharges, the need for tests, request translators, etc. The team would input requests for consults with different specialists into the computers, tests, cultures, imaging, physiotherapy, etc. I stood next to the desks or sat by the meeting table listening to their conversations, discussions, and phone calls. On Tuesdays and Thursdays in the afternoon an infectious disease specialist would hold “antibiotic stewardship rounds” with the medical teams and go over all their active antibiotic prescriptions (reason for treatment, dosing, length of treatment, whether there was a better drug or dose, and when to stop treatment). The specialist would give their recommendations and then it was up to the staff doctor to decide whether to follow the recommendation or not.

EMOTIONAL LABOUR OF QUALITATIVE RESEARCH

The methodology employed in this study is a novel approach in the field of risk communication and in this section, I discuss the emotional labour involved in conducting

this type of qualitative research. Qualitative researchers are expected to be aware of their participants’ emotions and prevent any emotional harm to them, and these protections are highlighted in ethical codes (Nutov & Hazzan, 2011). However, researchers themselves report the various emotions they experienced in conducting their research at different stages, ranging from curiosity and joy to loneliness, frustration, and apprehension (ibid.). Emotions are a central component of social research (Dickson-Swift et al., 2009). ‘Emotional labor’ or ‘emotion work’ denote face-to-face interactions that produce an emotional state in another person, while at the same time managing one’s own emotions (Steinberg & Figart, 1999). Emotional labor also involves following specific “feeling rules” (Bellas, 1999; Diefendorff & Gosserand, 2003), such as not expressing emotion in professional or academic contexts. Following these display rules “may require the use of emotion regulation strategies such as faking an unfeeling emotion or suppressing an inappropriate felt emotion” (Diefendorff & Gosserand, 2003, p. 945). A related concept is that of emotion management, which supposes “an effort by any means, conscious or not, to change one’s feeling or emotion” (Hochschild, 2002, p. 9).

Doing qualitative research in public health, including in hospital ethnography, can be a highly emotional experience that elicits a wide array of feelings in the researcher, from anger and frustration to empathy and sadness, anxiety, guilt, and occasionally relief. This type of research can also lead the researcher to reflect on her own life experiences and reliving some traumatic experiences (Dickson-Swift et al., 2009), and to experience physical manifestations of emotion while conducting their studies. Thus researchers often engage in emotion management so that their posture and bodily display do not reveal what they are actually feeling (Dickson-Swift et al., 2009).

In conducting this study, and specifically in completing the hospital ethnography portion for the research, I had to perform emotional labour on a regular basis, an aspect of the research process that I did not anticipate in the early stages of the project. In the rest of this section I discuss three aspects of the emotional labour were required and their implications for conducting interdisciplinary research.

Gaining and maintaining access to the field site

Hospitals are highly closed institutions and access to them as fields of study is protected to preserve workers’ and patients’ privacy. There are many layers of approvals that must be obtained before accessing the field site and even after the study has begun. The process for accessing the hospital began ten months before I started my observation in the ward, and after one stage of access was cleared a new access requirement arose with new unforeseen demands, making the research process a slow and at times frustrating journey. At each stage of this clearance process my project and methodological choices were scrutinized and moving from one stage to the next depended on other people’s interest and actions.

Conducting research at this hospital can only be done in association with one of the research institute’s researchers, who become the de facto principal investigator for the project, as per hospital and research institute policy. Once I secured such collaboration, I had to obtain permission from the heads of the inpatient and oncology units where the research would take place, as well as the units’ managers. However, obtaining official approvals could only be done by the hospital’s researcher, which placed a considerable burden on the PI, who is also a physician in the hospital. They had to explain the project to

their colleagues, advocate for it, and reassure them that it posed minimal risks for patients, hospital workers and the institution.

Once all the approvals were secured, I was able to apply to the research institute’s Research Ethics Board. The institute provided me with documents designed principally for biomedical research and clinical trials (e.g., it asked how I would handle patient information and what statistical analyses I would perform). Adapting these templates to my study required extensive communication with the board’s assistant and with the PI. None of them had previous experience with protocols for qualitative research. This negotiation was the first step for bending the institutional framework that regulates all research at the hospital.

Six weeks later, the hospital’s REB approved my project, but despite the approval the institution’s lawyers and risk managers expressed recurring concerns regarding the reputational risks that my project could pose for the institution. Nevertheless, and despite not having a signed data transfer agreement (DTA), I began my observation in the inpatient unit. Eight weeks into my field work I received a draft of the DTA, which gave data ownership exclusively to the PI as well as publication rights, which I also shared as the student researcher. The document was developed from a template designed for data generated from clinical trials and prescribed the nature of any collaborative relation between a hospital researcher and a researcher from another institution, giving full control of the study to the hospital researcher. This contract showed again that the institutional mechanisms to support our collaboration did not exist in the hospital, and so we embarked in an arduous process of negotiating an *ad hoc* DTA with the lawyers of the hospital’s

contracts office, along with my university’s director of research ethics and the lawyer who oversees external partnerships and contracts.

The main challenge during this period of negotiation was the reluctance of the hospital lawyers to modify their template to fit my study. In an institution of biomedical research in which data is constituted by patients’ information, the hospital’s representatives could not understand that my study focused on hospital workers and not patients, and they were reluctant to give me full access and ownership of the data. What is customary for biomedical research was clearly not adequate for a qualitative study in this case.

Negotiating the data transfer agreement became a source of much anxiety for me. I kept going daily to the ward while not knowing if I would ever have access to my data or if I should be thinking of an alternative research project. Several meetings were postponed and communication with the hospital’s contract office was intermittent for several months.

Finally, after three months, the CEO of the research institute called a meeting in which the four institutions were involved –the hospital, the research institute, the hospital research ethics board, and the university. We were finally able to get together when my observations in the wards had already ended and I was doing interviews with doctors and nurses. Legal teams, hospital managers, research institute managers, the hospital-appointed PI, my supervisor, a member of the university’s ethics board, and I engaged in an open discussion about multidisciplinary practices and how to reach an agreement that would allow the project to move forward. The dominance of the biomedical model in hospital-based research was ever present as one of the hospital lawyers kept referring to “the clinical trial” when referring to my ethnographic study. Despite the institutional rigidity and the disciplinary differences, all parties recognized the importance of the project and we

were able to reach an agreement and an appropriate DTA was written to reflect this agreement.

Managing relations with the hospital’s PI

Collaborative work requires more emotional labour than individual work (Bellas, 1999) as the researcher needs to manage personal emotions and collaborators’ expectations. Recognizing the PI’s own emotional work in advocating for the project with their colleagues while also facing pushback from the contracts office and Research Institute, and advocating their own interests (authorship, data ownership) was a central part of managing our relationship. My relationship with the PI was amicable and based on a spirit of collaboration, despite recurring disagreements regarding some methodological and practical issues. This implied at times discussing and negotiating methodologies and publication practices of two very different academic fields, a key aspect of interdisciplinary research.

While I designed and conducted the study, with the advice and guidance of my supervisor and committee members, at the hospital my collaborator was considered the principal investigator. This led some participants to assume that I was a research assistant, and, in some cases, they dismissed my answers to their questions about the project. I was expected to conform to these perceptions for which I performed, sometimes unsuccessfully, much emotional regulation. For example, while conducting observation in the ward, two doctors asked questions about informed consent, but instead of listening to my answer they said they would ask the PI. At that moment, their decision seemed illogical given that I was the person best suited to answer their questions, so I clarified to them that I had designed the study. This, however, was interpreted as a show of disrespect toward the PI, which

made me more aware of the strict hierarchy in the ward. In the ward it was evident that hierarchy affected the behaviour of doctors, residents, and medical students. Studies have shown that there is a steep and implicit hierarchy in medical teams that sometimes discourages residents and medical students from asking questions and expressing concerns about patient care as they feel ignored by their superiors and do not want to be perceived as disrespectful or defiant (see for example Bould et al., 2015; Doja et al., 2018). Frequently, I was perceived by others as “just a student” or “a learner”, while the PI was commonly referred to as “the researcher”.

In the process of managing relations with the PI, hospital research ethics board and contracts office, I quickly learned the implicit hospital “feeling rules” (Bellás, 1999), i.e. when it was acceptable to express feelings, such as frustration or anger, and when emotional management was required in order to preserve the relationships. This process also made me more aware of my identity as a woman of colour and an immigrant with a strong accent, and question how my positionality affected the perception others had of me beyond my status as junior researcher and not medically trained.

Managing relations with participants

Pediatric wards are closed to the public, meaning that only hospital workers or patients and their families can access them. Doing ethnographic work in this context means that the researcher immediately jumps out of the background. It is therefore impossible as an ethnographer to maintain the site “undisturbed” as my mere presence was inevitably changing the environment. Doing participant observation in hospital is not possible (van der Geest & Finkler, 2004) and I was inevitably a novelty in the ward for the first few days until participants got used to seeing me around.

While doing observation in the wards I had to negotiate my space there.

Establishing a rapport with participants can be exhausting as every day I had to introduce myself to new participants and ask for their permission to observe their daily work and record any relevant occurrences and conversations. This process began with explaining my project and asking them for consent, I sought to not only explain as clearly as possible what I was observing and what they would be consenting to, but I also explained informed consent as an ongoing process, not just signing a form, thus allowing them to feel comfortable asking questions and emphasizing their right to terminate participation at any time. This process requires making participants feel safe and comfortable with the research, knowing that their identity will be protected and that they are facing only minimal risks by participating. Reducing their anxiety demanded emotional labour as I had to earn and maintain their trust throughout the research process, while projecting confidence even when I was feeling apprehension by the distrust that having someone observing your work can generate.

At first some people were very distant, serious, and evidently did not trust me, even those who had agreed to participate. While senior doctors were more open to participating, as they are researchers themselves, residents and medical students would look around to see whether their peers had consented before deciding themselves. Similarly, nurses were not always open to participating, and some of them refused. This made me immediately aware of the badge strapped to my neck identifying me as affiliated with the research institute and how this impacted nurses’ perception of me as a researcher being imposed on them. I tried to mitigate this perception by emphasizing that the ethnography is part of my

dissertation, that their participation is voluntary and that they would not face any consequences for participating or not.

However, whenever a doctor signed a consent form, the nurses, and medical students around them would also agree to participate. Similarly, if a senior doctor refused to participate, the rest of their team was frequently hesitant to do so. The hierarchical structure of the ward was evident from the start and this is one of the drawbacks of asking for individual consent. For example, some senior male physicians refused to participate even before I told them what the research was about. This was problematic as others around them, particularly subordinates, would then hesitate.

As the days went by, the doctors and nurses in the wards became more relaxed around me. Our conversations were more spontaneous and natural, and some even began joking with me. At some point I started exchanging pleasantries with nurses and health care aides. Sometimes they would ask me if I had seen a specific person, if the staff doctor had arrived, or to hand them equipment. For example, on one occasion a nurse, standing by a patient’s door in full PPE asked me to bring her a scale from the hallway. Some doctors also would ask me about my day and the progress of my “investigation.” Residents and medical students would tell me about their aspirations and the next steps in their careers. Suspicion evolved into trust, their anxiety was reduced, and after a few days doctors and nurses would tell me that I was also “part of the team”. In a way I developed a relationship with many of the recurrent doctors, nurses, residents, care facilitators, medical students, fellows, pharmacists, health care aides and cleaning staff. I felt sad when my observation period was over.

Witnessing human suffering

Going to the inpatient unit for the first time I was filled with the excitement that a new and fascinating research project brings. The ward was always busy with doctors and nurses coming in and out of patients’ rooms, computers in rolling stands being wheeled in all directions, and patients’ parents, siblings and friends bringing food, bags, and toys in and out of the unit. But as the days went by, I started to also notice the children’s constant crying, the angst in their parents’ faces, and the long-term patients that practically live in the hospital. Soon enough I was feeling strong empathy for the parents and the children, relating their experiences to my own experience as a mother.

During rounds I listened to the medical team discuss the cases of infants and children who were admitted to hospital under varying degrees of distress and the challenging therapies they had to go through. During my first weeks in the ward I felt deeply affected by the cases I heard during rounds. I felt sad and anxious, and the next day I would be interested to hear if tests had come back positive or not, if a recommended treatment protocol was working or not, and if the patient was improving. When listening to particularly complicated or tragic cases being discussed I could feel my face getting flushed, a lump in my throat and tears filling my eyes. It was difficult to control my emotions, or at least not display them. I managed this internal stress by looking down to my notebook and pretending to take notes until I could regain composure. As the weeks went by, I became more skilled at controlling strong emotions and emotion display in the ward.

While connecting emotionally with participants can be productive during interviews, it is arguably less so while conducting observation in the ward, where doctors and nurses are deeply engaged in their own emotional regulation. Workplaces have implicit

rules that specify which emotions can and should be expressed in different situations and that compel employees to do emotional labor in order to conform to the accepted emotional display (Diefendorff & Gosserand, 2003). The medical profession and the hospital as a workplace have a set of implicit emotional rules that limit the healthcare professionals’ expression of emotions, for example frustration when a course of treatment is not working, sadness if a patient has a negative outcome, angst if a patient has a complicated family situation, or get too emotionally attached to patients who are in emotional distress. While doctors and nurses may express all these emotions in private conversations and interviews, they perform emotional labor to reduce emotional display in the ward. Therefore, I tried to contain my expression of emotions as much as possible in the ward, while trying to find safe spaces where I could express and work through these emotional reactions (e.g. home, meeting with supervisor, discussing with peers).

Healthcare providers tend to maintain emotional neutrality, a practice that is recognized as part of their professional culture. The process of professionalization supposes adaptive mechanisms, and in occupations that demand trust from clients, such as medicine, professionals and trainees must convince others of their credibility (Haas & Shaffir, 1991, p. 53). Haas and Shaffir (1991) explain that as part of their professionalization “[medical] students learn to adopt a symbolic-ideological cloak of competence” (p. 55), including how to communicate authoritativeness through “body language, demeanor and carefully managed projections of self-image” (p. 80). Donning a cloak of competence also involves not expressing emotional reactions to patients (p. 85). This detachment gradually becomes part of the profession, the way to deal with complex situations, and the expectations of colleagues. This does not mean that doctors do not feel a wide array of emotions regarding

their patients, but rather that they perform intense emotional labour to regulate the display of those emotions in order to project competence.

As the weeks went by, I also felt the need to adopt a cloak of emotional competence and became more skillful at controlling emotion display in the ward. While I recognized that my emotional experience would impact my ethnographic work, from what I chose to note down to my interpretation of results, I also felt compelled to engage in the same kind of emotional work that the medical team performed. I felt like I had no right to become emotional, especially because all I was doing was observing and listening and not having contact with the patients or deciding their treatment. I also felt like I would lose the respect of the people around me if I did not conform to the emotion rules of the ward. So I engaged in deep emotional regulation and sometimes deep acting strategies, i.e. attempting to change how one feels so that the appropriate emotions can be displayed (Diefendorff & Gosserand, 2003, p. 954), for example by using relaxation techniques and creating a sense of calmness before going into the ward.

Ethnographers can become deeply involved in their participants' lives, especially if there is sustained contact with them (Bellas, 1999). While I did not become emotionally involved with my participants, because medical teams changed on a weekly basis, I did connect strongly with the stories of some patients. After a few days in the ward I would know each patient's story (why they were hospitalised, diagnosis, treatment, family, and social situation, etc.). Some of those stories touched me deeply and although I did not have contact with the patients, I would see them or their parents walking in the hallway. At some points I would experience physical reactions while listening to doctors talking about these

patients or if I could hear them crying in their rooms, and I would inevitably visually scan the unit in search for their nurse.

My role at the hospital was researcher, but I am first and foremost a person and I interacted with patients and their families when approached by them as a fellow human being. Toddlers wearing hospital gowns and attached to IV lines would walk down the hallways followed by a parent pushing an IV pole, and the children would look at me and smile or wave at me or say “hi!.” I instinctively reacted and waved back or smiled back and complimented them. Other interactions included parents and visitors would sometimes ask me to buzz them out of the unit or ask me the location of a room or a restroom, they would ask me where to get food and other practical information. They saw me wearing a hospital badge and assumed I was a hospital worker and I always offered them my help when asked. Other times parents would approach me and start talking about random things, like the weather or the price of gas. I interpreted these interactions as moments of much needed distraction for them; random conversations to achieve emotional distance from the hard reality of having a child hospitalized. I was familiar with their children’s diagnoses and treatment and could understand, as a parent, the immense anxiety they were feeling. I was always open to these hallway conversations even if they were not immediately germane to my research.

Doing hospital ethnography required emotional labour even before the observation started and remained as I was working on data analysis and interpretation, and even in the publication process. Ethnographers doing research about sensitive topics or in distressing spaces need to account for the impact of the emotional labour they will perform, both in their data collection and analysis, as well as in their personal lives. Most importantly,

emotional labour can become very intense when conducting interdisciplinary research that requires negotiating ethical, methodological, and epistemological differences between collaborators.

HOSPITAL INTERVIEWS

During the observation period I asked doctors and nurses if I could interview them. Between December 2018 and June 2019, I contacted via email dozens of doctors and nurses who had expressed interest in being interviewed. I conducted interviews with 5 nurses and 6 doctors (10 female and 1 male), and the hospital media relations officer. These were semi-structured interviews for which I prepared interview guides (see Appendix 1) but allowed for other questions and topics to emerge in the conversation. In these interviews I sought to further explore and deepen my understanding of healthcare professionals’ perception of risk in their workplace, particularly the risk of AMR, and how it affects their work routines and how they negotiate the “dirty hospital” frame and their role in the spread of AMR. These interviews were also an opportunity to ask healthcare professionals for clarification about actions and conversations I had witnessed in the ward and get a better sense of how they interpret AMR-related events in the hospital. In the conversation with the hospital communications officer I asked whether they communicate hospital outbreaks to news media and to the community, and what that process entails. I also asked them to reflect on the ethical implications of handling outbreak communications and how they make those choices.

The interviews took place at the hospital either in the cafeteria, physicians’ offices, or nurses break room. Although I had initially planned to do one hour-long interviews, my interviewees did not have that much time available, so I conducted 30-minute-long

interviews instead. In the case of nurses, we met during my interviewees’ break, whereas physicians put me in contact with their assistants to schedule an appointment during their workday. I asked physicians about their prescription practices and the usefulness of antimicrobial stewardship rounds; and both physicians and nurses whether they complied with all infection prevention and control protocols or if they thought some of them did not make sense; whether they felt at risk of infection and how they cope with that anxiety; whether they felt that the hospital acknowledged their concerns and doubts regarding infection prevention; whether they felt blamed for the spread of infectious diseases; how caring for patients with resistant infections impact their work and their perception of risk; whether they feel like they have a role to play in the judicious use of antimicrobials; etc. I started the interviews with an initial set of questions but asked additional questions if I considered it necessary or as the fluid nature of the conversation may have demanded.

I had previously met all of the interviewees –except for the communications officer– in the wards. I was familiar to them; we had had conversations, I had observed them for several weeks, and we called each other by first names. This familiarity facilitated the conversations as interviewees felt comfortable enough to share their thoughts openly. In that sense, the interviews with doctors and nurses had a feeling of mutual understanding as I had already witnessed the situations they talked about. Despite this sense of trust, some doctors and nurses were at first visibly nervous with some of my questions and in some cases asked me to “please, don’t get me fired.” I managed this by reiterating the conditions they had agreed to in the consent form, namely that the recording would be erased, interview transcripts would be de-identified, that no disciplinary measures could be taken against them for anything they said to me, and that their identity would be being kept

confidential. Once I had outlined these conditions, the interviewees were able to speak candidly about their experience working in the hospital.

ETHICAL CONSIDERATIONS AND CLEARANCES

There are various ethical considerations for hospital ethnographies, including who are the participants, whether they are members of a vulnerable population, and how informed consent be gathered, how data are managed and stored, and how participants’ privacy rights are protected. My ethnography explored how the risk of antimicrobial resistance affected the work of doctors and nurses in the wards, therefore patients and their families were not observed or included in field notes. This also meant that I had to make sure that patient information would not be revealed in my notes.

The process for obtaining informed consent was discussed in several meetings with the hospital-appointed PI. Many hospital ethnographers seek institutional consent, i.e. a blanket consent provided by hospital management to observe hospital workers in predetermined areas, so as to not interfere with the setting. Healthcare providers working in these areas would get a notice that the study is taking place and they would be able to withdraw for it if they wanted to. This approach to obtaining consent is fast and allows the researcher to observe interactions without disturbing the setting by asking each participant for consent. This way of obtaining consent, however, has been criticized as “studying down” or observing research subjects with the approval from management and as a form of exploitation¹⁷. Feminist approaches to ethnography emphasize principles of reciprocity,

¹⁷ Feminist scholars have approached ethnography as a collaborative method in which there is a horizontal relationship between the ethnographer and her participants, instead of the researcher positioning herself as the “expert” studying “subjects”. Additionally, feminist ethnographers have criticized traditional ethnography as exploiting subjects by extracting data from them, particularly in organizational ethnographies this usually takes place with the blessing of the subjects’ superiors, while not giving anything in return. Feminist ethnographers understand the data derived from the research as a co-production between the researcher and

honesty, accountability, responsibility, and equality to ensure treating participants with respect (Buch & Staller, 2007; Skeggs, 2001), which “enables an acknowledgement that their time is important and establishes the intention of non-exploitation” (Skeggs, 2001, p. 13). As a feminist scholar, this latter approach resonated strongly with me, thus I opted to seek individual consent from each research participant, which allowed me to build a rapport with them so that they could also feel free to answer my questions or make spontaneous comments. This also gave me the opportunity to explain consent as an ongoing process, rather than just a transactional experience, and that their participation was confidential, so no disciplinary measures would be taken against them for things they did or said while I was around¹⁸. Another key aspect of feminist ethnography, which complements the idea of non-exploitation of participants, is that of reciprocity, which seeks to give something back to participants (Skeggs, 2001). In seeking to reciprocate participants’ involvement in my research project I offered to provide the hospital-appointed PI with a report outlining the various challenges doctors and nurses face in relation to infection prevention and control, and their own perceptions of risk.

Obtaining informed consent from participants in this manner was a challenge as the inpatient unit (and to a lesser extent the oncology ward) is a space characterized by the constant flow of people (specialists, medical students, nurses, therapists, patients and their parents, visitors, cleaning staff, healthcare aides, nursing students, administrators, pharmacists, lab technicians, kitchen staff, etc.). Every day I would introduce myself to new participants, briefly explain my project, and answer their questions. This process

her participants, and they seek to address research questions of importance to participants and to improve participants’ lives (Buch & Saller, 2007; Skeggs 2001).

¹⁸I had, however, the obligation to report any incidents I witnessed in which a child was being endangered in any way. This never happened but that was the only caveat to the confidentiality clause.

involved waiting for the appropriate time, not interrupting, and keeping track of who had given consent and who had not. Not everyone on the floor was being observed, however. For example, some teams of specialists walked into the ward and straight into a patient’s room and would then leave, so I was not able to observe anything relevant and therefore they were not included in any field notes. Other times, I focused on observing one of the two medical teams on the floor, thus I did not ask for consent from the second team nor were they included in the field notes.

Although consent was always obtained before making any notes about a participant, sometimes I could witness a conversation or interaction before having a chance to ask for consent. Medical work in a pediatric ward is usually time sensitive and I chose to wait and not record potentially valuable interactions instead of interrupting conversations at inconvenient moments. Most participants understood this to be a natural research constraint in this setting. However, two participants expressed their concerns to the hospital-appointed PI, which led to discussions that required me to defend my choice of seeking individual consent while reassuring them that no interactions were recorded unless appropriate consent was given.

OTHER IN-DEPTH INTERVIEWS

Media professionals

News media and specifically health news play a key definitional role for health risks (Briggs & Hallin, 2016). Health reporters have specific newsgathering practices that impact news selection, framing, sourcing (Tanner et al., 2015), and ultimately how health risks are communicated to broader audiences. I interviewed four specialist journalists who publish in leading international news outlets, a science journalism professor at Carleton

University, and the author of a bestselling book on AMR to understand how reporting practices and institutional structures influence news coverage of AMR. Specifically, I asked when AMR becomes a relevant news story, which are the predominant frames used to report about it, which sources are consulted, how scientific knowledge and patient experience are mobilized by journalists, whether this risk is prioritized by news organizations in terms of giving reporters resources to write about it, and whether reporting on AMR is affected by the actions and discourses of other actors in this network of biocommunicability. The interviews focused on their reportage of AMR, in general, and of three significant events¹⁹ related to AMR, specifically. In these interviews I asked the journalists about their work as health and science reporters, specifically their work related to antimicrobial resistance, and how they interpret their role in society. Although I had a set of initial questions (see Appendix 1), I let the conversation flow and other questions and lines of discussion emerge. My initial questions related to how they decide to write about AMR, how they interpret the role of journalists in public health reporting, the challenges in reporting about AMR, sourcing practices, etc.

In total, I interviewed six Canadian reporters and writers: Helen Branswell (*STAT*); André Picard (*The Globe and Mail*); Tom Blackwell (*National Post*); Carly Weeks (*The Globe and Mail*), science journalist and journalism professor Sarah Everts (Carleton University), and Dr. Steffanie Strathdee²⁰, author of the best-selling memoir *The Perfect Predator: A Scientist's Race to Save Her Husband from a Deadly Superbug* (2019). The

¹⁹ The UN’s high level meeting on antimicrobial resistance (September 21, 2016); the first case of a multidrug-resistant infection in North America (May 2016) and the death of the patient (January 13, 2017); and the publication of the WHO’s list of most dangerous resistant bacteria (February 17, 2017).

²⁰ Dr. Steffanie Strathdee is an epidemiologist and Associate Dean of Global Health Sciences, Harold Simon Professor at the University of California San Diego School of Medicine and Co-Director at the Center for Innovative Phage Applications and Therapeutics

interviews lasted between 30-60 minutes. They were conducted in person, via Skype, or by phone depending on location and availability. The conversations were audio recorded and then transcribed. All of these participants agreed to be identified although they were given the choice of anonymity.

I contacted eight other journalists for interviews who declined participation or did not reply to various emails and calls.

Scientists

Scientists are actively involved in the co-production of knowledge about health risks, by mobilizing their research, interactions with media, and with expert and non-expert audiences’ particular ways of understanding risks. In mapping out the network of biocommunicability of AMR I interviewed Canadian scientists with active research programs on antimicrobial resistance to understand how they produce knowledge about this risk, the ways in which they disseminate this knowledge, how and whether specific interests –i.e. attracting funding, publishing, influencing policy–impact the way in which they produce scientific knowledge about AMR. In the interviews I asked the scientists when does AMR become scientific knowledge; how is this knowledge formulated and communicated; whether and how they seek media attention for their research; whether funding agencies require communication efforts and how do they comply with them; how do frames used by media and health organizations impact the way scientists communicate AMR; and how they evaluated media coverage of AMR as well as public health information campaigns. Although I had an initial interview guide (see Appendix 1), I allowed for other questions to emerge in the natural course of conversation.

In designing the methodology for this research, I took a feminist approach and sought to revalorize and prioritize women’s perspectives, experiences and knowledge (Beckman, 2014; Gray et al., 2015). I therefore attempted to recruit as many or more female participants and interviewees than male ones. Scientists have position of authority and a definitional role in society, however, women continue to be underrepresented in the fields of science, technology, engineering and mathematics (STEM) (Kahn & Ginther, 2017), and as faculty members (Mason et al., 2016; Smith et al., 2015). Therefore, I considered it particularly important to interview women scientists, but despite my efforts none of the women scientists doing research on AMR that I contacted agreed to participate in this study.

I contacted all the Canadian scientists with active research programs on AMR and conducted one-hour long interviews with the five scientists who agreed to participate in this study: Dr. Alex Wong (Carleton University), Dr. Patrick Boerlin (University of Guelph), Dr. Gerard Wright (McMaster University), and two other scientists who requested anonymity. Two of the scientists I interviewed are members of the Council of Canadian Academies Expert Panel on Antimicrobial Resistance. The interviews were conducted in person, by telephone, or via Skype. The conversations were audio recorded and then transcribed. I contacted six additional scientists who did not reply or declined to be interviewed.

Patients recovering from/living with MRSA

I identified a support group on Facebook for individuals living with MRSA²¹ infections. The group can be found on Facebook by searching “MRSA support group” and

²¹ Methicillin-resistant *Staphylococcus aureus*.

then click on “Join the group”, sending a request to the administrator. After the administrator grants membership, access is given to the group’s discussion feed and the ability to post on this feed. The group had 729 members in July 2018 from various countries, but the administrator explained that they were mainly from the United States. The public description of the support group reads:

“This group is for people who suffer from MRSA. Simply put, here's the wiki on the condition: <http://en.wikipedia.org/wiki/MRSA>. People without MRSA, who know people with MRSA, are also welcome in the group. Really, anyone who is supportive to the group is welcome. I only wish there was something that could be done about MRSA, so we could all be rid of our constant fear of even the smallest pimple turning into a severe boil. Thank you for your support. --- A.T.”

I contacted the group’s administrator, who created the group in 2014, and described my research to them. The administrator was highly interested in the study and invited me to join the group, which I had to decline due to the specifications of my ethics clearance regarding how participants should be contacted and the need to protect the privacy of other group members. I asked the administrator to post in the group’s feed an invitation instead, so that any members interested in being interviewed could email me. The administrator posted my invitation a total of 5 times between July and December 2018.

The invitation was for an in-person one-hour long interview or, alternatively, over the telephone or Skype. As I began receiving emails from interested group members it became evident that they would not agree to either in-person or teleconference interviews. I then adapted my interview guide and turned it into a questionnaire which I could send to interested participants via email and have them type their responses in the same document and then email it back. Additionally, I realized that emailing them informed consent forms that then they would need to print, sign, scan, and email back would be asking a lot of them. Instead I created an online survey through SurveyMonkey.com in which the same

text of the informed consent form was presented to participants and then they were asked whether they consented or not. Carleton University’s Research Ethics Board was informed of this change in the research protocol and granted approval of this change on October 21, 2019.

I emailed interested members of the MRSA group a questionnaire (see Appendix 2) consisting of 18 questions regarding their experience with MRSA, their knowledge of AMR prior to being diagnosed, how they were treated, the preventive measures (if any) they take to avoid spreading the infection, and how the infection affected their personal and professional life. After these modifications were made, I got 5 positive responses from people with MRSA who live in the United States. The participants signed their online consent forms and sent me the answered questionnaires. Once I received the participants’ answers I emailed them a USD \$10 Starbucks gift card as a token of appreciation. The data gathered from the questionnaires is confidential and all the documents were coded with pseudonyms to preserve anonymity. Due to the small number of patients who participated in this study and the fact that none of them lives in Canada, the data collected through the questionnaires are not presented as part of the results of this study but are noted in the conclusions (Chapter 7) to contextualize the relevance and implications of this research project.

ANALYSIS OF ETHNOGRAPHIC DATA

The data was composed of fieldnotes, interview transcripts, and patient questionnaires. Detailed fieldnotes and “thick descriptions” of the hospital, including participants’ actions and relations, were recorded during the observation in the wards. Fieldnotes also include quotes and my memos regarding my impressions and insights.

These fieldnotes were transcribed and anonymized. All interview recordings were transcribed, and some transcripts anonymized. While the journalists and most scientists did not require anonymity, all hospital interviews, two interviews with scientists, and all patient questionnaires were scrubbed of any personalized information that might identify individual participants. Additionally, in certain cases I used broader categories when referring to participants in my analysis in order to reduce the potential of them being identified. For example, when I refer to infectious disease specialists, this could include members of the antimicrobial stewardship team. Other times I will just mention a “specialist” but will not provide the medical specialty.

The analysis of the data followed a grounded theory approach (Charmaz & Mitchell, 2007; Corbin & Strauss, 2008; Creswell, 1998), i.e. (1) simultaneous data collection and analysis when possible; (2) pursuit of emergent themes and meanings through early data analysis; (3) discovery of basic social processes within the data; (4) inductive construction of abstract categories that explain and synthesize these processes; and (5) integration of categories into theoretical framework that specifies causes, conditions and consequences of the processes (Charmaz & Mitchell, 2007, p. 160).

The data was analysed in two stages:

1. **Thematic analysis:** Through an initial read of the observational data and interview transcripts key themes were identified. A first set of codes was developed accordingly. At this point I reviewed the initial codes with my dissertation supervisor and any incongruence in interpretation was resolved through discussion until consensus was reached. If deemed necessary, I also consulted with other members of my committee. Then I reviewed the initial codes for the hospital data in

the same manner with my hospital-based PI,²². The codes were revised as necessary and the data was then coded using the qualitative analysis software NVivo 12. The initial codes were taken as a point of departure, but the coding process was open, allowing new codes and sub-codes to emerge until I achieved a saturation of themes. A revised codebook was then created and reviewed again with my supervisor and hospital PI.

2. Interpretative analysis: The coded data was read and re-read to establish relations between themes and clusters of themes, and within them. In this stage new concepts and interpretations were generated. I met again with my supervisor and hospital PI to review the analysis and discuss the need for additional interviews. Incongruences in interpretation were resolved through discussion until consensus was reached. I also consulted with my supervisory committee as needed.

As per my contract with the hospital, I first sent a draft of chapter 4, which presents most of the hospital-based analysis, to the hospital team for review. This review was intended to verify participants’ anonymity and medical accuracy. A full draft of the dissertation was also submitted to the hospital team prior to the formal examination for review, again to ensure accuracy in the presentation of any scientific information and to verify protection of participant identity.

TEXTUAL ANALYSIS

Media coverage of four events

A qualitative content analysis (QCA) was performed to determine how the risk of AMR is discursively constructed in North American newspapers, as sites of risk definition

²² Discussions with hospital PI focused exclusively on the data gathered at the hospital.

and, potentially, where reflexivity is expressed, assigning responsibility, and questioning modern institutions and scientific practices. News media are the leading source of general health information to the public (Bomlitz & Brezis, 2008; Briggs & Hallin, 2016; Mitchell et al., 2017) and therefore it is crucial to understand how media construct AMR, particularly in terms of how it is defined, framed, which actors are given priority and definitional voice, and how blame and responsibility are socially distributed. Given that media, and specially news media, are implicated in a process of biomediatization (Briggs & Hallin, 2016), through which risk is socially co-produced by discourses and practices that influence one another, then analysing media narratives about AMR will shed light on how news media participate in the co-construction of AMR as a public health risk.

The sample was collected through the database Factiva. Four searches were conducted related to four different AMR related events. Previous research had shown that the volume of news coverage of AMR in North America is considerably low (Capurro, 2020). Given that my analysis is not focused on the volume of coverage but rather on the characteristics of it, I chose to collect my sample in relation to four events with meaningful impact on how the risk AMR is understood in order to ensure a sufficient number of news stories. The first event was the detection of an infection caused by colistin resistant *E. coli*, a bacterium resistant to last-resort antibiotic colistin, found for the first time in the United States on May 27, 2016. The sample was collected for coverage between May 1 and July 1, 2016 and was composed of 46 news stories. The second event was the United Nation’s high-level meeting to discuss with member states, private sector, and the World Health Organization how to manage this public health crisis. The meeting was held on September 21, 2016, and it was the fourth time that such a meeting has taken place to tackle a health

issue. All 193 UN member states signed a declaration to combat the proliferation of antibiotic resistance. A sample of 51 news stories was collected for coverage between September 1 and November 1, 2016. The third event is composed of two sub-events that occurred in close proximity to one another: the death of an American woman from a resistant infection on January 30, 2017; and the publication of the WHO’s list of most dangerous bacteria on February 17, 2017. A sample of 46 news stories was collected between January 1 and April 1, 2017. There were 46 news stories. The last event was the report published by the U.S. Centers for Disease Control and Prevention (CDC) on antimicrobial resistance, in which the agency mentions “nightmare bacteria”. The report was published on April 3, 2018 and the sample was collected for coverage between April 1 and May 1. The search resulted in 14 news stories.

The same sources and keywords were used in all searches, and only the dates were modified. The sources for this analysis are *The Globe and Mail*, *National Post*, *Ottawa Sun*, *Toronto Star*, *Vancouver Sun*, *Winnipeg Free Press*, *The New York Times*, and *Washington Post*. The keywords used in the search were AMR (OR) "antimicrobial resistance" (OR) superbug* (OR) "antibiotic resistance". There were 157 news stories for all four events. After removing duplicates and irrelevant stories, the final sample comprised 61 items, including hard news stories, editorials, columns, and letters to the editor.

Through QCA the content and meaning of texts is systematically described through the process of coding and the identification of themes and patterns (Hsieh & Shannon, 2005; Schreier, 2012). Each news piece was considered a separate unit of analysis. A codebook was developed, and the sample analysed using the qualitative analysis software NVivo 12.

The specific questions addressed are:

1. How do news media define AMR?
2. Who is given definitional voice?
3. Who is blamed?
4. Does media coverage of AMR show evidence of the process of reflexive modernization?

Reflexive modernization is a slow process –a complex social meta-change that takes place across social institutions, industries and actors and that transforms cultural understandings and practices– and the way in which it manifests is being negotiated as it happens (Beck et al. 2003, p. 13), therefore signs of a cultural shift could be found in news discourse. Media stories not only tell us about biomedical facts but also about who produces knowledge and who receives it, who is doing their job and who is not (Briggs and Hallin, 2016). Thus, each item was analysed in terms of whether it explained what is resistance (definition) and what causes it (causes), who is blamed for causing the risk (blame), if economic impact of AMR is considered (economic impact), whether political action is mentioned (political action), who is at risk (population at risk), whether modern professional and industrial practices were questioned²³ (reflexivity), suggested risk reduction measures (prevention), and what social actors were given voice (sources). A codebook (see Appendix 3) was prepared after a preliminary reading of the sample and available literature with nine main codes mentioned above in parenthesis, and sub-codes for each one. Risks are discursively constructed by defining them in specific ways,

²³ For example, if the stories challenged expert knowledge, or if there was an acknowledgement that human activities had exacerbated AMR, or if the stories suggested that a professional or industrial practice needed to be changed to tackle the risk of AMR.

identifying particular victims and assigning blame to certain groups; therefore, whether these aspects are present or absent from a news story and who is deemed either a victim or as causing the hazard, determine how AMR as a health risk is being constructed.

The sub-codes were not mutually exclusive, as the analysed news stories could have more than one definition of AMR or mention more than one cause. Therefore, all the codes present in each story were recorded during the coding process (e.g., if more than one actor was blamed or if more than one preventive measure was mentioned). The coding of the sample was an open process, thus new codes were created as they emerged in the coverage, and the codebook revised accordingly.

Policy documents and awareness campaigns

I analysed how the risk of AMR is constructed and communicated by health organizations and health authorities. I did a textual analysis of seven documents including policy papers, reports on AMR surveillance, as well as national and international action plans on antimicrobial resistance. I also examined the WHO’s website for antimicrobial resistance (World Health Organization, 2018a) and the WHO’s AWaRe campaign (World Health Organization, 2019c), which promotes antimicrobial stewardship. The analysis focused on how AMR is defined and framed, who is blamed for it, who is considered at risk, who is given voice or whose knowledge is prioritized, who is considered responsible for managing the risk, and what risk prevention measures are suggested.

The World Health Organization (WHO) has a prominent global role in defining the nature and scope of public health risks, influencing the rhetoric that will be used by governments, policymakers, health workers and media. The Public Health Agency of Canada (PHAC) has also produced reports on AMR and these documents also arguably

shape public understanding of AMR (at least in Canada) and inform prevention protocols that influence medical practice. Documents produced by these two health organizations were analysed, as well as the O’Neill Report (O’Neill, 2016), which examines the incidence and cost of resistant infections worldwide and gives recommendations.

The analysed documents were produced or commissioned by various national and international health authorities and organizations, including the Public Health Agency of Canada, the WHO, the United Nations, the Chief Public Health Officer of Canada²⁴, the Government of the United Kingdom, and the Wellcome Trust. These documents define antimicrobial resistance and a variety of implications (on public health, personal health, industry, medical practice) and on various scales (personal, community, national, global). Furthermore, the selected documents outline possible options to mitigate the spread of resistant organisms and foster adequate use of antimicrobials, from policy and regulation, to professional practices and personal choices. Several reports on AMR have been produced by multiple governments and institutions in the last decade. I selected for analysis a sample of documents published in the past five years and that have been influential globally and in Canada. Below I provide a brief description of each of the analysed documents:

(1) **“Global Action Plan on Antimicrobial Resistance” (World Health**

Organization, 2015): This document provides a framework for developing national action plans, including key actions that the various actors should take

²⁴ I differentiate between the Public Health Agency of Canada (PHAC) and the office of the Chief Public Health Officer of Canada (CPHO), Dr. Theresa Tam, because one of the examined documents was a report produced and published exclusively by the CPHO’s office, and not PHAC.

within 5 to 10 years to combat AMR. This document is the basis on which many countries are developing their own action plans on AMR.

- (2) **“Antimicrobial Resistance and Use in Canada: A Federal Framework for Action” (Public Health Agency of Canada, 2015):** This Framework outlines the federal approach to tackling AMR in Canada, including how various sectors should take action against AMR. The document underscores the need for cooperation on a local, national and global scale. It also outlines the Government's key focus areas and action plans.
- (3) **“Political Declaration of the High-Level Meeting of the General Assembly on Antimicrobial Resistance: draft resolution” (United Nations, 2016):** The member-states of the UN passed this draft resolution after holding the first high-level meeting on Antimicrobial Resistance. The document states that AMR should be considered a global public health risk requiring immediate political actions. In the document, the countries commit to develop national action plans to tackle AMR.
- (4) **“Tackling drug-resistant infections globally: Final report and recommendations” (O’Neill, 2016):** The Review on Antimicrobial Resistance (AMR), was commissioned by the UK Prime Minister, who asked economist Jim O’Neill to analyse the global problem of rising drug resistance and propose concrete actions to tackle it internationally. The Review’s final report and recommendations discuss the problem of AMR outlines solutions to reduce unnecessary use and increase the supply of new antimicrobials, and how these solutions can be funded while building political consensus around them. The report

revised the number of annual deaths worldwide from 700,000 to 1.5 million and estimated 20 million deaths by 2050. These numbers were received with shock and alarm by politicians and the medical community.

- (5) **“Tackling antimicrobial resistance and antimicrobial use: a pan-Canadian framework for action” (Public Health Agency of Canada, 2017):** This framework is grounded in a One Health approach, which recognizes the interconnectedness of humans, animals and the environment. The framework highlights the need for coordinated action across federal and provincial governments, private and public partners and the public across the human, animal and environmental sectors.
- (6) **“No Time to Wait: Securing the Future from Drug-Resistant Infections” (Interagency Coordination Group on Antimicrobial Resistance, 2019):** This is a report presented to the Secretary-General of the United Nations, that highlights the impending danger of antimicrobial resistance to human health while emphasizing the need for urgent action. It recommends developing new antimicrobials, vaccines, and diagnostics; to continue coordinated action across local, regional, national, and international levels; to invest in research and innovation; and to increase antimicrobial stewardship programs.
- (7) **“Handle with Care: Preserving Antibiotics Now and Into the Future” (Chief Public Health Officer of Canada, 2019):** This is a document produced by the office of the Chief Public Health Officer of Canada addressed to healthcare professionals and the general public. It explains the importance of using antibiotics responsibly and how unnecessary antibiotic use contributes to antibiotic resistance.

It also explains instances in which unnecessary prescriptions are given and what physicians and patients can do about it. In response to this report the Canadian Medical Association (2019) updated its policy on AMR, but also heavily criticized the Canadian government as complacent with AMR and not implementing adequate policies.

I performed a textual analysis to determine how the risk of AMR is defined, who is considered responsible for causing it, who is considered at risk, who has to manage the risk, who is given voice or whose knowledge is prioritized, and what measures are put forward for prevention and containment. I also examined changes in the discursive construction of AMR over time.

CHAPTER 4
THE RISK OF AMR IN THE WARD AND THE PROMISE
OF ANTIMICROBIAL STEWARDSHIP

This chapter examines how the risk of AMR comes into being in the hospital through various practices and narratives that shape healthcare providers' daily work. Drawing on fieldnotes and hospital interviews, it identifies rituals of infection prevention and control (IPAC), prescription practices, discussions around antibiotic use, and perceptions of risk on the part of healthcare providers about acquiring an antibiotic-resistant infection in the hospital and bringing it home. It also examines how doctors and nurses negotiate responsibility, blame, hospital surveillance, cultural practices, as well as personal and professional risks. I begin the chapter by discussing doctors' and nurses' perception of risk in the hospital, how the risk of infection is communicated in the ward, and the various ways in which healthcare providers negotiate risk exposure. Then, I discuss the use of antibiotics and the principles of antimicrobial stewardship in the hospital. Next, I examine the role of professional culture in prescription practices and how they influence antibiotic stewardship as a professional ethos. Finally, I explain how AMR remains a 'background risk' in the hospital, where various more imminent and local risks gain precedence.

HEALTHY PARANOIA AND THE RESPONSIBILITY OF SELF-CARE

Narratives of the 'dirty' hospital

The hospital is the symbol of modern medicine, a place where medical workers and medical technology heal the sick. However, the hospital is also a site of risk, where one can get sick or sicker by acquiring a whole new infection while hospitalized. Hospitals have been described as contaminated or 'dirty' in news coverage of antimicrobial resistance

(Chan et al., 2010; see also Richtel, 2019 and Richtel & Jacobs, 2019), a trope that is reinforced by studies which show that hospital wastewater is imbued with antibiotic-resistant bacteria (Hocquet et al., 2016). The ‘dirty hospital’ is not only a central component in media coverage but it is a narrative trope that hospital workers also express. During the period of observation, many doctors and nurses expressed feelings of disgust regarding various surfaces in the ward (shared telephones, keyboards, doorknobs, etc.) and frequently described the hospital as a site of contamination. For example, on one occasion, as I was standing by the computers where doctors meet to discuss cases, review test results, and fill out patient charts, two specialists could be overheard talking. They were discussing test results and one was looking for the computer mouse, which I had seen fall into the wastepaper basket earlier in the day. “Is this what you’re looking for?” I asked, while pointing to the bin. One of the physicians replied, “Yeah! Oh god! It was in the trash bin. Well here comes the MRSA!” (Week 6, Day 2).

The specialist made this comment in a natural manner and using a matter-of-fact tone, suggesting that the ‘dirty hospital’ trope is widely shared among hospital workers and accepted. A similar view was expressed by physicians in interviews, who worried about the potential risks of the workspaces they shared with dozens of doctors and nurses every day. They stated that these shared workspaces are, “very dirty, and shared phones are really dirty (...) all our shared equipment, shared between staff, I find that a little bit gross” (Doctor 2, interview). Another physician identified this shared spaces and equipment as riskier for hospital workers than patients’ rooms as they are spaces where “ people are thinking about something else and they are not thinking of infection control, and they

might put their hand to their mouth or not wash their hands after using the keyboard, before they go eat, that’s probably the riskier thing” (Doctor 3, interview).

These expressions of awareness and concern about the risk of contagion were frequently accompanied by comments about the risk faced by patients and visitors of acquiring an infection in the hospital. While doctors and nurses have accepted the risky nature of the hospital as a workplace, they constantly warn patients and visitors of the risk of hospital-acquired infections. For example, consider the following observations about the risk to patients of extended care in hospital:

Medical student tells nurse that parents asked about keeping [patient] in hospital for the next 6 weeks until surgery. Nurse said “you could tell them to think about it because at hospital [patient is] surrounded by sick people. I mean, RSV is going to be everywhere in a few weeks [winter flu season]. And MRSA, oh my god! That goes rampant at [other hospital], not so prevalent here, but still! [Patient] will definitely catch something here and then have the surgery postponed again” (Week 7, Day 1).

Physicians’ assessments of shared spaces and equipment as risky or as sites where infection is spread were not based on scientific evidence per se, but rather on their daily experience with these spaces and equipment. This form of situational knowledge also led to specific behaviours, as it was common to see doctors, nurses, residents, and medical students wiping down phones and keyboards before using them. Situational knowledge is closely linked to emotional experiences (Conway & Bekerian, 1987), thus physicians’ perception of risky or dirty workspaces could be the result of memories about a colleague’s behaviour in those spaces. However, this perception of risk could also be part of medical culture more widely and the feeling that as healthcare workers they need to perform certain rituals of hygiene. Wiping down equipment was commonly seen when doctors or nurses were in common spaces but working by themselves, thus the act of cleaning could be

witnessed by others around them. However, when two or more people sat down to work together on a computer (for example, to review test results), the preoccupation about the riskiness of the shared equipment was not expressed, and they did not wipe it down with disinfectant wipes. Similarly, when food was brought to the shared table, doctors and nurses frequently ate without expressing concern about the cleanliness of the surface where the food was placed. Therefore, perceptions of dirtiness and risk in the ward were mediated by situational and embodied experience, and not expressed consistently. Additionally, expressions of concern about the risk of hospital-acquired infections were common, for example when discussing the risk for patients and visitors if staying in the hospital for too long. This perception of the ward as a place of contagion was reinforced by the multiple signs on the walls informing, for example, of viruses and bacteria surviving on surfaces for many days or instructing workers and visitors to perform hand hygiene rituals.

Minimizing personal and collective risk

Hospitals have developed infection prevention protocols to reduce the risk of hospital-acquired infections, decrease the risk of infection transmission throughout the hospital and ensure cleanliness of medical equipment. These practices include hand hygiene routines, measures for isolating patients, and the donning of personal protective equipment (PPE) when entering an isolation room. These IPAC protocols are expected to be rigorously followed by healthcare staff and visitors, since it is understood that if one person breaks infection prevention protocols, then everybody is at risk of infection.

IPAC protocols are perceived as standardized, practical, technical, scientific, and rational behaviour based on germ theory (Macqueen, 1995, p. 117). Outbreaks of hospital-acquired infections have long been associated with poor infection prevention practices

among healthcare workers. In fact, there is evidence that inappropriate removal of PPE can be associated with hand contamination, and potentially contribute to the spread of antibiotic-resistant bacteria (Okamoto et al., 2019). In that sense, doctors and nurses are in a dual position of risk: they pose a risk of infection to their patients by potentially carrying germs into the room, but they are also at risk of acquiring an infection from the patient environment given the nature of their jobs. Besides facing health risks, hospital workers also face professional risks, as hospitals routinely audit employees for IPAC compliance while expecting them to monitor colleagues’ risk behaviour and report violations.

IPAC measures are embedded in a logic of governmentality, thus individuals are expected to monitor their own behaviour and detect signs of risk in the behaviours of their colleagues (Aradau & Van Munster, 2007, p. 107). Governmentality scholars argue that risks come into being through messages that reproduce and normalize the imperative of self-care and the responsibility to monitor how others behave (Lupton, 2013). In the hospital, risk messages call for behavioural regulation of hospital workers and visitors and legitimize and normalize infection prevention measures. Some scholars argue that, in hospitals, governmentality is actually combined with disciplinary power (Martin et al., 2013) through the presence of auditors that monitor worker behaviour for compliance with IPAC protocols; however, there are no clear professional sanctions for those who do not comply.

The risk of infection, including antibiotic-resistant infection, looms large in the ward and is communicated in three ways: (1) through visual messages (posters and signs on walls and doors), (2) through the ubiquitous presence of technologies of infection prevention and control; (3) and through a series of individual and collective infection

prevention rituals. Upon entering the ward, one encounters dozens of IPAC signs posted on bulletin boards, doors, door frames, walls, and next to specific equipment which make the risk of infection ubiquitous. These signs contain information about microbes, warnings indicating various levels of risk, guidelines, and instructions about the appropriate measures the individual should take, from donning protective equipment to cleaning one’s hands and instruments. For example, a sign on a bulletin board in the inpatient unit’s hallway (see Appendix 4) reminds that some antibiotic-resistant organisms live on surfaces for long periods of time. Methicillin-resistant *Staphylococcus aureus* (MRSA) can live in the environment for up to 7 months, while *Clostridium difficile* for up to 5 months.

Several patient rooms had red isolation signs on the door frame signalling that anyone entering should take additional precautions. Isolation signs (see Appendix 5) indicate the level of PPE required, from contact precautions (including gloves and gown when touching the patient or patient environment), to droplet precautions (gloves, gown, face mask and shield), to airborne precautions (N95 mask prior to entering the room). Hand hygiene signs are placed next to hand sanitizer dispensers, giving step-by-step instructions on how to properly use the sanitizer. There are also other signs reminding that “Purell should be used before donning of gloves” (wall sign, inpatient unit), “Cleaning your hands is one of the best ways to prevent infection” (wall sign, oncology unit), or simply “Just clean your hands!” (wall sign, inpatient unit).

Before entering an isolation room, individuals are expected to put on the PPE by performing a series of actions in a specific order. The routine varies depending on the type of risk (contact precautions, droplet precautions, airborne precautions), but they follow a similar pattern: 1) Rub hands with hand sanitizer for at least 15 seconds; 2) put on gown; 3)

put on a mask; 4) rub hands with sanitizer again for 15 seconds; 5) put on gloves. The individual should remove all the PPE before leaving the room, and then sanitize hands upon leaving the room.

Infection control in the hospital is facilitated by various forms of equipment on the ward, including hand sanitizer dispensers on the walls, bins full of clean gowns outside each patient’s room, boxes with gloves and masks, and disinfectant wipes. This equipment is meant to either clean surfaces that are deemed dirty (such as hands or stethoscopes) or to place a physical barrier between clean bodies and dirty ones, the healthy and the ill. These prevention routines are intended to protect the patient in the room as well as people outside and the healthcare providers, and they are communicated as a personal responsibility to preserve one’s health but also as a duty unto others. The risk of contagion is thus embodied, in the form of unclean hands, and the body carrying and spreading germs; and prevention is performed through rituals that seek to separate healthy bodies from diseased ones. Furthermore, IPAC rituals draw a line between what is clean and what Mary Douglas (1966) conceptualized as “dirt,” that which is out of place and pollutes. While bodily contact is acceptable in some instances, in the hospital bodies becomes dangerous and social order depends on the execution of prevention and hygiene rituals. Therefore, through these IPAC rituals the risk of pollution or contagion is materialized, enacted, and reinforced.

The abundance of hand sanitizer dispensers suggest that hands are considered particularly risky; if not cleaned frequently, they are presumed filthy and carrying germs. Various scholars have conceptualized hands as key media through which infectious disease spread (cf. Brown et al., 2008; Hamilton, 2019). For example, Hamilton (2019) examined

hand-hygiene posters in public spaces and found that these messages promoted an embodied pedagogy to develop a “habitus of hygiene” (p.263). Through the production of a “haptic visuality” (ibid.), the posters represented the body and all surfaces around it as contaminated and, therefore, invited the individual to know and inhabit their body and their environment in different terms, which demanded new hygiene behaviours and haptic etiquette. Similarly, risk messages in the ward construct hands as media for the spread of infection and, therefore, as risky. Despite this, doctors and nurses comply with hand hygiene to various degrees, not always sharing similar levels of haptic anxiety. This is expressed in the following field note:

Based on the number of wall Purell dispensers and signs telling to clean hands, you’d think that every surface in the ward is contaminated (...) However, no one seems terribly concerned (...) [the risk messages have] become part of the background and the risk is diffused (Week 10, Day 3).

While this behaviour could seem contradictory and even defiant, it suggests that doctors and nurses in the ward actually negotiate the biomedical knowledge regarding the risk of infection with situational and experiential knowledge. This negotiated risk behaviour leads to various levels of compliance with IPAC protocols and sometimes to taking extra prevention measures not outlined in the protocols, as illustrated above with the example of doctors and nurses cleaning shared workspaces and instruments.

Negotiating IPAC behaviour

Past ethnographic research shows that cultural understandings of dirt and pollution have greater influence on healthcare providers’ IPAC behaviour than formal protocols and standards (Jackson, 2016; Macqueen, 1995). In fact, medical work in hospitals is characterized by routines, norms and values that evidence a local culture or local way of doing things (Vermeulen, 2004) even when it comes to highly standardized and regulated

IPAC measures (Baral, 2015). And thus, prevention protocols –which are based on individual decisions, such as performing hand hygiene routines and donning and removing the PPE following detailed instructions (Cole, 2014)– are not always fully followed by healthcare providers.

Despite the abundance of risk messages, and healthcare professionals’ comments regarding the hospital being a risky place, in their daily work doctors and nurses exhibit lower levels of concern about the risk of infection. After a few days in the ward, doctors and nurses stopped asking if I was an auditor and their hand hygiene practices became less frequent and meticulous, and even their use of PPE became less rigorous. This is known as the ‘Hawthorne effect’ or ‘observer effect’, which contends that individuals modify an aspect of their behavior in response to their awareness of being observed (Monahan & Fisher, 2010), particularly if they feel scrutinized (p. 371). This effect, however, tends to fade once participants become used to the ethnographer (ibid.). I noted this change of behaviour:

As they get used to me, they use hand sanitizer less frequently, all of them. The first days I was surprised by how compliant they were but it’s wearing off. No one is using sanitizer nearly as frequently as before. They are still gowning up but less rigorously, they don’t use [sanitizer] before gloves for example (Week 2, day 3).

When feeling observed, hospital workers were more aware of the various protocols and guidelines they are expected to follow; however, when they do not feel scrutinized, physicians and nurses appeared to depend less on this professional expectation and more on experiential and emotional knowledge in their risk mitigation behaviour. Doctors and nurses also regularly eat in the wards, usually in the nursing station and around the shared computers –which they described as “gross”– and sometimes even during morning rounds while talking to patients’ relatives. Touching potentially contaminated surfaces such as

tables and door handles, and then touching food –sometimes shared food– can increase the risk of contracting antibiotic-resistant infections, which healthcare providers recognize. However, on long and busy days doctors and nurses sometimes cannot take lunch breaks and thus resort to eating while working. Other times shared food is provided by grateful parents as a token of appreciation for the care provided to their child. These snacks are a source of emotional comfort for doctors and nurses, who suspend momentarily their concerns over the risk posed by unclean surfaces to enjoy a moment of pause, a treat, and a chance to socialize with colleagues, if only for a minute or two. This was explained by one of the doctors interviewed in this study who said, “To be honest, I think about it [food on table by nursing station], but having Timbits is very convenient and a really nice little treat so I’m willing to overlook [the infection risk]. To be totally honest” (Doctor 6, interview).

Other times doctors and nurses interpret IPAC messages and rituals of prevention as inaccurate or exaggerated and they skip steps in the protocols because they consider the risk of contagion to be sufficiently low, or that the prevention routine is unnecessarily meticulous or time consuming. This suggests that risk prevention is constantly negotiated with individual perceptions of risk, informed by previous experiences, and more pressing needs, for example the need to care for too many patients and thus trying to work at a fast pace. A nurse explained how she negotiates risk reduction measures while working and she referred in particular to hand hygiene:

“I would wash my hands before I go in a room and after touching something. But they say there’s four points, so in each encounter there’s four points of handwashing. So, before you enter the room, before you touch the patient or before you put your gloves on or whatever, after you take the gloves off, after you leave the room, basically. That’s four points that people, I would almost certainly tell you, don’t do. They probably do it twice out of the four, unless we’re visibly soiled or whatever, we use our discretion (...) If I sanitize them four times every time I saw a patient, I have three patients, I’m seeing them every hour, even more sometimes,

that’s like hundreds of times that I’m sanitizing my hands over and over” (Nurse 1, interview).

Physicians and nurses would also skip IPAC measures due to incongruences, contradictions, and miscommunication regarding patients’ isolation status. These miscommunications and contradictions were a particular source of frustration for nurses, who enter their patients’ rooms several times during their shifts, because they made the decision of which precautions to take confusing. Isolation warnings on patients’ doors normally include instructions for the adequate precautions doctors and nurses should take. However, many times there were inconsistencies in IPAC signage because diagnoses get revised and the level of risk changes. I noted such an occasion: “the isolation warning is on the door but not the “isolation” sign on the door frame. Two specialists went straight into the room with no PPE before realizing their mistake and coming out to put on their PPE (Week 5, day 1). Other times miscommunication would happen regarding a patient’s isolation status when the medical team forgot to notify nurses of the change or forgot to update the isolation status on the patient management system Epic.

Other times doctors and nurses would express frustration over what they perceived as inconsistencies in IPAC guidelines from one patient to the next. For example, during rounds a staff doctor mentioned that the IPAC team had maintained isolation status for a patient even though they have no respiratory symptoms, and a member of the medical team commented with surprise: “Why do we have this kid in ISO? And then we have [another patient] not isolated when she has crusts all over her face and a very bad cold. If I were an oncology parent I’d be freaking out, but hey! what do I know? I’m not IPAC” (Week 13, day 2). Such expressions of surprise and frustration suggest that while doctors and nurses

are willing to negotiate their own risk reduction behaviour, they expect consistency in following protocol from others.

To maintain consistency in compliance, the hospital provides its workers with information on IPAC protocols, and every year doctors and nurses must complete an online training module. Still, for some healthcare professionals the information provided was not enough to dispel all of their doubts; some even mentioned that they do not get training specifically for IPAC when caring for a patient with an antibiotic-resistant infection. Doctors and nurses caring for patients with resistant infections such as MRSA, VRE, ESBL, CPO are required to adopt contact precautions (gloves and gowns). In the case of *C. difficile* physicians and nurses must also wash their hands with soap instead of just rubbing hand sanitizer. Some nurses, however, expressed frustration over what they perceived as IPAC incongruences. While many times doctors and nurses resorted to situational knowledge and previous experience in making risk decisions, they resented and considered it unfair that the hospital puts the responsibility of knowing the adequate prevention measures on the individual. In that sense, they believed that hospital management should be more proactive in training hospital workers on IPAC protocols. For example, a nurse lamented that “[Management] will say ‘well, you should’ve done the training’ or like ‘read the policy’. But they won’t go to you and say let’s go through it together, you know. They kind of...like, you should know this (Nurse 1, interview).

For other nurses, however, the notion of personal responsibility is fully internalized, and they assume that being proactive in obtaining necessary IPAC knowledge and complying with it is part of their job:

“You can go full force and do everything you’re supposed to do and not take shortcuts. Very minimal but some do take shortcuts and say, ‘oh but I’m just going

in there real quick’, you know? So I think the training is adequate, I don’t think there’s anything missing, and it’s up to you to be accountable also for your own training and to seek out training if you feel like you don’t understand the isolation protocol. So, I think a lot of it is being accountable for our own practices and how we practice PPE because the information is there” (Nurse 3, interview).

Complying with IPAC measures can be difficult for healthcare providers, as it takes time from their already busy days and wearing PPE makes it harder to assess and care for patients. A recent study found that nurses estimated that donning and removing PPE added between 20 minutes to two hours to their shifts, and admitted that in order to comply with these measures, they had cut some corners that could compromise care (Kaba et al., 2017, p. 201). As one doctor explained:

“I mean, it’s a pain. I hate putting it on. I fog up my glasses half the time, I can’t feel a femoral pulse half the time with the gloves, it’s very hot, it’s very uncomfortable, I hate it. But I hate getting sick more. And I hate getting my other patients sick even more. It definitely takes more time. But I don’t know, if we don’t take the time to protect ourselves and our patients, what are we doing here? Right? It’s not optional. It’s part of the workflow” (Doctor 6, interview).

Despite being monitored for compliance with IPAC measures, on the ward healthcare providers negotiated their risk behaviour with the need to get to their patients fast when they could not find the appropriate PPE or medical instruments in the rooms. Lack of adequate PPE was common and when faced with this situation doctors and nurses would negotiate their perception of personal risk with that of the patient. For example, “Doctor had to come out of isolation room to look for masks because there weren’t any in the anteroom. Lack of equipment in the rooms is also the main reason doctors and nurses walk out of isolation rooms in full PPE” (Week 11, day 3).

Donning the PPE was also challenging for nurses when they were taking trays with sterilized syringes and medicines into a room. Many nurses seemed in doubt as to where to place the tray and other instruments while sanitizing their hands and putting on the gown,

gloves and mask, an observation I later confirmed in interviews. While watching nurses work, I noted that many of them would place the trays with sterilized instruments on any presumable contaminated surface in the hallway (counter, on top of gown bin, even the floor) and then put on the PPE. The correct protocol, however, is to enter the room and leave any objects inside without coming into contact with the environment, and then leave the room to put on the PPE. Other times, healthcare workers were willing to assume personal risk to offer comfort to their patient, even if it meant creating a potential risk for other patients and colleagues. As one nurse explained:

“Especially if you walk in wearing the gown and the gloves and the mask with the visor, yeah, sometimes I tip my mask down and I show them my face because I know that when they see me a lot of them recognize me and will calm down. If they’re crying and scared, I will take it down, and then I’ll cover down as soon as I can.” (Nurse 5, interview).

Everyday doctors and nurses do their own evaluation of risk and weigh it against other priorities, such as saving time in a hectic day or calming a scared child, as well as situational and embodied knowledge. I saw many instances of these negotiated behaviors, from nurses walking down the hall wearing full PPE just to get a crying child some water (Week 2, day 3), to medical teams waiting a little longer to put an oncology patient back in isolation because of the emotional harm it will cause (Week 11, day 1). Other times, doctors and nurses negotiate their IPAC behaviour against what they consider a very low risk and the need to work fast. One of the interviewed doctors explained that

“With the PPE sometimes it seems like it gets in the way if you want to do certain things, say if you want to go in and discuss with the patient just something very quickly, you’re not going to be touching anything in the room, or if you’re going in to talk to the patient’s family, who may not have the disease, then PPE can certainly be a hassle. It sure doesn’t feel like it’s enough but sometimes it feels like it’s a little bit too much in certain situations” (Doctor 5, interview).

Infection prevention and control is aimed at reducing the risk of infection in the hospital, i.e. making it a less risky place. Some IPAC policies, however, are especially difficult for doctors and nurses to follow as they entail either a professional or social risk. As part of the hospital’s IPAC efforts there is an institution-wide policy to prevent ‘presenteeism’, which states that hospital workers should not go to work when sick. Presenteeism in medical settings is considered a public health hazard as it increases the risk of infection transmission to vulnerable populations (Widera et al., 2010) and may affect physicians’ performance (Oxtoby, 2015). Doctors and nurses shared their experiences regarding this particular policy and all interviewees agreed the rule should be followed, but they also agreed that it is practically impossible to comply with due to personal, economic, professional, and social reasons. Nurses, for example, were concerned about potential sanctions and even termination if they miss a certain number of workdays:

“So, if you call in sick too much [the hospital] starts to “help you” [makes air quotes] be sick less. I feel like I should tell the microphone that I just did air quotes” (Nurse 5, interview).

N2: There’s a specific number of sick days that you can’t exceed, and if you do then you go to a program, it’s called....I don’t remember what it is called. This program has steps in it, so let’s say step 1 they give you a warning and say next year you’re not supposed to call sick more than let’s say three episodes. So, if you call sick for more than three episodes then you go to step 2, and then they say oh now for two years you cannot call sick for more than three episodes. If you do, then you go to step 4 (3) and then I think they can [makes a gesture with hand]...

G: Terminate you?

N2: Yes, terminate you. So, you know what I mean? You’re exposed, you get sick more than regular people, and at the same time you can’t call sick. But at the same time, you can’t come (to the hospital) because you’ll expose the patients. So, it’s always stressful to get sick (Nurse 2, interview).

In the case of doctors in the ward, the hospital has a system that pairs them up, so that if one gets sick the other one covers their shift. This system, however, is not automatic

as the doctor who has fallen ill needs to call the replacement and ask them to leave other duties or go to work on their day off in order to cover for them. The doctors explained that asking for a replacement feels like asking a favour more than a right as employees:

“It’s very difficult to call a colleague in to cover, or at least some people feel that way. Some people have no problem, I’ve covered for a few of them. I wouldn’t speak for everybody but for example, the challenge that I’ve had is that I was sick for [holiday] and there’s no backup person if I don’t show up. I have to scramble to find someone to cover, ruin their holiday. So even though I am aware of all these things, and I was super careful when I was here, I didn’t touch anything and I washed my hands every time I turned around, I probably should not have been here. But who was I going to call on [holiday]? So, there’s no fear of repercussions but there is a very big feeling of responsibility with your colleagues” (Doctor 1, interview).

I myself have worked through many infections, you know, protecting my patients the best that I can. It’s so hard for us to take a day off (...) Because who’s going to cover our clinics. That’s going to inconvenience one of my colleagues who is now getting pulled in to do this. Or if I’m up on the ward, then somebody has to cover me for a couple of days, and then there’s all this guilt around that, and then now you owe that person (Doctor 6, interview).

Thus, doctors rely on an informal system of favours in which being sick means disrupting a colleague’s schedule and then owing them a favour, while also relinquishing control of patient care to said colleague. This meant that many times doctors and nurses went to work while visibly sick and potentially risking passing the illness on to their patients and colleagues. For example: “Senior resident is clearly sick. He sounds hoarse and looks unwell. Why is he here” (Week 8, day 4) and “There seems to be a cold going around the team. Staff doctor is sick with a terrible cold, yet they are here rounding” (Week 11, day 3).

Despite not facing professional repercussions for missing workdays, physicians felt uncomfortable staying home when sick which, they explained, is also part of medical

culture. The physicians mentioned that as much as they expect their colleagues and trainees to show up to work even if sick, so are they expected to do so:

“Yeah, [the stay at home when sick policy] is a load of crap...sorry. Nobody does it. I don't know. I think in part is the fact that all doctors have a very strong type A personality. You can't be seen as weak. And then there's also the guilt. If you're not showing up for work, somebody else is going to have to pick up the slack (...) And I think that's a culture shift that we need, when you are sick in bed feeling so bad because someone had to cover, but we're not doing anyone a favor by coming in and spreading our germs” (Doctor 4, interview).

“I've seen physicians like wheel themselves around in chairs because they are feeling so unwell, but they don't want to call in sick. Maybe it's a cultural thing, maybe physicians are masochists, I don't know. I'm guilty of it too (...) and I've seen colleagues sort of roll their eyes about residents who take sick days, as if they're taking a sick day and I'm here when I'm sick” (Doctor 6, interview).

“I think it's a long-standing physician cultural thing (...) this [work] is supposed to come first and foremost everything else in our lives, but that's why physicians are burning out, that's why physicians have a high rate of suicide, and mental health [problems], and addiction, and depression, and divorce, because we don't realize that we're human beings. And so, it's cultural within our profession but it's also cultural within our society, that I'm expected to cure everything, that I'm expected to know everything” (Doctor 2, interview).

Thus, the risk of spreading infection is weighted against professional practices and the fear of social judgement by colleagues. In this instances, physician's biomedical knowledge is suspended in favor of a cultural understanding of a social risk. This suggests that different kinds of risk knowledge co-exist and are in constant dialogue and negotiation, something that also becomes evident in the next section.

The bugs cannot come home! Cleansing rituals

As doctors and nurses believe the hospital to be a 'dirty' environment, many of them extend the infection prevention precautions into their personal lives in order to reduce the risk of contaminating their homes and getting their families sick. Research has shown that nurses tend to perceive themselves as sources of risk and thus extend the hygiene

routines, similar to cleansing rituals, performed in the hospital to their homes to minimize their role in the spread of infection (Jackson, 2016). In interviews I confirmed this perception is not only true for nurses but also for physicians. Most healthcare providers expressed concern about ‘taking a bug home.’ As one physician explained, “I’m always terrified. Usually when I get home, I take everything off and all goes in the wash, if I’ve been in the ward. If I’ve been down here [in the clinic] probably not, which is silly because if there’s MRSA up there [in the ward] then there’s probably MRSA in my computer” (Doctor 1, interview). A similar feeling was expressed by a nurse who referred to the risk of infection she posed for her children and the anxiety she feels about it:

“I make sure I wash my hands before I leave [the hospital] and use the sanitizer, Purell. And before I touch my kids at home I go straight to the bathroom and wash my hands, take off all of my scrubs and stuff, because I have four kids at home, so it’s going to be trouble if they get sick. So yeah, it’s always in my head” (Nurse 2, interview).

During interviews, doctors and nurses were quick to clarify that their cleansing rituals were not based on scientific evidence, but instead were based on their embodied experience of the hospital as a place of risk. One physician explained that “I’ll just start viroxing [disinfecting] my bag, my shoes (...) I’m trying to become more relaxed about it [because] as long as you’re aware of it and doing what you can, you also have to live your life without being paranoid” (Doctor 6, interview). However, they were also quick to devalue their perception of risk in favour of a scientific explanation, stating that if they wear their PPE correctly throughout the day –i.e. following protocol–, then such cleansing rituals are “pointless”. For example, one physician explained:

“If I know a patient has a resistant infection I might even...I mean I’m always careful, but I might be even more careful just because I don’t want to bring anything home (...) Once in a while if I’ve been in the wards where everybody is sick, and I

mean, this is not based on any science (...) I just change my clothes and have a shower. It’s probably pointless because I am wearing the protective equipment and I think it’s more psychological than anything, but I will do that at times” (Doctor 4, interview).

These additional infection prevention practices or ‘cleansing rituals’ performed by most of the doctors and nurses interviewed in this study evidence their perception of their workplace as contaminated and risky, as well as the emotional and psychological component of “feeling dirty” and risky themselves and their effort to feel “clean” again. When discussing risk of contagion in the hospital, most healthcare providers referred to respiratory viruses, such as influenza or RSV, but equally prominent was the resistant bacterium MRSA, which was presumed to be on almost every surface. Still, doctors and nurses negotiated various levels of IPAC compliance based on their own evaluation of risk and the need to take care of what were considered more pressing issues, such as getting to the bedside faster, saving time, etc. This perceived gap between personal feelings of risk and IPAC protocols puts into evidence a constant negotiation between the expert knowledge that healthcare professionals have –including biomedical understandings of contagion and of infection prevention and control– and their own personal and situated experience of risk, as well as cultural ways of knowing risk.

RESPONSIBLE ANTIBIOTIC USE AND THE ETHOS OF ANTIMICROBIAL STEWARDSHIP

The most obvious way in which the risk of antimicrobial resistance is enacted in the hospital is through the Antimicrobial Stewardship Program (ASP), led by members of the Division of Infectious Diseases (ID) and Department of Pharmacy. Antimicrobial stewardship refers to the judicious use of antimicrobials, i.e. deciding correctly whether a patient needs antimicrobials and choosing the right medication, dose, and length of treatment to preserve the effectiveness of antimicrobials (Barlam et al., 2016; Public Health

Agency of Canada, 2017, pp. 18–21). It is considered a key measure for tackling the global spread of AMR (Centers for Disease Control and Prevention, 2015; Chief Public Health Officer of Canada, 2019; Public Health Agency of Canada, 2017; World Health Organization, 2015). Through the ASP the hospital seeks to optimize clinical outcomes while reducing the spread of resistant organisms, as well as reducing health care costs. The ASP team meets twice a week with the medical teams in the inpatient unit, intensive care unit, and surgery ward. During these rounds, physicians discuss all of their antimicrobial prescriptions for patients not followed by the ID service. This prospective audit and feedback process allows attending doctors and their teams the opportunity to reflect on their use of antimicrobials and discuss with the ASP team (comprising an ID specialist, dedicated pharmacist, and sometimes one or more ID residents) why they prescribed each antimicrobial and whether the drug is the best option and the dosing is correct. They also discuss whether there is sufficient evidence (i.e. published peer-review studies) to use antibiotics with specific diagnoses, they evaluate the risks and benefits of waiting a few days before giving antibiotics, extending the treatment or reducing it, or maintaining IV antibiotics versus switching to oral ones. Thus, successful ASP rounds suppose a rich discussion between the ASP team and the medical team, i.e. having enough time to discuss each patient on antimicrobials and for the medical team to ask questions and the ASP team to listen to the details of the case before making a recommendation. After a successful ASP round the medical team can be more confident that their final decision on treatment is the most appropriate both in terms of treating the patient and of responsible antimicrobial use.

The ASP seeks to generate awareness of the impact of prescription practices on the spread of AMR while also instilling an ethos of stewardship in doctors, residents, and

students. The ASP is also a required organizational practice under Accreditation Canada.²⁵

The ASP is widely recognized and valued in the hospital and a source of pride for many physicians who praised the initiative:

“[ASP rounds] are a good teaching moment for the team, and this is a good chance also if not sure about something to run it by somebody who’s got a lot of experience, because we don’t want to overprescribe but then sometimes we can have a bit of diagnostic uncertainty (...) [ASP] is embedded in a larger big picture view for the hospital that links to hand hygiene practices, contact precautions, and self-monitoring and quality improvement. So, it’s nice that the hospital, from my point of view, we have strong leadership on that and people I think recognize the importance because it’s valued” (Doctor 3, interview).

“it’s a really good educational experience and because of ASP I’ve only benefited my patients (...) I think it gets patients off antibiotics faster. I think it gets them on the right antibiotics sooner and the duration of therapy I think is optimized through those rounds” (Doctor 6, interview).

ASP rounds are also a mechanism to teach medical teams about how specific antimicrobials work, to discuss new protocols of antimicrobial use, and challenge cultural prescription practices, i.e. the use of certain antibiotics without exploring new, better alternatives, or giving specific doses even if not the most effective because it has always been done that way. I witnessed several ASP rounds during my fieldwork. The excerpt from my fieldnotes below describes an instance in which an ASP expert helped a resident optimize their treatment while also making sure the adequate antibiotic was being used:

[ASP expert] discussed antibiotic prescriptions with residents. Told them not to prescribe based on white cell counts but to assess the patient head to toe and decide based on this examination whether it is a viral or bacterial infection. Also told a resident that if his patient doesn’t have a severe infection, only a moderate one, he shouldn’t be prescribing a third-generation antibiotic reserved for more severe cases (Week 3, day 2).

²⁵ Accreditation Canada is a not-for-profit organization that is dedicated to working with patients, policy makers and the public to improve the quality of health and social services. The organization has accredited more than 1,000 health and social service organizations in Canada and around the world.

Most of the interviewed physicians highlighted the value of ASP rounds not only as a way of making specific treatments better but also to think critically about prescription practices, particularly in the context of increasing antimicrobial resistance. For example:

“It’s too easy sometimes to just do things because that’s how it’s always been done but when you sit down and have to discuss and justify why you’re picking an antibiotic over another one or why you’re even treating with antibiotics, it makes you think about your practice and it makes us better physicians (...) it helps us to get out of that culture and to challenge yourself, OK so I’ve always used this antibiotic, maybe it’s OK, maybe that’s the right thing to do but let’s have a discussion because maybe there’s something better. Or maybe antibiotic resistance patterns have changed” (Doctor 4, interview).

The pedagogic component is a key aspect of the stewardship program as most physicians are not experts in antimicrobials. As a result, they usually take the ASP team’s advice, such as discontinuing antibiotics, changing medication or adjusting dosage. During ASP rounds I observed that when the ASP team sat at the table with the staff doctor and residents the discussion was far richer and there usually was an actual moment of critical reflection about antibiotic use and prescription practices. However, when the team remained standing and seemed to be in a hurry, the meeting tended to be shorter confined to specific cases. The success of ASP rounds was also dependent on how seriously the staff physician took those meetings and whether they encouraged residents to attend as well.

ASP rounds are a requirement for medical teams. Although many medical team members expressed that they found them beneficial, they also lamented having to stop their work to take part in these mandated meetings. Additionally, some physicians considered ASP rounds redundant as the ID team can be called to consult on cases at any time, while others interpreted the ASP as an “infectious diseases issue”. On a few occasions, by the time the ASP team arrived for rounds the medical team was not in the ward, suggesting that

antimicrobial stewardship is still not understood as a requirement of medical practice. The following fieldnote describes one of these occasions:

ASP specialist came for rounds but the staff doctor and team are not around. They called the pharmacist, who said “since no one is there you should just forget it”. ASP specialist left saying they had to move on to “other more important things I need to do with my time.” This shows that medical teams don’t always take ASP rounds as seriously as regular rounds, particularly on very busy days. There seems to be a disconnection between the medical teams and the ASP team. ASP rounds happen so informally that many people just forget they exist. (Week 9, day 3).

Thus ASP rounds were intended as moments of reflexivity for physicians about their antimicrobial use, but other times these discussions did not happen and these lost opportunities reveal that medical teams negotiated their obligation to attend these meetings, i.e. to curb a global risk that is perceived as distant, with activities that were perceived as more pressing, i.e. immediate risk. Thus, antimicrobial stewardship is not a consistently shared ethos of practice among medical staff in the hospital, not because physicians do not understand the global risk of antimicrobial resistance, but because they need to constantly modulate their practice with stewardship guidelines and institutional requirements that come into conflict with their own situational and embodied experience. Additionally, this also shows that the risk of AMR competes for the medical team’s attention with other more pressing and immediate risks.

Ultimately, the decision regarding treatment lies with the attending physician, and most of the time they took the advice received from the ASP experts; however, in some cases they decided to go against this advice. During my fieldwork I observed that staff doctors tended to ignore the advice given when the ASP team was either too rigid with the recommendation, for example not considering some particularities of the case, which was perceived as an intrusion from an ID specialist, or too lax with the recommendation, which

made it seem like the suggested change was not important. Staff doctors were most receptive to the recommendations when the ASP team first listened to all the details of the case attentively and then gave a recommendation and explained the reasons behind it. Still, physicians are not expected to blindly take the advice of the ASP team, but rather to reflect on their prescription practices. As one of the interviewed doctors explained:

“I take with a grain of salt that ASP has never seen my child, they’ve never seen the patient. So, if the patient is very sick, or unwell, or is scaring me in anyway then I will likely also go with broader antibiotics (...) I do sometimes reserve judgement when ASP is telling me to go lower and I just, there’s something about the kid that is to me like, this kid was too sick or... you know?” (Doctor 1, interview).

Other times, the medical team will follow recommendations from ASP experts even if not fully understanding the reasons behind those recommendations. For example:

Fellow and staff [doctor] showed up on the floor as residents were working on discharge plans. Senior resident told them that ASP specialist was OK with changing antibiotics for a particular patient but said she isn’t a “big fan” of the antibiotic the senior resident had suggested “because of something to do with resistance”. Staff [doctor] rolled his eyes and said “all right, sure. Go with her suggestion” (Week 8, day 2).

While ASP rounds are a moment explicitly devoted to reflection and antimicrobial stewardship, this ethos of practice is sometimes also palpable during morning rounds.

When a pharmacist is available to do rounds with the medical team, they fulfill the role of antibiotic steward, challenging cultural prescription practices, recommending to the staff doctor and residents the most precise antibiotics for the infection they are treating, adjusting doses, suggesting ways for administering the drug, and even coming up with solutions for bad-tasting suspensions (a recurrent concern in a pediatric hospital, where administering unpalatable drugs can demand a lot of time and persuasion skills from nurses and increase the risk of non-compliance). Medical teams value the expertise pharmacists provide and recognize that they push the stewardship ethos during rounds. For example:

“I would love to have a pharmacist all the time. Just going beyond antimicrobials, I think that our patients are getting more and more complicated and are on more medication, and so even something as simple as interactions and side effects of medications it’s just nice to have someone with that expertise reminding us to do the ECG, check the levels, that sort of thing, it would be incredibly helpful” (Doctor 6, interview).

Sometimes pharmacists would make recommendations to improve treatment by changing the antibiotic, the dose, or the length of treatment with the goal of making the treatment more effective, and thus breeding less resistance, but the team would dismiss the recommendation. For example:

Team discussing on rounds which antibiotic to give to a patient with chronic ear infections. The pharmacist points out that the chosen antibiotic (ceftriaxone – third generation) is not the first option of treatment for otitis media but is rather given to patients who have infections that are resistant to penicillin. The team did not explicitly explain why the pharmacist’s recommendation was dismissed and ceftriaxone was continued (Week 8, day 5).

A similar role is also played by nurses, who during rounds provide an update of how the patient has been doing for the past 24 hours (vitals, feeding, medications, patient’s/family’s concerns, etc.). They also see rounds as an opportunity to advocate for the patient, reminding doctors of forgotten medication, and asking when isolation status could be discontinued. For example:

Nurses constantly advocate for their patients’ comfort. At rounds or at any other time they ask doctors if IV can be removed, if isolation can be discontinued, if IV antibiotics can be switched to oral, etc. In that sense their advocating usually brings up options the doctors had not yet considered (or didn’t know were a problem for a particular patient). For some things there are general principles (like 48 hours afebrile on IV antibiotics before switching to oral or symptoms of infection for isolation). But it’s really the nurses who bring up these things and who impact prescriptions and isolation status (Week 6, day 2).

While the role of nurses in the implementation of antibiotic stewardship programs in hospitals has been recognized as “vital” (Wiley & Villamizar, 2019, p. 1), all of the interviewed nurses said that they have no role to play in antimicrobial stewardship because

“the ultimate decision is by the physician, the pediatrician, or whoever is the specialist”

(Nurse 3, interview). However, all the interviewed nurses thought that reminding doctors of forgotten medication and making sure the doses and length of treatment are correct is part of their job. This has been recognized as a key role played by nurses in antimicrobial stewardship (Monsees et al., 2018, 2019; Olans et al., 2016). While the interviewed nurses understand the importance of optimal antimicrobial use, they do not consider themselves part of the stewardship efforts:

Some residents will listen to you, some won't. But I always find that, personally, I will bring it up if I have a concern, or I'll even ask like if they're on three antibiotics I'll be like 'oh, juts out of curiosity why are they on three?' And at times, just bringing that up [the doctors] say 'oh, maybe we can cut one out' or whatever, or maybe we should start them on something [medication] (Nurse 1, interview).

When they prescribe there's always the question of why are you prescribing this medication, and for how long are we giving it. So, if it's for seven days I make sure to count, because if they stop it before then I'll be like no, we should still be giving it. So, we question it but it's not us, it's the doctors' decision (Nurse 2, interview).

In asking doctors to explain their antimicrobial prescriptions and reminding them of the medications patients are on, nurses perform a crucial role in antimicrobial stewardship. However, the interviewed nurses still felt that they have no part in it as stewardship is considered physician territory. In that sense, nurses considered that asking medical teams to explain why they decided over one antibiotic over other, or why certain length of treatment, would be perceived by physicians as an intromission. Power relations between physicians and nurses also come into play as older nurses felt more comfortable talking to doctors and residents than younger ones. Still they referred to medical students, residents and physicians as many times shutting down their questions, so they were careful in the way they questioned prescription practices.

Changing and challenging guidelines of antibiotic use

Recommendations for antibiotic duration of therapy are periodically revised vis-à-vis new evidence, for example showing that the dose or length of treatment can be reduced without compromising the effectiveness of the drug. Guidelines are also revised for which drugs to prescribe for different types of bacterial infections, and new treatment options when bacteria develop resistance to the usual treatment. Additionally, practices can be modified to reduce the number of antimicrobials required as prophylaxis to enable treatments such as chemotherapy. This change in guidelines, however, is not always seamless as these changes are negotiated against previous experience. The following fieldnote is an example of this, as a resident asked the pharmacist for information on new guidelines but ended up deciding based of situational knowledge:

Senior resident asks pharmacist what the length of treatment is for osteomyelitis. Pharmacist says for cellulitis is 1-2 weeks and for osteomyelitis it used to be 4-6 but now it's recommended to do 3-4. But the patient's osteomyelitis hasn't been confirmed, so maybe it's just cellulitis, they wonder. But resident says that because of [the patient's] pain and how long it's taking them to improve it is most likely osteomyelitis²⁶. So, they decide to do the longer treatment (Week 8, day 3).

Sometimes changes to prescription protocols are the result of increased AMR. For example:

Antibiotic resistance was discussed in rounds. Pharmacist said studies have shown increased resistance for the *Helicobacter pylori* they are treating, so now the recommendation is 14 days instead of 10. This new recommendation is known as the Toronto Consensus²⁷. Another recommendation from the consensus is using 4 instead of 3 agents (so it's a cocktail of antibiotics) in case the bacterium is resistant to any of them (Week 8, day 2).

²⁶ Physicians usually use imaging to diagnose osteomyelitis.

²⁷ (Fallone et al., 2016)

Another protocol of antibiotic use that has recently changed is the age of infants presenting with a fever who automatically get antibiotics, and one of the interviewed doctors explained the institutional nature of these decisions:

“It used to be under three months, that was protocol, and everyone would get antibiotics. (...) Under a month, if you have a fever, 99% of the time you’re getting antibiotics by guidelines. So that’s a guideline-driven thing (...) [In this hospital] is really six weeks, it’s a bit institution-dependent, that a lot of them will get antibiotics because you won’t know, right? (...) Because the risk of missing an infection is too big” (Doctor 1, interview).

This same doctor then explained how prescription practices are not only part of institutional culture and how each medical institution trains residents and students, but also differ across provinces and territories. These examples show that expert medical knowledge is fluid and constantly changing in light of new evidence, but also changes depending on institutional and social context. Thus, prescription guidelines and protocols are as much based on what is considered scientific evidence at the time as they are on political and institutional structures. In addition to this, physicians also rely instinctively on previous experience when deciding treatments. Some doctors referred to cultural ways of prescribing, for example, a physician explained that in the province where she previously worked “We always did high dose amoxicillin for everything, we never did low dose;” however, upon moving to a different province it became clear that her previous prescription practices were viewed as inadequate, as her new colleagues prescribed in a different way:

“when I came here [to a different province] I did high dose amox, because that’s what I had been trained on. At home we use ceftriaxone a lot because it was once a day and we could send the kid home, and so I came here, and I used ceftriaxone a lot because part of what you learn is within your environment. And so [ASP specialist] was like “you did what?!” [laughs] (...) the vast majority of strep pneumos are going to be susceptible to low dose amoxicillin. So, you just use low dose” (Doctor 1, interview).

Each medical specialty also has its own prescription culture and use antimicrobials for various different purposes. For example, in oncology antibiotics are regularly used to enable chemotherapy or as prophylaxis when patients present with febrile neutropenia. Oncologists have specific protocols of antibiotic use, but the rise in AMR lead to changes in guidelines in the past years. One of the interviewed physicians explained that 10 years ago when patients presented with neutropenic fever, they would be prescribed two antibiotics. Now, however, “studying the patterns of what organisms these kids get, we had a guideline change about 5 years ago saying you only need Piptazo.” Reducing the number of antibiotics “provides a little bit of solace for me too that we’re not trying to over treat them but we’re aggressive, and that there are people in the world who are concerned about [AMR] and trying to make sure we’re not over treating for what we don’t need” (Doctor 2, interview).

Changes to antibiotic recommendations are also discussed during ASP rounds. The excerpt below is an example of a discussion between an attending doctor and the ASP expert, in which the latter explains the active effort to have some unofficial antimicrobial use guidelines changed so that physicians make better choices in the antibiotics they prescribe, based on the bacterium they are targeting:

Staff [doctor] asked why an antibiotic that works better for gut bacteria is routinely prescribed for nose and throat issues (...) [ASP] specialist mentioned that they are trying to change how antibiotics are prescribed in this situation so that the best antibiotic for the part of the body that hosts the infection is used: “we need to change the culture of how we prescribe antibiotics”. This led to an interesting conversation about how different antibiotics are absorbed differently in various parts of the body. The specialist said “consult with your [specialty] colleagues since they are involved (in the case). Make sure they are on board with the switch”. The specialist recommended to “highlight the positives of the new antibiotic” by mentioning that it is better absorbed and targets better the mouth and nose anaerobes (Week 8, day 2).

This example shows that changing cultural prescription practices and guidelines requires more than evidence showing the suggested medication works better; it also requires supporting the prescribing physician in learning more about how different antibiotics work and why one may be the optimal choice. The medical teams in the ward make the final decisions regarding patient treatment, and thus they are the most responsible for judicious antimicrobial use. Sometimes physicians, particularly junior ones, would think critically about their antibiotic prescriptions and share concerns about them with the rest of the team. For example, sitting at the doctors’ table I observed a conversation between a junior attending doctor, her senior resident and a specialist in which the attending was questioning her own decision to treat an infant with antibiotics:

At doctors’ table, [staff doctor] talks with another doctor and senior resident. Staff discusses the treatment they gave to a 3 month-old patient with symptoms they thought were a UTI. However, they were second guessing their decision to put the patient on a course of antibiotics before the cultures were back. The other doctor said if they were so sure [about the infection] then it was OK to prescribe antibiotics (...) [Staff doctor] said they were used to their previous hospital where patients were put on 10 days of intravenous antibiotics before even ordering labs (Week 1, day 3).

The example above shows that physicians are sometimes unsure of their antibiotic prescriptions and may critically reflect on their prescription decisions. In this case the doctor was concerned about the secondary effects of antibiotics on her infant patient, but at the same time they were longing for the antibiotic protocol at their old hospital, which removed completely the responsibility for inadequate antibiotic prescribing by the physician. On another occasion a senior resident and medical student were discussing an infant patient who presented with a fever and a test confirming a UTI, but who had also received a vaccine the day before and the doctors suspected the patient may have had an allergic reaction. The resident and student were trying to decide whether to put the patient

on antibiotics –as per the protocol for febrile UTI–or not do it and assume that the fever was being caused by the vaccine:

MS: So, I guess we should put her on antibiotics. We don’t know the bug so maybe [amoxicillin]?

R: Yes. But wait...

MS: The UTI sure explains the fever.

R: Right, but is it really a febrile UTI or is it a post vaccination fever? Check the white [cell] count.

MS: Hmm, that’s weird. Her white count is only +1. That wouldn’t cause a fever.

R: Yes, that’s weird. But we cannot call it an afebrile UTI either.

Both check [the antimicrobial stewardship mobile application] Spectrum on their phones to choose an antibiotic and dose.

MS: So, I don’t know if [ampicillin] or amox. Amox is like 90% susceptible but amp is only like 80%. How susceptible should it be to prescribe?

R: Good question. I don’t know. Let me check with [staff doctor] to make sure she wants to treat.

Resident sends text message to doctor.

MS: But +1 white cell count could be her baseline.

R: Right. We should check her history. But even if this is unrelated to her fever and other problems, we still treat afebrile UTIs in children. We need a better medical history. Let’s go see her.

This example shows an instance in which a resident and a medical student were questioning the protocol (i.e. treat febrile UTI with antibiotics) and looked at the bigger picture of the case. In the end they decided against treating with antibiotics and the patient recovered within a couple of days, confirming a reaction to the vaccine. In questioning the protocol, the resident and the student took more time to assess the situation and were judicious with their use of antibiotics. Their explicit motivation was, however, not to reduce the spread of AMR but to avoid the side effects of antibiotics on the patient.

Discontinuing unnecessary prescriptions

Overprescribing has been identified as one important driver of antimicrobial resistance (Chief Public Health Officer of Canada, 2019; Public Health Agency of Canada, 2017; World Health Organization, 2015, 2019c) and in Canada 92% of antimicrobials are

dispensed in the community, many of which are unnecessary prescriptions for colds, flu, and viral sore throat (Chief Public Health Officer of Canada, 2019, pp. 8–9). Many patients admitted to the hospital come with antibiotics prescribed by family doctors in the community and the medical team then needs to assess whether the antibiotic is necessary or if it should be discontinued. As one of the interviewed physicians explained:

“It’s very common for us to stop antibiotics, probably most of it is from experience. But I guess the other piece is our capacity to monitor children, for better or for worse, is one of the powers of being here at the hospital, so I think we’re more comfortable discontinuing antibiotics and say if they don’t get a lot worse during the next 24 or 48 hours it means antibiotics were not doing something to make them better and if not then they were going to get better anyway. So that’s one part of that decision-making. But it’s also very practice dependent, some people I think will be less aggressive in discontinuing antibiotics, other people will be a little bit more. The one down side with discontinuing antibiotics though is that if they were working and they were getting better, you’ve probably prolonged the hospital stay by a few days because the patient is going to decline and then you’re going to have to restart antibiotics, so it’s not a risk-free practice” (Doctor 5, interview).

A similar view was expressed by another doctor who said, “Often we will stop antibiotics that were started in the community or even here in the emergency department and (...) most of the times it’s the right call, [but] once in a while you realize a few days later that oops, maybe the child did need the antibiotics and you put them back on” (Doctor 4, interview). While discontinuing community prescriptions is a common practice on the ward to ensure judicious use of antimicrobials, another doctor justified those prescriptions as the only option community physicians have since they do not have the diagnostic technology available in a pediatric hospital, thus suggesting that expert and risk knowledge are situational and dependent on the availability of diagnostic tools, time, and other resources. In that sense, a treatment course that is deemed acceptable in the community is not actionable in the hospital:

“Every week that I’m on the ward I’m stopping antibiotics that people got in the community. Depends on what the indication was, I mean we don’t want to end the treatment course because they can look better because they’re now partially treated. But again, for minor type infections, so [the family doctor] thought it was maybe pneumonia and they started them on antibiotics but they didn’t do a chest x-ray and now I’ve done the chest x-ray and it looks clearly viral, I’m happy to say you don’t have a bacterial pneumonia, it’s a viral pneumonia and stop their antibiotics. And that’s no judgement against the community physicians, oftentimes they’re just seeing somebody and they’ve got a 15 minute appointment to figure it out. The person looks sick and so they are being conservative because they prefer that they wouldn’t get worse” (Doctor 3, interview).

Other antibiotic prescriptions that are questioned are those made in the emergency department before the patient was admitted to the ward. Patients who arrive to the emergency department with suspected bacterial infections and a fever may get a dose of a broad-spectrum antibiotic after cultures are drawn, depending on their clinical status. After the patient is admitted, the medical team overseeing them in the inpatient or oncology unit will decide how much and how often to give antibiotics and whether to continue with the medication, change it, or discontinue it. Many physicians on the ward question the antibiotic prescribing practices among emergency doctors. As one of the physicians interviewed in this study explained, they find difficult to discontinue what they consider unnecessary prescriptions, with or without further testing, because they provide the patient’s family with a feeling of having taken action, of ‘doing something’:

“I think [the emergency department] puts too many kids on antibiotics that don’t need them, and once they’re on is much harder to stop them than it is to start them once they’re in the ward (...)sometimes is very challenging to contradict what has already been talked about, especially in a family that is maybe feeling anxious or has really anchored on to that diagnosis and here I am coming in and changing the whole plan” (Doctor 6, interview).

Other doctors expressed concern about antibiotic treatments in the ER because admission into the ward is a lengthy process and many times patients missed their second dose of the antibiotic. Depending on the antibiotic, that isolated dose does not necessarily

help treat the infection if the treatment is not continued but can actually select for drug-resistant organisms. The fieldnote below describes a conversation between three doctors about penicillin prescriptions in the ER:

Senior resident talking with two doctors at the table, she seemed frustrated and commented on a conversation she had had with an infectious diseases specialist about how penicillin has to be administered every 4 hours, however in the ER they give the first dose and then it can take more than 12 hours before they get the second one. She said, “that’s not treating anything!” (Week 1, day 3).

These changes in antimicrobial treatments could reflect a lack of consistency or even a lack of knowledge on how to diagnose and treat; however, these incongruencies show that there are also likely cultural differences in prescription practices not only across provinces and institutions, but also within institutions. Thus, expert knowledge regarding AMR and antimicrobial stewardship is also situational and embodied, they are dependent on the prescriber’s personal experience and training.

Self-criticism and blame shifting

From public health reports to news stories about AMR, one of the factors frequently cited as contributing to the spread of antimicrobial resistant organisms is unnecessary prescriptions in Canada, and worldwide. Some doctors on the ward, upon hearing about the focus of this dissertation research, commented on their prescription practices and reflected on the blame physicians and other actors bare for not using antibiotics judiciously. For example:

A specialist started talking about how in gastroenterology antibiotics are routinely used in low doses as anti-inflammatories but not for their antimicrobial properties. She said she is becoming more aware of bad prescription practices and trying to be more conscious. She also said she’s very worried about how farmers use antibiotics. “They use it for growth. It’s stupid!” (Week 3, day 2).

During the interviews, the doctors reflected upon the role of the medical community in the spread of AMR, being blamed for overprescribing, and their duty to become antimicrobial stewards and think critically of their prescription practices. However, they also tended to minimize the role that prescription practices have played in exacerbating the risk of AMR, and instead they shifted the blame to other industries –such as farming in the example above–, individuals for overusing disinfectant products, society for misunderstanding how medications work, and media for siding with patients and blaming doctors as illustrated in the following examples:

“I think within the medical community [there’s responsibility], absolutely, because how many kids do you know that have had 20 courses of antibiotics in their life for every single ear infection they’ve had. So, I think for sure that doctors bear the burden of that in the medical community. Outside of the medical community I don’t know. The stuff that I’ve heard at least is all about not using Lysol in your home, that kind of thing. Which is interesting because they are not related, I mean the bugs that we’re talking about in hospital and the bugs that you’re lysoling at home, hopefully, are not the same, like VRE or MRSA. Although I’m sure my apartment is full of MRSA, I never want to know” (Doctor 1, interview).

“There’s definitely this rhetoric out there that patient comes into your office, they demand antibiotics, you give it even though they don’t need it or you don’t think that they need it, but I don’t think that’s the rule. I think that’s the exception. It’s also just the nature of the product, we have this product that can cure infection but also has a long-term effect on society, kind of like chemo, we give lots of strong chemo to cure patients but there’s long-term side-effects to that, for that patient and for society. I think it’s more an issue of everything we do [in medicine] has a consequence, positive or negative” (Doctor 2, interview).

“I think doctors should probably shoulder the blame for antimicrobial resistance, especially if we don’t turn things around and do something about it. I mean we know now and so the onus is on us to try to educate our patients and change our practices. I think doctors can get inappropriately blamed for a lot of things in the media where, as I said, you’re only hearing...the media is biased so they only report one side of the story. But I would say that antimicrobial resistance is our responsibility and we have to take this on” (Doctor 3, interview).

These examples suggest that doctors view medical knowledge and practice as superior to other ways of knowledge. Doctors deemed their prescriptions and treatments

justifiable and what “had to be done,” while shifting the blame for causing AMR onto others. In that sense, the doctors explained that the effects of their prescriptions are “inevitable,” and referred with disdain to other individuals and industries who contribute to the spread of AMR because of ignorance and “stupidity.” Therefore, the physicians understood the spread of AMR as a multi-dimensional problem and human medicine as contributing unintentionally to the problem as a side-effect of the practice. The physicians, however, agreed the better antimicrobial use in human medicine is needed.

TRAGEDY OF THE COMMONS

Antibiotic prescriptions are not always straight forward. Upon examining the patient, physicians have to make a decision on whether the infection is viral or bacterial. This process of diagnosis and antibiotic prescription is variable and involves risk assessment including, among other things, side-effects of antibiotics, age of patient, socio-economic factors, and increasing antibiotic resistance (Björnsdóttir et al., 2010). In the hospital, doctors would usually ask for further investigations (i.e. cultures, blood tests, scans, etc.) in order to diagnose an infection, but they would also decide whether to give the patient antibiotics while they waited for test results based on intuition informed by previous experience, prioritizing the immediate risks of infection, even if deemed low, while leaving the risk of AMR in the background. Despite expressing concerns about AMR, physicians rarely considered the impact of their antibiotic prescriptions on the global risk of AMR. This situation can be conceptualized as a “tragedy of the commons.”²⁸

²⁸ “Tragedy of the commons” is an expression used to refer to instances in which a collective resource is used by individuals according to their own interests, depleting it instead of preserving it, and thus acting against the common good (Hardin, 1968). For a discussion of AMR as a tragedy of the commons, see Giubilini (2019).

Gut feeling: calling it bacterial

Doctors in the ward many times struggled when deciding whether a patient had a bacterial infection, and thus required antibiotics, or a viral one. Although that decision was made based on a number of tests conducted on the patient, sometimes antibiotics were prescribed before a diagnosis has been confirmed, or more than one antibiotic was given because the bacterium had not been identified or its susceptibilities, i.e. to which antibiotic it is vulnerable. The following fieldnote describes this very common situation in the ward:

2 year-old on IV antibiotics. They don't know if it is viral or bacterial or two different things. She's on broad spectrum [antibiotics] as empiric therapy to rule out a bacterial process pending results of investigations to confirm one way or the other (Week 6, day 3).

The process through which the diagnosis and treatment are decided during rounds involves the careful consideration of the patient's symptoms, clinical history, and available test results. After all the test results come back, the team is able to confirm whether their initial diagnosis and medication are correct and adjust treatment if necessary. Some diagnoses and prescriptions are decided immediately during rounds, but others more complex require further discussion and consideration of available evidence regarding specific treatments (i.e. published peer-review studies). In these cases, the team would also consult with an ID specialist and a pharmacist if one was not present during rounds. However, antibiotics were prescribed empirically whenever a febrile child was admitted in the ward and a viral infection was not obvious, showing that the risk of not using antibiotics and allowing the spread of a bacterial infection is considered greater than any other consideration. An example of this cultural practice is a conversation between a staff doctor and her senior resident after rounds in which the doctor explained that “because this is a pediatric hospital we give antibiotics whenever there is fever, even if the risk of

infection is low” (week 7, day 2). Other times various antibiotics are prescribed for suspected infections while the team waits for test results. For example:

[On rounds] resident and students discuss a patient with an infection, either GI or STI. They are giving the patient antibiotics targeting chlamydia and syphilis but are not entirely sure that’s the issue. It could be gastrointestinal. Staff doctor is not here. Pharmacist provides some guidance, but they think they should consult ID (Week 7, day 2).

The interviewed physicians reflected on the process of deciding whether an infection was caused by a virus or a bacterium, which they described as a “gut feeling,” albeit informed by medical knowledge and previous experiences:

“My god! we go through med school and through residency and we’re supposed to learn clinical judgement but at the end of the day, as a physician sometimes it just feels like gut, and your gut feeling is totally informed by experiences you’ve had in the past and things you’ve learned, and all the research that you’ve done, and all the cases that you’ve seen in the past, but at the end of the day it still feels like a gut move” (Doctor 1, interview).

“Different clinicians have different practices, and different subspecialties. But over time, seeing very bad complicated cases that didn’t go well, I think that can really colour doctors’ reactivity, because probably the single commonly shared fear for all of us as clinicians would be a bad outcome for one of our patients. So, I think sometimes doctors’ prescribing practices would be overly coloured by maybe a particular bad case that they had, maybe a bit of an outlier” (Doctor 3, interview).

“I think that’s very physician dependent, everybody is more or less comfortable with risk, more or less risk, and I think it’s dependent on the child as well. If you have a medically very fragile child, for instance, you may be more inclined to, and maybe it’s not the right decision, but you may be more inclined to start them on antibiotics because if you were wrong in the first place, it is bacterial and you didn’t start them on antibiotics they may have less reserve and end up a lot sicker” (Doctor 4, interview).

These examples show that despite usually referring to medical knowledge as objective and scientific, the physicians were able to distinguish some cultural prescription practices across sub-specialties. They also referred to “gut feelings” and previous experience influencing current decision-making, thus referring to medical decisions as

based on situational and embodied experience, and therefore negotiated.

“Wait and see” versus “Just in case”

Many times, the medical team was faced with several possibilities of diagnoses that fit the symptoms, so they had to consider various possible treatment options. Patients with viral infections do not require antimicrobials, whereas patients with bacterial and fungal infections do. As a way of reducing the spread of AMR, the WHO recommends using diagnostic tools to confirm bacterial infections before prescribing antibiotics (World Health Organization et al., 2016). However, in the daily medical work in the ward most times the medical decision would boil down to either “wait and see,” i.e. not give antibiotics and monitor the patient’s condition as it would resolve on its own if it was not a bacterial infection, or give “antibiotics just in case,” since not giving them and having the patient deteriorate can be too risky in a pediatric ward. For example:

“With encephalitis we usually assume infection,” a specialist told me referring to patient who got antibiotics while awaiting results of investigation to confirm a bacterial infection. However, the medical team expressed being sure that the tests would come back negative, confirming their suspicion of a viral infection. Now they are not sure what it was but the anti-epileptic drugs worked. “It is very frustrating to not know what it was,” they said (Week 7, day 4).

The guideline of “wait and see” is recommended not only in hospitals but also for community doctors, who no longer prescribe antibiotics for children with minor infections, such as otitis media, but rather tell parents to wait a few days to see if the infection resolves by itself (CDC, 2019a; Le Saux & Robinson, 2016). I asked a senior resident in the ward about their decision to not “wait and see” before giving antibiotics to a patient with a mild ear infection among other complications:

Senior resident approached the staff doctor to talk about a new admission, 3 year-old with asthma exacerbation and mild otitis media. Patient also has a cold and spiked a fever on day 3 of it. Resident says they prescribed a high concentration

amoxicillin for the ear infection in the ER, so I ask the resident how they made the decision to prescribe.

SR: There are a few reasons, the ear infection we know is most likely viral, but the fact that the fever started on day 3 makes me think it could be a complication from the cold, like a bacterial infection. Now, many things could cause that fever and they would require a lot of investigation, but I see there's an infection in the ear so [a bacterial infection] is the most likely the cause.

STAFF: [To resident] I'm very interested in your reasoning because I would've done the same thing. [Talking to me] Look, when you have a child in hospital it is because they are very ill. Yes, you can wait and see, which actually works fine in the community. Family doctor says wait and see, bring them back in three days, it works. But in hospital it only delays care and can lead to other complications. If we do a chest x-ray, which I thought you were going to say [looks at resident], and a few days pass and then you're wondering if you should do a culture... I mean, it just doesn't work! You'd be wasting time. If you prescribe antibiotics right away you know that's been taken care of, then you move on to more important symptoms.

SR: Yeah, so you as doctor weigh all the risks very quickly and make a decision. As a parent I would definitely prefer to wait but in this case the child is already very ill and you need to get some things under control from the beginning. Maybe as a junior resident I would've chosen to wait but not now. I've seen many children who didn't do well and I think that definitely colours my decisions now. And also institutions make you more conservative and I think this hospital as an institution is very conservative.

This conversation shows that for these particular doctors prescribing antibiotics is a way of getting at least part of a very complex presentation under control. Yet, other physicians in the ward used the opposite argument, that because the patient is in hospital, being observed by doctors and nurses all the time, the “wait and see” approach would be easier as they could prescribe as soon as a bacterial infection gets confirmed, instead of prescribing antibiotics “just in case” when it could be viral. As mentioned above, some interviewees explained that in the community it is harder to ask parents to come back and wait for hours to be seen, and there is no way of knowing how sick the patient will get, so antibiotics “just in case” is the default. The staff doctor referred to above, however, prefers to give antibiotics just in case fully knowing that most ear infections resolve on their own,

and the patient has other conditions going on that could explain the fever. In this situation antibiotic stewardship is not a priority, they want to cross out the ear infection and focus on the asthma. This example also shows how previous experience and memory mediate perceptions of risk and influence prescription practices. The resident explained that as a junior resident he was more prone to wait and see how the patient progressed before giving antibiotics, but now he has become “conservative” with his treatment of suspected bacterial infections. Thus, prescribing antibiotics gives some physicians a sense of getting at least an aspect of the disease under control, even if in the end there was no bacterial infection.

On rare occasions, however, medical teams are pressured by families to continue unnecessary antimicrobial treatments, particularly in units where patients are hospitalized for longer periods of time and followed for many years, such as oncology departments. In this case doctors and nurses develop a relationship with the patients’ families, and their pushing for unnecessary treatment can be a source of great frustration among the medical staff. For example:

The team is talking about family-driven care. “I feel like we do a lot of things here because families want us to do it but it’s not medically necessary,” a member of the team said. The rest agreed and complained that if they don’t agree with the family then they get in trouble but if they make concessions with the family then it is impossible to change course of treatment. Staff [doctor] says “we should stick to our treatment plan and not allow families to push us to do things, like make decisions on [...] antifungal treatments”. This conversation happened in the context of a family insisting on continuing an antifungal treatment even through the fungal meningitis diagnosis was discarded days ago and the drugs are now affecting the patient’s liver (Week 13, day 3).

Diagnosing a patient and deciding a course of treatment is hardly a simple process. Medical teams consider various risks associated with antimicrobial use; they often wait before prescribing; they weigh the patient’s medical history and complications; and they consider the families’ wishes, among other things. There usually is not much time to make

these evaluations as treatment decisions have to be made swiftly, particularly when a patient is deteriorating. Additionally, in trying to provide patient-centered care, the family is involved in the treatment decision-making process, which can lead to different and sometimes competing interests. In this context judicious antimicrobial use and the risk of AMR are not the main priorities, as doctors’ focus on the immediate risks for their patients.

Cultural prescription practices and competing biomedical paradigms

In the hospital, doctors struggled with antibiotic prescriptions because of conflicting specialty-specific practices and changing guidelines. Different medical specialties have specific prescribing practices that are not shared by other clinical groups, who would consider such conditions as not requiring antibiotic therapy or have different recommendations of specific antibiotics for treatment. However, these are cultural practices that sometimes clash in the ward as different specialists consult on the same patient. The ultimate decision of treatment lies with the staff doctor, who then weighs all the recommendations in the patient’s best interest. However, trust in their colleagues and respect for their expertise, seniority and power relations, and which specialist will be following up the patient after discharge also impact the decision. Two cases I observed in the ward offer unique insight into these conflicting cultural prescription practices:

Attending stops by and starts talking to me about the patient with the staph infection and says “dermatology wants those antibiotics and infectious diseases advises against it. So, we’re in the middle of this trying to make a decision that is in the best interest of the patient. So we decided to give a short course of antibiotics because ultimately it is dermatology who will do the follow-up with him as an out-patient (...) Each specialty has very strong beliefs about antibiotic use and we take the advice of all the specialists we consult very seriously but ultimately he’s a dermatology patient” (Week 5, day 3).

Neurology and nephrology are pushing for IV antibiotics, but patient is improving with oral treatment. Staff and residents see no reason [to give IV antibiotics] and want to send patient home and keep the oral antibiotics for 5 more days. Shows

discrepancy in how antibiotics are used and prescribed across specialties. This decision-making process is not always explicitly addressed by the medical team in discussions of AMR (Week 2, day 3).

Cultural prescription practices are negotiated between various specialists. For example, when ASP specialists give treatment recommendations from a global stewardship perspective, they are sometimes perceived as pushing infectious diseases specialists’ own prescription practices:

After ASP rounds attending doctor tells senior resident: “Well, [ID specialist] will tell you to stop all broad spectrum [antibiotics], as [they] should because [they’re] all about stewardship. Someone less paranoid will tell you to keep it on. I mean, even another ID specialist could give you totally different advice”. Staff doctor also mentioned that ID specialist offered to send the team a study to prove their point, but doctor was skeptical as it is not a “proper study” but a case study, “and that’s not real evidence” (Week 5, day 2).

This example shows that there is not always consensus among medical professionals about what constitutes medical knowledge. While the staff doctor, who is not an ID specialist, considered that case study is not scientific evidence because it is a report of only one case, and therefore anecdotal, the ID specialist thought otherwise. Additionally, this example shows that antibiotic stewardship is not a widespread ethos in the hospital. While doctors running the ASP rounds have not seen the patient and therefore the staff doctor must decide whether their general advice is applicable to their patient, the fact that the physician qualified the ID expert as “paranoid” dismisses the importance of antibiotic stewardship, a key component in tackling the spread of AMR. Furthermore, the physician made those comments to her trainee who, most likely, respects more the opinion of the staff doctor with whom they have worked on various cases, than the ASP specialist who they just met.

In interviews, doctors discussed the ways in which they resolve conflicts between recommendations given by different specialists who consulted on the case, or between a specialist’s recommendation and that received during ASP rounds or in consultation with ASP experts:

“Every single kid that has mastoiditis or a sinusitis or whatever, ENT and ASP never agree (...) But usually I trust ASP over ENT because ENT is practicing out of reflex [i.e. cultural prescription practices] and ASP is practicing out of data. Like, they know what the bugs are that we have at [the hospital] and they know what their antibiogram profiles are and their sensitivities and all that. But I do sometimes reserve judgement when ASP is telling me to go lower [on antibiotics]” (Doctor 1, interview).

“So, if I reach a point at which I am uneasy with [ASP’s] recommendation or feel differently about it, or another team is recommending something different, I’ll discuss it with them and explain the sides. And there have been times when I’ve said I’m just not comfortable so I’m going to keep going, and that’s usually the case of how our discussions are, they’ll want me to stop something [antibiotic] and I’ll be like nah, I’m too nervous [laughs]. And that will sometimes come just from a gut feeling really, of many patients that I’ve seen, or it can come from something I’ve seen on exam when looking at that particular patient (...) Because I’ve seen the other side, where we wait or we back off and it doesn’t work and the kids get really sick and when they get sick we’re talking about ICU level stuff, and some of them die from infection so (...) [ASP team] think more of judicious use of antibiotics for the global population and I have a harder time thinking about that when I’m scared for my individual patient. But it’s good if we have those differences and have those discussions and learn from the other person, because maybe there’s something I am not taking into account that they are” (Doctor 2, interview).

“I might know the person doing stewardship rounds very well and maybe have a degree of confidence in their opinion, and then the [specialist] is an outside consultant that I’ve never met and so I might...that might play in and that’s why the interpersonal factor and the history can sometimes inform. And there’s also I think layers of hierarchy for our residents and things like that where sometimes there may be a sense that there are people that they are afraid to disagree with (...) The person who is going to be following and who’s going to see them as an outpatient, what they wanted as a management plan in that case might outweigh the person who just is coming in and parachuting in and giving advice on a global level, which is kind of what the stewardship is (...)” (Doctor 3, interview).

These competing paradigms of antibiotic use and the complex process of deciding treatment can at times be confusing for residents and medical students who will be

acquiring all these cultural practices during their process of training and professionalization (Haas & Shaffir, 1991). The example below shows an instance in which a senior resident wants to discharge a patient because they have been switched from intravenous to oral antibiotics and, accordingly, could go home. The attending doctor, however, disagrees:

“Our guidelines for stepping down to [oral antibiotics] are very clear. If the patient is improving clinically and inflammatory markers are down, then we can step down and discharge. Otherwise they keep IV antibiotics and we don’t discharge. We should be consistent!” said the resident, obviously exasperated and asking to stick to protocol and evidence. The staff doctor very calmly explained why those markers are not absolute. His argument was that he wanted to see if the infection kept resolving with oral antibiotics or if there was another flare up. He also told the resident to consult with [sub-specialists] because “they will have their own opinion about the antibiotics” (Week 8, day 2).

On another occasion a medical team was trying to find evidence that an antibiotic treatment could be shortened in order to help an uninsured patient:

Patient septic with *E.coli* should get IV antibiotics for 10 days but the team is going over the literature to see if they can reduce treatment to 7 days instead of 10 because the family is from out of town and have no insurance. After a while, the staff doctor decides to keep the standard 10-day treatment because patient is only 5 weeks old. The risk is that the infection will relapse as with 7 days of treatment it may only be partially cleared (Week 9, day 2).

This is an interesting example in which the patient’s socio-economic circumstances could have impacted the antibiotic treatment. The decision to keep the standard treatment was based on the age of the patient and lack of evidence that a shorter course of treatment would be effective, but had the patient been older the team might have insisted on shortening the treatment or done more research. In this process, however, they did not consult with the ID specialists, probably knowing that they would have recommended a standard 10-day treatment.

The examples above show that in the hospital, medical consensus is provisional, an outcome of all the various and informal moments of negotiation. Therefore, the co-

production of risk emerges in this process of continual negotiation between different forms of expert knowledge, previous experience, power relations, and the need to make the right medical decision along with the maintenance of the social order of the hospital –which is perhaps at least as important as a specific decision– is a key thing to note.

“We can always give them more antibiotics”

The concept of antimicrobial stewardship is rooted in the fact that the more we use antimicrobials, the more they lose effectiveness as microbes evolve resistance to them (Barlam et al., 2016), and therefore, it is imperative to use antimicrobials judiciously. In the hospital doctors are challenged to think critically about their antibiotic prescription practices through the ASP; however, by understanding stewardship as an “infectious diseases issue”, physicians continue to think of antibiotics as a medical tool that will always be available. For example:

[Patient] admitted with *E.coli* meningitis got treated for it before cultures came back, now confirming meningitis but caused by another bacterium. Antibiotics were switched to better target the confirmed bacterium. On rounds team decides to discontinue the antibiotics since he’s doing better after completing the standard course of therapy and they will see how he does without them. The resident stated confidently: “We can always give him more antibiotics” (Week 4, day 2).

On rounds team discussed patient with abnormal pneumonia that includes a rash. Patient is currently on two antibiotics because “one should work, we just don’t know which one yet,” staff doctor explained. Once they get the test results they should be able to discontinue one of them (Week 5, day 1).

In many instances, during rounds the pharmacists need to persuade the medical team of choosing the most precise antibiotic as residents and medical students do not always see the importance of this. For example:

On rounds pharmacist recommended treating a patient with a second-generation antibiotic that is more targeted to organisms that cause orbital cellulitis because the antibiotic prescribed was too broad. The problem is that the suspension of the new antibiotic tastes very bad and patient (a small child) might not take it. The patient is

already getting it through the IV, but they are considering, due to improvement, giving it orally. Resident, frustrated with the options, asks pharmacist:

R: But why don't we go back to the previous [antibiotic]?

P: Because it's broad.

R: Is that a big deal?

P: Yes! Yes, it is a big deal! You have to go with the most specific.

In the end the resident took the pharmacist's advice (Week 8, day 2).

Additionally, to choose the most precise and effective antibiotic, once the bacterium causing the infection is isolated, it should be tested for susceptibility. For instance, if the infection is caused by *Staphylococcus aureus* a susceptibility test would allow to know if the bacterium is vulnerable to classic anti-staphylococcal treatments (MSSA), such as cloxacillin and cephalexin, or if the strain is resistant (MRSA) to these drugs and should be treated with vancomycin, clindamycin or trimethoprim-sulfamethoxazole. Once on the ward there was a case in which the patient was taking a cocktail of four antibiotics while waiting to isolate the bacterium causing the infection, and when the results came back, they confirmed the suspected bacterium. However, because they did not test for susceptibility - as the pharmacist explained to me-, they were not able to drop any of the antibiotics, a missed opportunity for judicious antibiotic use (Week 8, day 3).

But the best treatment is not always available on the market, something pharmacists also inform the team of, so physicians need to adapt their prescriptions to the drugs that are easily available, particularly for patients who live in remote areas and will need to refill their antibiotic prescriptions back home. For example:

During rounds team discussed a patient with strep A tonsillitis and the staff [doctor] asks them why the kid is on amoxicillin when treatment for strep A is penicillin. No one knows. Pharmacist explained that penicillin in suspension has been back ordered in Canada for years. And even if available it tastes awful, so pediatricians prefer better tasting amoxicillin for medication compliance. Finally, if patient can swallow pills then they go with penicillin because it is more appropriate, narrow, works better for strep A, while amoxicillin is slightly broader in spectrum (Week 7, day 1).

When prescribing antibiotics physicians should lay out the treatment plan, from the dose they are giving to the length of treatment, both to families and the rest of the team. This, however, is not always the case, particularly in oncology where treating bacterial infections is secondary to their main objective of treating cancer. While observing rounds in the oncology unit I observed many discussions about patients who were on antibiotics – and sometimes antifungals– without a clear treatment plan, so they kept administering the medication until a new medical team (they change on a weekly basis) realised this and either came up with a plan or left the decision to yet another team. For example:

Patient has been on antifungals for a very long time. Staff says they’re concerned, and patient needs a plan regarding how antifungals are being used. This seems to happen sometimes, patients are on antibiotics or antifungals and there isn’t a discontinuation date, they just keep going until a new medical team arrives asking what’s the end date. Staff asked for an ID consult yesterday to determine when the antifungal should be discontinued, but no one came. This is highly problematic from a stewardship perspective (Week 13, day 1).

If antibiotic stewardship is to become an ethos of medical practice, physicians would be expected to have a broader understanding of how antibiotics work and keep apprised of new antibiotic treatments and how to use them properly. Becoming aware of differences between different specialties in terms of antibiotics use, as well as greater awareness of how memory and previous experience mediate perceptions of risk and courses of treatment, there could be more acceptance of new practices that improve antibiotic use and move beyond entrenched prescription practices (i.e. that’s how it’s always being done). Additionally, they might rely more on diagnostic testing to confirm bacterial infections and susceptibility testing to prescribe for the most precise and effective treatments – this was not always evident in my observations.

AMR AS A BACKGROUND RISK

As explained above, in deciding antibiotic treatments physicians tend to prioritize the immediate risk of the patient developing a serious bacterial infection over the global and slow-growing risk of AMR, even if the risk of bacterial infection is very low and they strongly suspect it to be viral. After a few weeks observing doctors and nurses in the ward it became clear that, despite being aware of the risk of AMR, there are myriad other concerns the teams tended to address, and in almost all cases these took precedence over the risk of AMR:

Every day, doctors prescribe based on experience, evidence and instinct and perform tests that will give them a new piece of information to decide their next step. But this investigation is a race against the clock as the patient can quickly deteriorate, particularly young babies, so while they figure out what’s wrong, they administer antibiotics as a pre-emptive measure. Antibiotic stewardship is not a priority. No one wonders how they’ll be able to treat patients once antibiotics don’t work anymore, and they are too busy to do so, that’s perceived as the job of ASP and their rounds. This is because of several factors: first, the patient is their main priority, they need to get the situation under control; second, the fear of things going wrong and the patients’ family suing for malpractice; finally, antibiotics are drugs with great results and seemingly negligible impact (upset stomach, diarrhea, depleting the gut microbiome) so they seem innocuous (Week 5, day 2).

This observation was confirmed by one of the physicians in an interview, who explained how the risk of AMR and the need for judicious antibiotic use is not a concern at all when treating cancer patients:

“I think the risk of someone being sceptic is much more scarier [*sic*] than my perceived risk of creating an antibiotic resistant organism. I mean, I’ve seen these kids die from infection. To be totally honest that thought is not what goes through my mind or I’m giving all this piptazo [Piperacillin-tazobactam], am I going to create an antibiotic-resistant organism? That though does not cross my mind when I’m treating my patient” (Doctor 2, interview).

Another concern that affects doctors’ prescription practices is the fear or being sued if the patient has a bad outcome. One doctor explained this to me in the ward after we

talked about the nature of my project and they signed the consent form:

[Staff doctor] thinks AMR as a risk is too abstract for physicians versus stopping antibiotics too soon and missing something. The patient is very concrete and so is the risk of being sued by the family. “The global risk of AMR won’t make me lose my medical license; my patient’s family would sue me if something happens to the patient because I didn’t prescribe antibiotics” (Week 5, day 1).

Hospital doctors balance many priorities and concerns when deciding to prescribe antibiotics, and more immediate risks, ranging from spread of infection in the patient to being sued and losing their medical license. Thus, the risk of AMR remains latent but not imminent, part of the background of professional practice, affecting the global population but not the patient in front of them. As a doctor explained in an interview, antibiotics are used as safety nets by pediatrician because “it feels safer to have the kids on antibiotics even though we know the risk of AMR is there. It just feels safer to have them on antibiotics” (Doctor 1, interview).

In their daily work, doctors and nurses balance their own personal and professional risk in negotiating their compliance with IPAC measures. However, they remain acutely aware of the hospital’s surveillance systems to monitor compliance and adjust their IPAC behaviour, and remind their colleagues to follow IPAC precautions closely, as a performance for the auditors. For example:

Nurse approached me: “We thought you were monitoring us so we were constantly rubbing [hand sanitizer]” (Week 1, day 3).

Head nurse to nurses in nursing station: “[IPAC nurse] will be around today so wash your hands!” (Week 3, Day 1).

These examples reflect the principles of self-governance and governance of others, i.e. governmentality that characterize IPAC behaviour in the wards. The hospital has auditors who routinely monitor workers’ compliance with IPAC measures, and although

they only issue reports and there are no material consequences for not complying, nurses are acutely aware and suspicious of auditors in the wards. Additionally, a new mechanism of prevention of Central Line-Associated Blood Stream Infection (CLABSI), and of monitoring nurses’ work, was adopted while I was conducting observation in the wards. According to the new guideline, staff doctors were expected to ask nurses during rounds about the status of the patients’ central lines, which nurses should maintain clean by changing dressings regularly and avoiding contamination of the area. This new CLABSI prevention measure assumes that central line infections are a direct consequence of nurses’ lack of care and so many times nurses seemed to resent the inquiries regarding the status of patients’ central lines:

There’s a message on the board regarding the need for doctors to ask nurses during rounds about the state of patients’ central lines. Every time the staff has asked nurses about it they reply “It’s fine, why?” as if it is obvious that they are taking care of it (Week 13, day 2).

Staff [doctor] is asking nurses about status of ports to avoid CLABSI. Nurse says port looks fine, no sign of infection but looks a little scabby. She says it bothers her when ports are scabby but it’s “because we nurses are kind of neurotic about [avoiding line infections]”, suggesting that nurses take better care of the ports than what the protocol is (Week 14, day 2).

Discussing CLABSI prevention in an interview, one nurse expressed her frustration because she feels nurses are blamed for these infections even though doctors and other medical workers may handle the lines as well:

“But anything about CLABSI revolves so heavily around nursing practice when in reality (...) kids will go down to OR or anywhere else, like anaesthesia, and someone else will access their line and not swab or they will swab for like two seconds, or swab for five seconds and then don’t let it dry, so you’re like ‘what was even the point of that?’ They’ll lift up dressings and just start touching central lines, or like we had a guy open up a central line dressing with his teeth the other day, and we were like ‘oh my god!’ So, I think that nurses are the target of we need to do this for central lines and we should be but it’s also important to remember that many other people come in contact with these kids” (Nurse 5, interview).

Many nurses mentioned feeling that these monitoring mechanisms (i.e. auditors in the ward and inquiries about central line care) placed undue blame and responsibility on them. Similarly, some nurses also mentioned how they experience feelings of blame by patients and their families in case of hospital-acquired infections, even though several doctors, technicians and visitors also come in contact with patients:

“In a three patient room it’s a lot easier for things to spread, because of visitors, because of the nurse –maybe- because we still wash our hands between people but they are in such close proximity that it’s just more likely for them to get sick, as opposed to a two patient room (...) Usually one nurse has all three patients, so sometimes parents might blame (the nurse) if their kid gets sick when they’re in a three patient room” (Nurse 1, interview).

“We’re the first line, right? So, everybody puts the blame on us, ‘oh, probably the nurses are not washing their hands properly, that’s why everybody is sick with this or that’” (Nurse 2, interview).

Messages regarding the risk of infection and the need for prevention protocols in the hospital are interpreted in different ways by healthcare providers. While doctors and nurses understand that, by the nature of their work, they are at increased risk of acquiring infections, including resistant ones, many of them lamented that risk messages in the hospital are always about the risk for the patients and do not acknowledge the risk of contagion that healthcare professionals themselves face. From the wall signs in the ward to the emails they receive about having their N95 masks fitted and completing their annual IPAC test, doctors and nurses perceive these messages as employer-imposed obligations.

For example:

“I think there’s a much bigger focus on the patients than on us getting something (...) we kept getting messages and emails telling us to get tested for our N95 [masks]. So a lot of people went and did that, so that’s a good thing but it didn’t always come off as...like a protective thing (...) it felt more like we need to cover our butts and make sure to get this done, get yourself tested for N95 (...) Especially

because it wasn't like 'protect yourself!' it was more like just 'get it done!'" (Nurse 5, interview).

Echoing this feeling other research participants referred to not only the health risks that healthcare providers face, but to the psychological and economic ones they face too, which they claimed the hospital does not adequately acknowledge:

"I think the risk [messages] are all directed toward the patient or passing something on to the next patient, but not my own health and the health of my family, no. Maybe employees feel differently, but as a physician no. And you certainly saw me at work when...yeah [physician had been to work while sick]. But what can I do? (...) When I was going to [other hospital] every room I was in, every wall I saw had a sign that said, 'aggressive behaviour and language will not be accepted here and you'll be asked to leave'. We don't have one single sign like that at [this hospital]. Why? And we put up with a lot for the sake of a child, but why does that become our responsibility and not the responsibility of a parent? And why is there a culture here that we need to accept that? So that comes from the top, and it has to trickle down that that kind of behaviour is not acceptable here" (Doctor 2, interview).

"Even getting sick during flu season, the sick calls are really high because we're exposed and at the same time they tell us if you're sick don't come to the hospital, but if you call sick more than a specific number of times you go to this program, which is the 1, 2, 3 stages. So, it's a sword with two edges, like if you're sick, should you come? You know you shouldn't but at the same time you know there's going to be a punishment, right?" (Nurse 2, interview).

"If they [acknowledged nurses' risk], they would give us sick days (...) I feel like although we have the most patient contact, the most involvement with patients, we're probably listened to and commended the least" (Nurse 4, interview).

Some medical staff suggested the possibility of reframing these risk messages from a personal angle to show that the hospital cares about the risk healthcare providers face every day and to remind health workers that beyond the obligation to reduce the risk of infection for their patients, they should comply with these measures to protect themselves and their families as well. For example:

"The sense that we get at the hospital, when we refer to resistant organisms, preventive measures are generally more geared towards spread between patients rather than trying to avoid healthcare providers developing infections (...) I think it probably should be addressed to some degree, while this is something that

healthcare providers are aware of, being reminded that there is two reasons to be careful, one is to protect your patient but another one is to protect ourselves, I think that’s a useful reminder and beneficial in motivating people to use better practices” (Doctor 5, interview).

Framing prevention messages in this manner could also communicate to patients and their families the importance of protecting healthcare workers so that they can protect their patients. However, some felt that their own risk was in fact acknowledged by the hospital. Indeed, some of them understood the risk messages to be not only about keeping the patients safe but also in protecting healthcare workers. For example:

“I don’t think they talk to us very much about it. But do they need to talk to us about it? I don’t know. We all know it. I mean, we work with sick people, it’s clear that there are bugs all over the place. There’s a big emphasis on the hand washing, big emphasis on wearing protective equipment. I think that’s probably enough” (Doctor 4, interview).

“I think the hospital understands that every day I come to work I place myself at risk of getting sick. I don’t think that physicians at least, I don’t think we take that seriously enough. For example, many of us will continue to come to work unless we are on death’s doorstep with an illness, quite frankly” (Doctor 6, interview).

AMR comes to the foreground as a logistical problem or a direct risk

Resistant infections require the patient be isolated, a measure that seeks to keep the patient in their room at all times to avoid the spread of the infection to medical and non-medical hospital workers, visitors, and other patients. However, guidelines are not always clear and that is a source of frustration for many doctors and nurses, for whom AMR is in most cases an administrative nuisance and professional risk. For example, a patient had been placed in the same room as another one who eventually tested positive for MRSA, so they should not have been sharing room since patients colonized with antibiotic-resistant organisms are placed in single-bed rooms under contact precautions. After the mistake was

discovered, both patients had to be isolated, which posed a logistics problem for the head nurse who had to move other patients around to make two isolation rooms available:

Premature 4 month-old was in room with another patient who tested positive for MRSA (carrier, not active infection). Baby was removed to another room and isolated after 1 week of sharing room. Patient who is carrier only got their swab done after 5 days of being hospitalized. They are waiting for results [to see if they are still carriers] (week 10, day 1).

Part of the IPAC protocol for resistant infections is that when a patient has tested positive for MRSA, in current hospitalization or a previous one, they are isolated until they get three negative consecutive MRSA test results. Once a MRSA carrier has three negative tests, the patient is assumed to no longer be colonized. Having patients in isolation who do not require it is considered by nurses a waste of time because they need to wear PPE when entering the room; additionally, being in isolation is challenging for the patient and the family because the patient cannot leave the room at all. However, getting all test results required and clearance from the IPAC team to lift the isolation is a slow process due to changing medical teams, miscommunication, and slow responses. For example:

Patient is in isolation because they tested MRSA positive a while ago. With 3 negative tests they can be removed from isolation. Last week the resident said there was a third negative from another hospital but that wasn't good enough for this hospital, they needed three negatives from this hospital to lift the isolation, which was very hard for the patient (who has a mental disability) and the mother. The mother is pushing to have the isolation stopped. This has been an ongoing issue for over a week, discussed at various instances. In fact, the decision had already been made to lift the isolation but new resident and nurse weren't part of that conversation (...) Resident tells nurse they'll go talk to IPAC (...) Nurse talked to IPAC and confirmed 3 negative MRSA tests at this hospital (which had already been confirmed by another nurse with another resident before). IPAC says again that the isolation can be lifted (Week 10, day 3).

Other instances in which the risk of AMR becomes more concrete in the hospital is when patients arrive with community-acquired resistant infections. These infections can be resistant to one or more antibiotics, usually the first choice of drug to treat that infection,

but they are still susceptible to others. So, the medical team treating the patient must change prescriptions to another antibiotic or test to isolate the bacterium and to which drugs it is susceptible. Some of these resistant infections are more common than others in the ward, and physicians are used to them; however, they also seem confident that there will always be another antibiotic that will treat the infection and seldom reflect on the need to prescribe as precisely as possible.

In an interview one doctor reflected upon the risk that physicians face when treating patients with resistant infections and the need to be more vigilant and follow protocol regarding isolation with these patients:

“I think the only one I worry about is MRSA particularly because it is transmitted through contact, and often those are the patients where you don’t know they have MRSA until two days after admission and all of the sudden everyone is gowning and gloving and meanwhile I’ve been touching this patient for two days without wearing any PPE (...) I think sometimes we are a bit surprised by patients who come in MRSA positive. In addition, I do think that we’re still trying to figure out how to flag these things in [the patient management software] Epic. I think it is also possible that a patient who is known to be MRSA positive, whoever is reviewing the chart that night when the patient is admitted or doesn’t notice the flag until IPAC comes in the next morning and reassesses things and alerts the team to the fact that this patient was previously MRSA [positive], I’ve had that happen before. So, I don’t think we are as vigilant about it as maybe we should be or can be. (...) I’m often the first person to ask about MRSA risk factors whereas rarely do the residents offer that information to me. So, I don’t think people think about it as much as we maybe should” (Doctor 6, interview).

CONCLUSION

Perceptions of risk in the ward as well as prescription practices are mediated by personal experiences, memories, and embodied knowledge, which medical professionals are not always aware of. In that sense, risk decisions are made based on medical knowledge and on cultural understandings of risk to the same degree. The risk of AMR is co-produced through myriad negotiations throughout the day, in which various forms of knowledge, power relations, and the need to make the right decision all come into play. Similarly,

infection prevention behaviours are negotiated with cultural understandings of dirtiness and cleanliness, as well with material and temporal constraints.

In the hospital, AMR is communicated as a health risk and risk mitigation is enacted through routines of prevention, prescription practices and the ethos of antimicrobial stewardship. Healthcare professionals are familiar with the discourse of the hospital as a site of contagion. The ward can thus be conceptualized as a “theatre of contagion” in which healthcare professionals perform their identity as doctors and nurses through use of technologies and performing rituals of prevention. This “presentation of self” (Goffman, 1990) projects an image of professionalism for an audience of colleagues, hospital administrators, patients and their families. The risk of AMR, and of infection in general, is performed through these rituals of hygiene and contact precautions. IPAC protocols and risk messages in the ward become mechanism of governmentality that compel hospital workers to self-regulate and monitor others’ behaviour.

Despite this, AMR is often seen as a background risk, i.e. healthcare providers are aware of its existence and consequences, but it usually is not a priority in their practice. Physicians need to assess various risks and competing priorities and AMR is still perceived as too abstract and remote. The risk of AMR usually comes to the foreground as a therapy problem, a professional risk, or a personal risk for medical staff. In the first case AMR becomes a concern when patients are not responding to antimicrobials and treatment need to be adjusted. As a professional risk, antimicrobial stewardship guidelines are weighted against the risk of a bad outcome for the patient if antimicrobials are not prescribed even before any testing is done. AMR also becomes a professional risk, and a logistical problem, in terms of prevention, for example for nurses deciding how to room-in patients who have

tested positive for resistant infections. Finally, AMR becomes salient in the form of personal risk when a healthcare professional has been exposed, or exposure is suspected, to a resistant infection or is at risk of being exposed while caring for a patient.

In making treatment decisions, physicians rely on cultural prescription practices; in particular cases, they are compelled to think critically about their antimicrobial use, in which case they search for evidence in the medical literature. Thus, AMR becomes a background risk that flares up on specific situations, and antimicrobial stewardship is not a priority. Risks only exist as long as someone recognizes them as such, i.e., their urgency fluctuates depending on different values and interests, and their ‘riskiness’ is defined in relation to other competing risks (Beck, 1992b, pp. 29–30). The ASP rounds are a constant effort to remind physicians about the risk of AMR as a priority and of their responsibility in reducing that risk. These rounds seek to translate antimicrobial stewardship into an ethos of medical practice, thus triggering moments of reflexivity with regard to medical practice. ASP acts as a trigger for increased negotiations between different forms of expert knowledge as well as situational knowledge.

Despite expressing pride over their antibiotic stewardship program and how useful they find those ASP rounds as moments of reflection about their practice, physicians most frequently are primarily focused on the patient they are treating today, but seldom consider the implications of their prescription practices for future patients. The notion that “we can always give more antibiotics” is certainly prevalent in the wards; doctors are confident that there will always be another antibiotic or that a higher antibiotic dose, or longer treatment, will resolve the resistant infection. This attitude is informed by previous experience and, as

one doctor mentioned, the fact that institutions make doctors more conservative with their treatment decisions.

CHAPTER 5

EVERYBODY IS TALKING ABOUT “SUPERBUGS:” JOURNALISTIC PRACTICE AND MEDIATED DISCOURSES OF AMR

This chapter examines the role of news media in the co-production of AMR as a public health risk, including how the risk is enacted in news discourse and professional journalism practice. News coverage of public health events has a profound impact in shaping popular perceptions of health and health risk. Media are deeply involved in the co-production of medical knowledge, by defining risks and assigning blame for threats to public health, while providing the language and symbolic resources to make sense of those issues (Briggs and Hallin, 2016). Ensuring strong public awareness of AMR was established as a priority by the WHO in its *Global Action Plan on Antimicrobial Resistance* (World Health Organization, 2015), an objective which involves cooperation among healthcare professionals, media outlets and public health authorities. I begin by drawing on interviews with hospital doctors to discuss how they make sense of media coverage of AMR and the influence they believe it has on how patients and families understand AMR. Then, I present the results of the analysis of news coverage of four AMR-related events in eight North American newspapers (as detailed in Chapter 3), and I examine how the risk of AMR is defined in news discourse, how blame and responsibility for AMR are assigned, and which prevention measures are communicated to the public. I then examine the professional and institutional practices and challenges that shape news coverage of AMR, and probe how journalists imagine and enact their role in communicating public health risks generally and how they write about AMR specifically.

“THERE’S NOTHING SUPER ABOUT ‘SUPERBUGS’”

Doctors in the pediatric hospital recognized the need to increase public awareness and understanding of AMR, but they expressed surprise that a biomedical topic which had long been known about among hospital workers had permeated public discourse and created interest in prescription practices. As one doctor explained, “it’s interesting that [discussion of AMR] has leaked into the outside world and now the outside world is all of the sudden aware that we’re creating all these scary microorganisms” (Doctor 1, interview). In expressing surprise about the public interest in AMR, physicians were also demarcating a boundary between what they considered expert knowledge and therefore should be discussed by experts. In this sense, one of the physicians acknowledged that AMR “it’s an important thing to bring to the public eye” but questioned the quality of reporting suggesting that reporters do not have the required expertise to communicate medical knowledge: “I hope though that the information they are getting is accurate and it’s not just fearmongering, like most things in the media are these days” (Doctor 6, interview).

Physicians tend to support a biomedical authority model of biocommunicability, in which health experts retain definitional power and educate audiences. Briggs and Hallin (2016) found that physicians claimed consuming news regularly but also were intrigued by journalistic practices and commented on health news with disdain, qualifying the coverage as a form of therapy promotion or disinformation (p. 54-55). The physicians interviewed in this study said they do not consume news on a regular basis. Still, they firmly supported the biomedical authority model of biocommunicability and criticized news coverage of AMR as oversimplified and hyped. The physicians mentioned having seen in news coverage of AMR “garbage, some absolute garbage and fearmongering and that kind of thing” (Doctor

1, interview), and qualified the news stories as “very sensationalized, much like [news coverage of the opioid] fentanyl” (Doctor 2, interview). The physicians were particularly concerned with the effect that news coverage of AMR and lack of rigor in reporting could have on the wider population, saying that “it starts scaring people into complete madness sometimes. And, you know, fact checking doesn’t always happen in the media” (Doctor 4, interview). The physicians also alluded to news coverage being sensational due to economic and market interests. For example, one physician implied that reporters want to make their stories “exciting” to appeal to audiences and end up painting terrifying and inaccurate portraits of public health:

“Superbugs! [laughs scornfully] The stuff I find more interesting is some of the stuff that is inflated. I think there’s the temptation in the media to focus on the things that people are afraid of to make the story exciting and then it makes people a little terrified” (Doctor 3, interview).

The doctors complained of feeling blamed in media coverage of AMR on two levels. First, they said news stories affix blame to the medical community for not prescribing antibiotics judiciously and thus contributing to the spread of AMR; second, they pointed to sensationalized news coverage of particular patients who had bad outcomes—either because they were not adequately treated or had a negative reaction to an antibiotic. For example, one physician said, “I actually feel [pressure] from the media a little bit. I don’t know but recently I’ve been listening and reading all these articles about super organisms, and you know these things from a medical point of view” (Doctor 1, interview). The physicians considered that being blamed in media coverage of AMR was unwarranted and so, they performed their own blame shifting by focusing on community doctors and saying that “I am concerned [about media coverage of AMR] but also understand where it’s coming from in terms of the antibiotic practices that I’ve already seen as a resident,

broad spectrum antibiotics being used, I would say, inappropriately, more often prescribed in the community” (Doctor 5, interview).

Another doctor expressed concern that media coverage of AMR not only unfairly blamed doctors but also, because of institutional policies, physicians are not allowed to defend their treatment choices. This doctor said, the media “do inflammatory stories on people who didn’t get treated and then had adverse outcomes, which then creates paranoia and people come in asking for the antibiotics.” She considered that non-experts “can potentially be over sensitized or over worried” due to news coverage of AMR, which she explained was difficult for experts to handle because the patient’s “parent can say all they want to say to the media and tell their version of the tale but as hospitals, as care providers we are often not able to [respond] (...) and the decisions actually did make sense and were appropriate but there are some other factors that maybe aren’t being told and you only hear one side of the story” (Doctor, 3). A similar view was expressed by another doctor who explained that media coverage of AMR sends the idea that “‘there’s this superbug that is going to kill everybody!’ I mean, it’s how it comes across and we’re not there, can we just back it up a bit because what that leads to is patients saying in the family doctors’ offices ‘I don’t want antibiotics’ when they need antibiotics” (Doctor 2, interview).

These doctors also considered that media coverage of AMR is oversimplified and specifically referred to the use of the term ‘superbugs,’ which they found inaccurate and considered the topic of antimicrobial resistance to be too specialized to explain to nonmedical audiences:

“I picture something with a cape when in reality there’s nothing super about superbugs. And this term coined by the media, you know parents will come and [ask] ‘is this a superbug? What is a superbug?’ (...) they hear it in the media and they think it’s a superbug. But now is the translation piece in the media. Not to be

too critical, but they are trying to explain things that are maybe complicated to understand if you don't have a high degree of medical background or experience in words that people can understand, and so...fair enough, superbugs” (Doctor 3, interview).

This example shows how physicians believe news coverage of AMR has a strong negative effect on the population, generating “paranoia” and “over sensitizing” individuals who then have concerns about antibiotic treatments. This view supports the idea that only experts can accurately communicate medical knowledge, as AMR might be “complicated to understand” and communicate, and therefore is premised on a deficit model of communication.

Despite the criticism, physicians were ambivalent about the media coverage of AMR as they also highlighted the importance of raising public awareness about this risk and explained that media coverage had largely achieved that. All the interviewees mentioned that now they see some patients and their families coming to the hospital with increased public awareness of AMR, asking for explanations about why an antibiotic is being prescribed and whether it is the most appropriate, thus adopting the role of antimicrobial stewards. Most of the doctors agreed that with more public awareness of AMR they were seeing fewer patients demanding antibiotic prescriptions, showing that the average person understands that antibiotics are not always helpful. For example:

“I feel like now people will ask ‘do you think my child needs antibiotics?’ So often I'll answer no, I think it's a viral infection, there's no need for it, and the conversation often stops there. I think people may be more sensitized to it as there's been a lot in the news about c.diff outbreaks and that kind of thing. So, I think people in general have heard a little bit more about the need to not use antibiotics when not needed, so I feel like it's a bit easier than it was to be honest” (Doctor 4, interview).

“In more recent years I would say that people are more sensitized to the idea that antibiotics aren't always a good idea. I'd say I probably had more difficult conversations about that earlier in my career than I have had more recently, because

people are aware about resistant bacteria. Whereas when it was first sort of breaking the news, in those days people were given antibiotics for everything and people have been sensitized to it not being a great idea.” (Doctor 3, interview).

However, the doctors also noted that patients can become unnecessarily concerned about AMR due to what they considered is hyped news coverage that can cause panic in the general population. Their fear is that this kind of news coverage may lead patients to refuse antimicrobial treatments that they actually need. For example:

“People will panic if they hear that their child has, ‘cause we test for MRSA and VRE, although I haven’t seen VRE in a while. But for MRSA sometimes we’ll disclose it to parents and the initial reaction is ‘Oh my god! Is this something really bad?’ And then we’re like no, no (...) as long as it is not causing an infection it doesn’t matter. And if it is then you give a particular antibiotic. But sure, people’s reaction when you tell them that they’re colonized with a bug that is somewhat resistant to antibiotics their first reaction is ‘Oh my god! It’s a superbug!’, and then you are like no, don’t worry about it too much and then we do some teaching around it” (Doctor 4, interview).

Raising awareness of AMR and accurately communicating preventive measures was highlighted by the interviewed doctors as a priority, following a deficit model of risk communication (Abraham, 2009; Bucchi, 2008; Leiss, 1996). While the doctors do not think this is happening in news coverage of AMR, they do consider it part of their job to educate patients and their families on how to manage resistant infections and prevent their spread, and to explain their treatment decisions. For example:

“If the patient is admitted with let’s say diabetes, it wouldn’t necessarily occur to me to have a discussion with them about VRE or MRSA. But I do and certainly is more obvious when children are on antibiotics, and I have a lot of discussions with parents about why the antibiotic I’ve chosen, why it is important to finish the course, talking a lot about viral illnesses and what needs antibiotics and what doesn’t,” (Doctor 6, interview).

“A lot of the time I will bring it up when patients are requesting antibiotics, we’ll see that sometimes when a child has a viral illness and the parents don’t necessarily understand that you’re not going to treat a viral illness with antibiotics and then they ask for antibiotics just in case. So that’s when I’ll bring it up and the level of

discussion that I’ll go into depends on how receptive the parent is and how educated the parent is as well” (Doctor 4, interview).

“The place where it really comes out is when I’m counselling patients about why I’m not starting antibiotics. So, it’s not uncommon for people, when I’m discussing the risk and benefits of other treatments like antibiotics, to discuss the potential downside. Usually I would refer to the specific side effects that could affect the child, but occasionally I will discuss the risk of overusing antibiotics and creating resistance, and usually I will take that into account in my calculus because sometimes people will say ‘well, even if there is a low chance of this being a bacterial infection, why not just treat it’ or if it may take longer for a kid to get better on a narrow spectrum antibiotic why not give broad spectrum” (Doctor 5).

These examples show that the patient’s level of scientific literacy is considered by physicians a key aspect of discussing AMR with them, so that conversations with patients about treatment decisions are seen as opportunities to “educate” them. The physicians also considered that this “education” should extend to every patient on antimicrobials; however, they did not consider this should be physicians’ responsibility. One physician suggested doing it as standard practice with every patient, and explained they had discussed with the ASP team “whether this is something that nursing can take on as part of the discharge discussion role that they have, maybe providing a handout per parent, so every parent gets a handout on antimicrobial stewardship (...) or maybe it’s a role for pharmacists, I’m not sure. But I do think this is something that parents know about in the back of their minds, but we don’t always address it directly during the admission” (Doctor 6, interview).

The interviewed physicians believe that it is important to raise public awareness of AMR. However, they did not always consider talking to patients about AMR as part of their job –albeit, all of them said they do it to varying degrees. At a societal level, the physicians believed it is necessary to make the public aware of antimicrobial resistance but were also critical of news coverage of AMR, which they perceived as inaccurate and sensationalized, and said it can reproduce misunderstandings and potentially generate

panic. The physicians supported a deficit model of communication, by emphasizing that only medical experts could “educate” people regarding AMR, a topic that could be “too complicated” for journalists to communicate, and for individuals to understand. Despite this, they agreed that patients are more aware of AMR and understand it better due to media coverage of the risk. This contradiction shows how physicians believe that only medical training gives people the authority and expertise to discuss medical issues, and therefore, AMR should only be discussed by experts who can “educate” patients. Doctors’ responses sometimes seemed territorial and defensive, showing the need to protect their professional culture and practice, and strongly demarcate a boundary between experts and non-experts. Despite this, when they let go of that protectiveness, physicians were able to acknowledge the role of media in raising public awareness of the risk.

THE “ANTIBIOTIC APOCALYPSE”

In the past decade “superbugs” have spread into the public sphere, with AMR garnering increased media attention, from news features to pop science books, novels, documentaries and comic books (for example Graziano, 2015; Kenney et al., 2017; McCarthy, 2019; McKenna, 2010, 2017; Strathdee, 2019). Media, however, are not mere stages where various definitions compete. Instead, they are social actors actively involved in the co-production of risk (Briggs & Hallin, 2016). This is particularly true in the case of news media, which are a leading source of information about health risks for the general public (Bomlitz & Brezis, 2008; Briggs & Hallin, 2016; Mitchell et al., 2017). In the risk society media play a key definitional role through their agenda-setting function (McCombs & Shaw, 1972), which can put some issues into the spotlight of public attention, while others remain largely ignored (Beck & Levy, 2013, pp. 15–17). Modern risks are not

equally distributed as some people are more directly and negatively affected than others (Beck, 1992b, p. 35, 1994, p. 29); therefore, there is enormous power in controlling risk definitions, including attributions of responsibility and the identification of groups at risk (Beck 1992, p. 54, 227), as these narratives can validate particular definitions and ways of knowing, while discrediting others (Cottle, 1998, p. 5). Additionally, expert knowledge about risk is not only expressed but can also be challenged in media discourses, and so they are key sites for reflexive modernization (Cottle, 1998, p. 8).

To better understand how news media are implicated in the co-production of AMR as a public health risk, I conducted a qualitative analysis of news coverage about four events related to AMR. I examined how AMR discourse is constructed in eight North American newspapers²⁹ as sites of risk definition and, potentially, signs of where a cultural shift triggered by reflexive modernization could be found—specifically looking for acknowledgement that the risk of AMR was exacerbated by modern industrial practices and the need to change these practices. The analysis addressed four specific questions: (1) How is AMR defined? (2) What is the role of experts, scientists, and health agencies in shaping media discourse about AMR? (3) Who is blamed? And (4) is there criticism and reflexivity? The sample was composed of 61 articles, over half of which were published in the two American newspapers (n=37), most of them in the *Washington Post* (n=23), while the six Canadian newspapers combined published a total of 24 stories. The codebook³⁰

²⁹The first event was the detection of an infection caused by colistin resistant *E. coli*, a bacterium resistant to last-resort antibiotic colistin, found for the first time in the United States on May 27, 2016. The second event was the United Nation’s high-level meeting on September 21, 2016 to discuss with member states, private sector, and WHO how to manage AMR. The third event is composed by two events: the death of an American woman from a resistant infection on January 30, 2017; and the publication of the WHO’s list of most dangerous bacteria on February 17, 2017. The fourth event was the report published by the CDC on antimicrobial resistance on April 3, 2018, in which the agency mentions “nightmare bacteria”. See methodological details of the QCA in Chapter 3.

³⁰See appendix 3 for code definitions.

comprised 10 main codes and several sub-codes. The sub-codes were not mutually exclusive, as the analysed news stories could have more than one definition of AMR or mention more than one cause. Therefore, all the codes present in each story were recorded during the coding process³¹.

Definition of the risk

The risk of AMR was defined in the news coverage as an inevitable, albeit exacerbated, evolutionary process, thus highlighting its nature as a human-caused risk. AMR was mostly described as being caused by human activity such as antibiotic misuse or overuse in humans and animals. For example:

It has been known for decades that bacteria evolve to fight the drugs, and that overuse and abuse of antibiotics in human health and agriculture have stimulated resistance. Now the point has been reached where some antibiotics have lost their efficacy (“The global danger of losing antibiotics,” 2016).

In some instances, AMR was framed in relation to the evolutionary process behind it, i.e. microbes becoming resistant to antimicrobials they have been repeatedly exposed to and that all antibiotic use breeds resistance. For example:

Although most bacteria die when they encounter an antibiotic, a few hardy bugs survive. Through repeated exposure, those tough bacteria proliferate, spreading resistance genes through the bacterial population. That's the curse of antibiotics: The more they're used, the worse they get, especially when they're used carelessly (Bagley & Outtersen, 2017).

Antimicrobial resistance occurs when microbes —like bacteria, parasites, viruses, and fungi— evolve to defeat the drugs that once killed them. The problem is especially pressing for antibiotics, which are becoming increasingly ineffective at treating everything from gonorrhea to tuberculosis (Yang, 2016b) .

The news stories also mentioned specific drivers of AMR. The most frequently mentioned ones were antibiotic use in humans (n=29), antibiotic use in animals (n=29),

³¹ See chapter 3 for details on the methodology.

lack of new antibiotics (n=21), poor hygiene (n=11), use of antimicrobial gels (n=6), and international travel (n=3). For example:

Many of these bacteria have evolved and mutated, allowing them to resist, in the worst cases, all of our available antibiotic therapies because of the sheer volume of use in concentrated environments such as on farms. Incidence rates have risen overall, and the problem has spread worldwide as a result of inadequate infection-control practices and international travel (Heil, 2017).

The causes of drug resistance in the American military were many of the same as in civilian populations: poor hygiene, overuse of antibiotics and treatment in multiple facilities”, said Dr. Kent E. Kester, a retired colonel who led the Walter Reed Army Institute of Research and oversaw the drug resistance program (Loewenberg, 2018).

India - a popular destination for cut-rate medical tourism - has been called a superbug's "perfect petri dish" because of poor sanitation and uncontrolled antibiotic use (Kirkey, 2017).

More concretely, AMR was depicted as a public health problem (n=45) and a global threat (n=40). Most of the coverage highlighted the fact that AMR is a health threat that affects all nations; however, the origin of the threat was usually tracked to developing countries or non-Western countries, thus establishing a dichotomy between "healthy, developed Us" and "diseased, underdeveloped Them", which can be a mechanism for identity building through illness (cf. Wald, 2008). These descriptions did not address, however, the role that Western industrialization had in the emergence of resistant pathogens in these countries, many of which are former colonies. For example:

The point is that what happens in China does not stay in China. While colistin has been used on farm animals in China, it has been a last-resort antibiotic for people in the United States and elsewhere. Losing it would leave another hole in the antibiotic armamentarium (“The global danger of losing antibiotics,” 2016).

The *mcr-1* gene was first identified in China almost a year ago, showing up in pork, live pigs and infected humans. Since then, health officials and infectious-disease experts around the world have been looking for it; it has since been found in nearly 30 countries (Sun, 2016a).

Typhoid is endemic to Pakistan, where poor infrastructure, low vaccination rates and overpopulated city dwellings persist. Doctors in the Sindh province were not surprised by an outbreak in November 2016 -- until cases proved unresponsive to ceftriaxone, used to treat multidrug-resistant, or MDR, strains of typhoid (Baumgaertner, 2018).

While AMR was mostly referred to in the news coverage as a nosocomial condition, a hospital complication affecting mostly hospital patients with weakened immune systems, there was recognition that otherwise healthy people are increasingly at risk of acquiring resistant infections. Hospital patients (n=17) were most often cited as being at risk of resistant infections, followed by the general public (n=11), long-term patients (n=4), the elderly (n=4), food workers (n=1) and infants (n=1). For example:

Most of these deaths occur among older patients in hospitals or nursing homes, or among transplant and cancer patients whose immune systems are suppressed. But some are among the young and healthy: A new study of 48 American pediatric hospitals found that drug-resistant infections in children, while still rare, had increased sevenfold in eight years, which the authors called "ominous" (McNeil, 2017).

Superbugs that the WHO considers the highest priority are responsible for severe infections and high mortality rates, especially among hospitalized patients in intensive care or using ventilators and blood catheters, as well as among transplant recipients and people undergoing chemotherapy. While these pathogens are not widespread, "the burden for society is now alarming," she said (Sun, 2017a).

“Cases have cropped up at several hospitals in scattered locations, and some patients had no interaction with health care facilities whatsoever. At least one person infected somewhere in the community had no underlying conditions”, said Dr. Nasia Safdar, director of infection control at the University of Wisconsin Hospital (Yang, 2016a).

In fewer instances AMR was framed as a tragedy of the commons (n=3), highlighting how individual actions driven by self-interest affect the common good, i.e. using antimicrobials to reduce immediate personal risk even if antimicrobials were not needed or if it is not the correct antimicrobial. Other times AMR was described as a silent threat (n=3), or a national security threat (n=2). For example:

But this is the crux of the issue: a sort of bacterial tragedy of the commons. Many Canadians feel - incorrectly, it turns out - that antibacterial soap is best for our family; when we buy it, we feel we're making that decision in a vacuum. The fact that using this soap might mean someone you've never met gets infected with a superbug may seem like a distant concern at best. But of course, if we all act this way, in ignorant self-interest, we all eventually lose. Giving up antibacterial soap is therefore a classic case of all of us needing to take action for the greater good of public health (Callaghan, 2016).

The problem is often described as a tragedy of the commons - as a society, we understand that overuse of antibiotics is wrong, but as individuals we still demand them. The failure is a global phenomenon, too; other nations overuse antibiotics on an even larger scale than the United States (“A prescription for antibiotics,” 2016).

It's a threat to American national security, too. Forces in Iraq and Afghanistan were laid low by drug-resistant infections for many years before the military began a program in 2009 to tackle it (Loewenberg, 2018).

Another frame used on a few occasions in the news coverage of AMR was that of the economic burden posed by the spread of resistant infections. In nine news stories AMR was described as harmful to the global economy and one article referred to increased hospital costs due to resistant infections. For example:

On Monday, the World Bank said drug-resistant infections could cause global economic damage comparable to the 2008 financial crisis. In a worst-case scenario, the bank projects that low-income countries could lose more than 5 percent of their gross domestic product and that up to 28 million people, mostly in developing countries, could be pushed into poverty by 2050 (...) The meeting underscores the growing awareness by governments that antimicrobial resistance is not just a health problem but also an enormous economic and security threat. And it's an international threat, because it spreads easily across species and throughout the world, observing no political boundaries (Sun, 2016b).

The widespread prevalence of multidrug-resistant infections has nearly quadrupled the amount of time patients must spend in a field hospital to recover from war wounds. This extra time, plus the specialized antibiotics a patient requires to overcome a drug-resistant infection, means far fewer patients can be treated than the norm, and the care is much more expensive and difficult (Loewenberg, 2018).

AMR was mostly described in the news coverage using hyperbolic terms as “superbugs” (n=54), describing an apocalyptic scenario in which medical treatments are

useless (n=44), or described as “nightmare bacteria”³² (n=6). Framing AMR in terms of apocalypse and catastrophe in news coverage is a recurrent pattern found in various studies (for example Nerlich & James, 2009; Washer & Joffe, 2006), which reinforces the trope of AMR being uncontrollable. For example:

The CDC is recommending increased testing for the superbug gene. The gene spreads readily among bacteria, and the biggest fear is that the gene will spread to bacteria that are now susceptible only to colistin. That would result in a kind of super-superbug, invincible to every lifesaving antibiotic available (Sun, 2016a).

And as a superbug, gonorrhea is particularly super. Resistant strains have now emerged against every class of antibiotic and doctors are down to their last available treatment (Yang, 2016c).

Gonorrhea and other sexually transmitted infections might become untreatable. Diseases that our parents defeated -- like tuberculosis -- could come roaring back. The economic costs would be staggering: In September, the World Bank estimated that between 1.1 and 3.8 percent of the global economy will be lost by 2050 if we fail to act (Bagley & Outtersen, 2017).

If these lifesaving drugs were rendered ineffective by superbugs, even minor infections would be untreatable, bringing back a level of danger not seen since the 19th century (Sun, 2016b).

Another characteristic of the language used in the news coverage of AMR is the anthropomorphization of AMR, i.e. giving resistant organisms human qualities and capacities, for example describing them as being “at war” with humans. This characterization of antimicrobial resistant organisms suggests consciousness and intention, as if they had the will to attack humanity. For example:

A war of attack, counterattack and resistance has played out among bacteria, viruses and other organisms for much longer than humans have been on earth. In nature, microbes evolve ways of poisoning one another so that they can compete for scarce resources. The poisons they make (which are not toxic to humans) are the origin of the antibiotics we use today. But bacteria are constantly developing resistance mechanisms to these, which explains the resistant superbugs we're now seeing (Nodwell, 2016).

³² The phrase “nightmare bacteria” was first used by the CDC to refer to multidrug-resistant bacteria in April 2018.

Bacteria not only swap the plasmids back and forth, the plasmids pick up other drug-resistant genes along the way. "The bacteria carry them around like tool kits," Burrows said. "It makes them ready to kill off any drug they come into contact with" (Kirkey, 2017).

Research team's 'out-of-the-box' thinking delivers promising ammunition in war with antibiotic-resistant bacteria (...) The next step is turning the promise into a significant addition to medicine's arsenal in the increasingly worrisome science-bacteria arms race (Martin, 2016).

The risk of AMR was framed in the news coverage as complex and multidimensional, and journalists commonly resorted to the use of hyperbole to evoke a sense of imminent danger. AMR was described as an inevitable evolutionary process, although the actual process was rarely explained, and a product of human activity, such as antibiotic misuse and international travel. AMR was defined as a crisis with global roots, but also a tragedy of the commons, suggesting the idea that a coordinated action is necessary at the community, national and international levels. It was deemed a public health problem but mostly a hospital-based risk, thus reinforcing the common misconception that resistant infections are secondary complications of hospitalization and cannot be acquired in the community. Additionally, AMR was considered to be both an economic risk and a national security threat. This multiplicity of definitions not only frames AMR as multidimensional but also as impossible to fully grasp or address. The scale and complexity of the problem is explained as so disproportionate that the coverage conveys the idea that AMR is a “wicked problem” –i.e. a problem that is impossible to fix because there is no single solution, an ending point is impossible to foresee, and its interconnections are so complex that when one aspect of it can be solved it only reveals more problems (Brown et al., 2010).

Use of expert knowledge and sources

Another important aspect in news coverage of AMR are the sources used in each story to establish its central frames (Hallin et al., 1993; Schudson, 2012). In health news physicians have traditionally been privileged sources with definitional power and depicted in a positive light (Briggs & Hallin, 2016, pp. 91–93), however, there has been a change in sourcing practices for health news as academic researchers and industry have replaced physicians as the main voices of medical authority, leading to increased diversity in the production and distribution of biomedical knowledge (Briggs & Hallin, 2016, p. 80; Clarke et al., 2003). Additionally, positive depictions of physicians have been nuanced with negative coverage, although positive coverage is still dominant, mostly reinforced by stories of science and medicine saving lives without any mention of limitations or other interests beyond the patient (Briggs & Hallin, 2016, pp. 92–93). Briggs and Hallin (2016) note that with the inclusion of negative stories and controversies, health news has become a stage in which biomedical professionals debate each other publicly and individuals are compelled to do their own research, thus eroding public trust in science and medicine (p. 96-97, 101). Similarly, Beck referred to the media as the site where experts contradicted one another, revealing the failure of science in solving the risks it had created, which he called “reflexive scientization” (Beck, 1992 p. 166).

In the analysed news coverage of AMR the most frequently cited sources were public health officials (n=28) and scientists (n=28), usually in the context of reporting or commenting on a new scientific study or the release of a formal report on antimicrobial resistance by the WHO. Other commonly cited sources were health agencies (n=24), doctors (n=15), advocates (n=4), politicians (n=4), scientific studies (n=4) and economic

agencies (n=3). Many doctors and researchers were interviewed to provide local context and, occasionally, an assessment of the risk posed by AMR to the population and to suggest risk mitigation measures. This sourcing follows what other studies found regarding physicians not being the main definitional voices. However, in the case of AMR the news coverage did not show a controversy in which various scientists or biomedical experts debated competing points of view, but instead all sources agreed on the causes and severity of AMR as a health risk. The coverage reinforced a biomedical way of knowing the risk of AMR by giving definitional power to health experts and physicians, and in doing so obscured cultural and embodied ways of experiencing AMR. Furthermore, despite defining the problem as complex and multidimensional, the news coverage focused on only a few definitional voices.

News coverage of AMR did not suggest individuals do their own research. Nor did it provide much information regarding risk prevention measures at the individual level; it did not include patients with resistant infections as sources but rather reproduced exclusively doctors’ experience treating resistant infections, the newest resistant organisms identified, and public health efforts to tackle the risk, as expressed by medical and government sources. This tendency, however, could be changing in more recent news coverage of AMR, particularly the discovery of widespread resistant *Candida auris* in hospitals in North America and *Klebsiella pneumoniae* in hospitals across Europe (Gallagher, 2019; for example Jacobs & Richtel, 2019; Richtel, 2019; Zafar, 2019). The emergence of these bacteria is leading to a resurgence of the “dirty hospital” trope in media coverage, a frame previously found in a study about media coverage of MRSA outbreaks in British hospitals (Chan et al., 2010).

Distribution of blame

News discourses also contribute to the production of risk by assigning blame to various individuals and groups for their role in causing the threat (Capurro et al., 2018). Despite expressing overall agreement regarding the nature and scope of AMR as a public health risk, on some occasions news stories refer to the responsibility that different social actors carry in spreading antimicrobial resistant organisms. Pharmaceuticals (n=18), agroindustry (n=17), and physicians (n=15) were frequently identified as blameworthy agents for contributing to antibiotic resistance by not developing new treatments, routinely (mis)using antibiotics in livestock, and inadequate prescription practices. For example, pharmaceutical companies, which are often identified as evil doers in many medical stories (Greenberg et al., 2017), were blamed for pursuing their own commercial interest and not developing new, life-saving antibiotics:

Most drug companies are not eager to make [antibiotics]. Compared with other drugs, antibiotics are not big moneymakers, and some manufacturers have gotten out of the business (Tavernise et al., 2016).

“New antibiotic candidates are in short supply”, Dr. Kieny said, “because 70 years of research have made it harder to find new ones, and because they are not very profitable for pharmaceutical companies”(McNeil, 2017).

Another sector blamed for the acceleration and spread of AMR is the agricultural industry, which is one of the biggest consumers of antibiotics worldwide (McKenna, 2017). This industry was targeted for blame in media coverage both for administering antibiotics to animals for growth promotion (particularly last-resort drug colistin), instead of reserving them for therapeutic use, and for the unsanitary conditions in which animals are raised, increasing the risk of infection. For example:

Cattle and poultry are increasingly raised on food they did not evolve to eat, particularly corn, in cramped, filthy settings, brought to slaughter weight far faster

than nature intended, treated not as living things but as science experiments and relentlessly dosed with unnatural chemicals to keep them from rotting. It cannot continue indefinitely, if for no other reason than creeping antibiotic resistance, a classic evolutionary revenge of nature (“Eating better,” 2016).

While the agroindustry was mentioned as having great responsibility in generating AMR, and use of antibiotics in livestock was mentioned as one of the main causes of AMR, the news coverage, however, did not mention how AMR also poses an economic risk to this industry and the loss of jobs that will ensue, showing that the economy frame is not common in reporting of AMR. Physicians were also signalled in the coverage as responsible for the spread of AMR through unnecessary antibiotic prescriptions, although the principle of antimicrobial stewardship was never mentioned. For example:

Family doctors see a lot of parents bringing in their kids complaining of painful ear infections. Most ear infections are caused by viruses, not bacteria. But “just in case,” it has become habit to prescribe antibiotics, which are only effective against bacteria. This doesn't help our patients and, in fact, over-the-counter pain-relief medications can better ease the child's pain. Antibiotic misuse harms us all, and studies show it has led to the spread of powerful, antibiotic-resistant superbugs (Wilson, 2017).

Infants in eastern Tennessee, he said, had more antibiotic-resistant ear infections than those in the state's western half or in many other states. Doctors there are “exuberant prescribers,” he said, which drives antibiotic resistance (McNeil, 2017).

Other actors blamed for exacerbating AMR were patients who demand antibiotic treatments when unnecessary (n=10), hospitals as sites where resistant infections are spread due to carelessness when performing hygiene routines (n=8), and the healthcare system in general (n=4) for not preventing AMR. For example:

As patients –and especially as parents anxious about sick children– we fill clinics and doctors' offices and ask for an antibiotic. This elemental desire for something that will make us feel better is entirely understandable, but it is also the crux of a common and serious mistake. When patients make an emotional appeal, clinicians find it hard to say no. This leads to overuse of antibiotics for conditions on which they have no effect. (...) The overuse of antibiotics and the inappropriate

prescribing of them just leads to more resistance, as the bacteria evolve to fight off the drugs (“A prescription for antibiotics,” 2016)

The other bacteria tagged as a critical priority: *Pseudomonas aeruginosa*, which can be spread on the hands of health-care workers or by equipment that gets contaminated and is not properly cleaned (Sun, 2017b).

In addition, doctors and nurses need to take practices like hand washing and equipment sterilization much more seriously to reduce widespread drug-resistant infections in hospitals (“The United Nations Takes On Superbugs,” 2016)

Blame was distributed among many social actors in the media coverage; however, government was seldom one of them. When political responsibility was addressed in the news stories it was in terms of taking action now to avoid a future crisis –politicians were blamed for lack of political action in five occasions, but there was no mention of blame for their not having acted earlier. In discussing the construction of social problems, Gusfield (1981) noted that causal responsibility for harmful events is inevitably assigned to certain groups (for example the medical community, patients, pharmaceuticals, agroindustry), while responsibility for the problem’s resolution is usually laid on persons or institutions with authority to impose sanctions or enforce rules. For example:

The Senate Committee on Appropriations just last week approved a spending bill that fails to give the Agriculture Department the funds it needs to combat resistance. The Food and Drug Administration has failed to set targets for the reduction of antibiotic use in food animals, and it collects limited data on how antibiotics are used on farms. With the end of antibiotics in sight, inaction will be catastrophic. Congress should fully fund efforts to combat resistance, and the FDA should set targets for antibiotics reduction and make sure they are met (“Bacteria are getting deadlier”, 2016).

Modern risks are caused by myriad factors and on some occasions the newspapers listed several actors implicated in the spread of AMR as a way of providing context and summarizing the problem, thus explaining the scope of the problem and the complexity of the solutions needed. For example:

The pharmaceutical industry lost interest not only because of the disappointment of synthetic chemistry as an engine for discovery but also because antibiotics are simply less profitable than drugs for more persistent conditions like cancer, depression and high cholesterol. Meanwhile, the world indulged in the existing array of antibiotics in such a reckless fashion that it's hard to know where to place blame. Physicians are just as guilty of overprescribing antibiotics -- even to mollify hypochondriacs -- as patients are of demanding the drugs too often. Farmers grew accustomed to overmedicating livestock because a steady supply of antibiotics supposedly pre-empted infection and encouraged vigorous growth (Jabr, 2016).

And everyone is culpable: patients who demand antibiotics unnecessarily and doctors who caved to their demands; farmers who routinely feed their livestock antibiotics and consumers who demand cheap meat; low-income countries that allow antibiotics to be widely-sold without prescription, and wealthy nations that need to do more to help those countries improve the sanitary conditions that lead to high infection rates (Yang, 2016b).

The news coverage of AMR blamed a few social actors for exacerbating the risk, particularly the pharmaceutical and agricultural industries, and physicians. This trend was noted by the interviewed doctors. However, the actors being blame are not as many as the myriad causes identified in the news stories, suggesting that because AMR is such a complex, wicked problem, journalists only focused on blaming those actors that are easily identifiable. In doing so, news coverage of AMR is framing only a few social actors as responsible for causing the problem which can affect public understanding of the risk and lead to the vilification of some industries.

Expressions of reflexive modernization in the news coverage of AMR

In its coverage of AMR news media provided recommendations for addressing the risk. These included, changing some professional or industrial practices (n=19), signalling a critique of modern practices through which key institutions, including government, industry, medicine and science, have become the main generators of risk (Lupton, 1999b). Specifically, out of the 61 news items examined here, 7 of them gave concrete measures for

changing current practices and in five instances expert knowledge itself was challenged.

For example:

[T]o reduce inappropriate prescribing for colds, sore throats and other, mostly viral or self-limiting minor ailments, every antibiotic prescription should be electronically reviewed to be certain it meets national guidelines. With electronic health records and prescriptions, such checking is possible. It should be mandatory for makers of electronic health records and major pharmacies to develop such capabilities and for health systems and physicians to install them as part of their quality reporting requirements in Medicare programs (Emanuel, 2016).

We need to change the patient/doctor relationship in order to ensure we eliminate unnecessary medicine (Levinson, 2016).

“We’re changing microbial ecology in a very significant way,” Laxminarayan said. “We need to protect antibiotics with the same seriousness as we protected the ozone layer through the Montreal protocol” (...) “There is no scientific discovery that’s going to allow us to permanently stay ahead of the bugs. No matter what we come up with, they will adapt to it” (Yang, 2016b).

Additionally, nearly half (n=30) of the news stories tasked government and regulatory agencies with the responsibility to monitor and control activities that drive AMR and implement plans to tackle the spread of resistant organisms. For example:

Because the indiscriminate use of drugs in animals can destroy the drugs' effectiveness for humans, the Food and Drug Administration has issued regulations that it says will reduce antibiotic use in livestock. The agency will need to monitor farms closely to make sure the rules are working (“The United Nations Takes On Superbugs,” 2016).

Beyond the ongoing critique of modern industrial and agricultural practices, the main risk reduction measure cited in the coverage was the development of new antibiotic treatments (n=25). However, it was seldom explained that bacteria could also, and rapidly, evolve resistance to new drugs, thus becoming an ineffective measure if not coupled with rigorous antimicrobial stewardship practices.

This nightmare scenario highlights two urgent needs: to slow the development of resistant bugs and to spur development of new antibiotics (...) the government and

industry should collaborate to fund pre-clinical research on antibiotics - in other words, studies of how drugs get into and fight infections (Emanuel, 2016).

The Food and Drug Administration has failed to set targets for the reduction of antibiotic use in food animals, and it collects limited data on how antibiotics are used on farms.

With the end of antibiotics in sight, inaction will be catastrophic. Congress should fully fund efforts to combat resistance, and the FDA should set targets for antibiotics reduction and make sure they are met (Bacteria are getting deadlier, 2016).

Other changes in professional and industrial practices identified in the news coverage included regulating the use of antibiotics in farming (n=15), funding more medical research (n=15), setting up antibiotic stewardship programs in hospitals and clinics (n=12), encouraging the population to maintain proper hygiene (n=11), infection surveillance (n=9), regulating the use of antibiotics in humans (n=6), vaccination (n=6), cooking food thoroughly (n=6), responsible use of antibiotics by patients (n=5), access to clean water (n=2), public awareness campaigns (n=2), regulating the use of antimicrobial products (n=2), and reducing the length of hospital stays (n=1). For example:

For clinicians, the key is better antibiotic "stewardship" - the tools and training to avoid using them when inappropriate. Patients also need to be told that antibiotics may not be right for them, perhaps with something as simple as a poster in the waiting room (“A prescription for antibiotics,” 2016).

Researchers consider the epidemic an international clarion call for comprehensive prevention efforts. If vaccination campaigns and modern sanitation systems don't outpace the pathogen, they anticipate a return to the pre-antibiotic era when mortality rates soared (Baumgaertner, 2018).

Doctors and nurses need to take practices like hand washing and equipment sterilization much more seriously to reduce widespread drug-resistant infections in hospitals. Consumers must make sure they and their children are vaccinated, which helps prevent infections in the first place (“The United Nations Takes On Superbugs,” 2016).

The analysis of news coverage of AMR reveals a disparity in volume of coverage, with Canadian newspapers publishing a significantly smaller number of stories than those

in the U.S. AMR was covered in North American newspapers as a multidimensional risk of global proportions and with multiple actors implicated in its spread. Health professionals, industry and patients were consistently blamed for the risk; however, the stories rarely made reference to lack of regulation and political responsibility. News media, however, did task governments with the responsibility to regulate now the use of antimicrobials to avoid a “post-antibiotic apocalypse” (Brown & Crawford, 2009). The newspapers also listed a number of modern practices that cause AMR, but the actual evolutionary process behind it was seldom explained, thus many times lacking appropriate context and instead resorting to hyperbole and fear-inducing language. The analysed news coverage of AMR reproduced the definitions and information about the risk provided by public health officers and exhorted individuals to regulate their risk behaviour, and thus followed a deficit model of risk communication. Despite reproducing expert knowledge and public health narratives of self-regulation, the news coverage of AMR did not strictly followed a deficit model of risk communication as they seldom mentioned preventive measures that would suggest a sense of control over the risk and direct instructions for individuals, as traditional risk communication approaches would (Abraham, 2009).

Elements that could signal the beginning of a cultural change in how antibiotics are understood, our exploitative relation to nature, and modern ways of production and consumption were found occasionally in the news coverage of AMR. Industrial and professional practices were criticized in the news coverage on occasion, and prescription practices were also challenged. Individuals were blamed for asking or expecting antibiotics from their doctors even when they have viral infections, but patients were also tasked with the responsibility of monitoring their physicians’ prescriptions and questioning

the need for antibiotics if prescribed, thus demanding patients’ self-regulation and positioning them as antibiotic stewards. However, most of the measures suggested to tackle AMR were taken at the local level, particularly political action, but seldom was the need for global action addressed or authorities called to engage in international cooperation. Expressions of reflexive modernization include framing risks beyond ideas of the nation-state, uncertainty over the role of politics regarding global risks, and a global perspective of risk. Therefore, instead of an incipient cultural change that could be characteristic of reflexive modernization, the analysed news coverage engaged in blame shifting, identifying scapegoats for a very complex global risk that involve myriad interrelated stakeholders, actions, and causes (Beck et al. 2003).

Additionally, lack of media attention is characteristic of forms of slow violence, which fall under the cracks of corporate media because it is not spectacular and they are open ended (Nixon, 2013, p. 6). The main consequence, according to Nixon, of this lack of media representation is the impact on what counts as a casualty of slow violence, as most human and environmental casualties of it are not seen, and therefore become “lightweight” or “disposable casualties” (p.13). In that sense, I argue that lack of media representation has a deep impact on the co-production of risk, on what is considered a risk and what is not, thus affecting the very definition of the hazard. When a risk goes unseen, so do the consequences of it, i.e. the embodied experience of contracting a resistant infection; the experiences and fears of healthcare workers; the environmental impact of hospital waste and disposing of antibiotics carelessly; among others.

REPORTING ABOUT AMR: VIEWS OF SCIENCE JOURNALISTS

After examining the media coverage of AMR, I now turn my attention to the actors

who construct these texts, in order to understand how they envision and frame the risk of AMR and the cultural and professional practices that come into play in deciding whether AMR should be covered or not, and how. Specifically, I conducted semi-structured interviews with four leading and well-known health journalists³³, a science journalist and journalism professor³⁴ at Carleton University, and an epidemiologist³⁵ who is the author of a popular science book about AMR and the rediscovery of phage therapy. I first discuss the drivers for reporting on AMR; then I explain the challenges for reporting on this public health risk; I follow with a discussion of how media practitioners understand the role of journalists in health reporting; and finally, I explain why they believe AMR has not become a “big story” in Canada.

Health reporting includes a variety of topics, from new research or treatment of a disease, to outbreaks; from communications issued by public health authorities to scandals related to medical malpractice. The journalists interviewed for this project agree that AMR is a serious public health crisis that demands greater attention from the public and policymakers, but explained that health stories are driven by the same criteria or newsworthiness as other news, i.e., novelty, significance, proximity, prominence of sources, and human interest (Galtung & Ruge, 1965; Harcup & O’Neill, 2017), which means that occasionally AMR-related stories will not get covered or be treated with just the thinnest of substantive attention. The journalists interviewed for this study explained that

³³ Helen Branswell (*STAT*); André Picard (*The Globe and Mail*); Tom Blackwell (*National Post*); and Carly Weeks (*The Globe and Mail*).

³⁴ Sarah Everts is a science reporter (*Scientific American*, *New Scientist*, *Smithsonian*) and an associate professor in the School of Journalism and Communication, Carleton University.

³⁵ Dr. Steffanie Strathdee is an infectious disease epidemiologist and Associate Dean of Global Health Sciences at the University of California San Diego School of Medicine and Co-Director at the Center for Innovative Phage Applications and Therapeutics. She is also the author of the bestselling memoir *The Perfect Predator: A scientist’s race to save her husband from a deadly superbug* (2019).

AMR reporting is driven mostly by new research published in medical or scientific journals, a new report or declaration by the WHO or Public Health Agency of Canada (PHAC), an outbreak in a local hospital, or the threat of a new resistant organism:

“Often we’ll come to these stories if there’s some sort of report that comes out, say like from an organization like the Public Health Agency of Canada or Health Canada, or some important study with some new findings that seem to advance the story (...) we’ll also see a lot of stories when there seems to be a new threat or a new bug in the horizon, something that is a new or worsening development (...) We often report on something when something bad happens or you hear oh here’s a problem, or here’s one hospital that is dealing with an outbreak, and then we kind of report on it and then drop it” (Carly Weeks, *The Globe and Mail*).

“A lot of health coverage in general is guided by journals, we follow the medical journals very closely. So, say the New England Journal (of Medicine) did a publication on antimicrobial resistance, good chance we would cover that. Same thing if there’s a report from public health agency, we would cover...almost always cover that. So, I’d say it’s institutionally driven a lot of it (...) And then some stories are driven by scandals, for lack of a better word. Say if a small bunch of people get sick in a hospital, say the Montreal General has an outbreak of a superbug of some sort, and then we’ll cover that (...) So it’s through research and publications, and also sometimes through recommendations. You’ll talk to someone and they’ll say ‘oh, my colleague happens to be studying CRE, you should talk to them’” (André Picard, *The Globe and Mail*).

Therefore, whether AMR gets media attention or not is guided by expert knowledge and novelty, which gives exclusive definitional voice to experts and obscures other ways of knowing the risk of AMR, and other stakeholders who also have lived and embodied experience of AMR.

Challenges in reporting on AMR

Despite acknowledging that AMR is an important topic that should be covered in the news, health journalists discussed a long list of challenges they face when writing about AMR. These challenges range from professional and institutional practices to lack of reliable data and sources, among others. Helen Branswell, a well-established Canadian health reporter currently writing for the U.S.-based specialty health news website *STAT*,

explained that AMR “is a hugely important issue and maybe one of the most important health concerns in my line of health reporting. You know, I think this is an enormous threat that doesn’t actually get enough attention” (July 27, 2018).

Lack of new angle or hook, and no surveillance data

Ongoing health stories need new angles or “hooks” for journalists to report on them. Novelty is a key criterion of newsworthiness (Galtung & Ruge, 1965) and the interviewed journalists referred to their struggle to find new angles for reporting on AMR. One of the drivers of health news coverage is the release of new data, particularly infection surveillance, that help contextualize the health risk and explain the nature and extent of the problem. The reporters interviewed for this project referred to a lack of reliable data for number of hospital-acquired and community-acquired resistant infections in Canada, making it difficult for them to contextualize the threat of AMR in that country. In that sense, they agreed that AMR would receive more media attention, thus raising public awareness, if journalists could have access to official national infection surveillance data that showed what the magnitude of the problem is in Canada. For example:

“An issue like [AMR] is just a huge issue that is almost ever present so we are looking for excuses to write about it. We’re looking for hooks, what is the new hook on this, what’s a little bit different in this story that we can use to tell a bigger story than what we’ve told over and over again about antimicrobial resistance getting worse and worse (...) And we don’t have good Canadian data either, so that’s a real drawback (...) I think if there were more data published there would be more media coverage, more publications, and these things feed off each other. And rather than covering up the problem I think hospitals should talk about when they had a problem and how they dealt with it, because I think they do have a role in raising awareness more than the media” (André Picard, *The Globe and Mail*).

“There has to be some sort of angle that makes it interesting, relevant and newsworthy for that day (...) I think that having better surveillance, better numbers elevates it, makes it crystal clear, you know, wow that’s the number of people who acquired infections or how many people died!, just really categorizing what’s the extent of this problem (...) If I look back at the opioid crisis, having good

surveillance did trigger action. It was years for the government to do something and even though we’ve had the numbers now for two and a half years there’s still a lot more that needs to be done, a lot more that could be done but there’s some action we’re seeing. So, I think to have some kind of movement [with AMR] there needs to be either something that is new or jarring, whether those numbers are coming from agencies or a media outlet reporting on this issue in a very new, in-depth way (Carly Weeks, *The Globe and Mail*).

Resistant infections are mostly associated with healthcare institutions as they have been traditionally understood as nosocomial infections, secondary to the actual reason why people are hospitalized. AMR infections, however, can also be acquired in the community³⁶ and the reporters, who said they were less familiar with community-acquired resistant infections, explained that it is even more complicated to report because there is no official data of the incidence of resistant infections acquired outside of hospital settings:

“I’m not sure that the concept of community-acquisition of resistant infections is super well known, the incidence isn’t well charted. We now know that some people get infections in the community not just in hospitals but I don’t think the community is a major...I mean, most of the risk of infection is in the hospitals. When MRSA was a bigger story, community-acquired MRSA was beginning to be talked about, because people were hearing about children getting it in daycares, and wrestlers were getting infected, or football teams. But in the main, I don’t know, I don’t think it’s necessarily well understood or well charted” (Helen Branswell, *STAT*).

“I wasn’t aware that that was [community-acquired AMR]. I think the nosocomial infections have that added that it’s a problem caused by the health system and in that sense it makes it a more interesting story, I guess. People who go into a health institution expect to be fixed not to encounter more problems” (Tom Blackwell, *National Post*).

Dr. Steffanie Strathdee, Associate Dean of Global Health Sciences and a Professor at the University of California San Diego School of Medicine, expressed a similar concern regarding the lack of an effective infection surveillance system in Canada for resistant infections:

³⁶ This was further explained in Chapter 1.

“I know that in Canada, for example, there’s no country-wide estimate of people dying from AMR per year. And I was shocked because I was just asked to write an op-ed for The Globe and Mail (...) and I criticize government for that but at the same time I say that things aren’t any better in the U.S. There was a report that came out recently showing that the CDC had underestimated the number of people dying due to AMR by at least seven fold and those data were published in 2010, so they are already out of date” (Steffanie Strathdee, February 7, 2019).

The Public Health Agency of Canada (PHAC) has surveillance systems in place for hospital-acquired and community-acquired infections. The Canadian Nosocomial Infection Surveillance Program (CNISP) is a collaboration between PHAC and 65 sentinel hospitals across 10 provinces, which reports on rates and trends in hospital-acquired infections, including antimicrobial resistant organisms, strain types and resistance patterns, across Canadian hospitals; and the Canadian Antimicrobial Resistance Surveillance System (CARSS), Canada’s national system for reporting on antimicrobial resistance and antimicrobial use in humans and animals, publishes an annual report, which includes data on community-acquired resistant infections, such as Methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *enterococci* (VRE), and *E.coli*. The interviewed journalists, however, were unaware of these surveillance systems, which show the need for increased promotion of these surveillance reports, which could bring local data to news stories on AMR. The journalists lamented the lack of new hooks and infection surveillance data, which they said were the reason why AMR is not news. Therefore, they also engaged in blame displacement, arguing that the lack of media coverage of AMR was caused by public health authorities and hospitals’ silence. Therefore, in terms of the co-production of the risk of AMR, these interviews suggest that medical professionals, public health authorities, journalists and media, are nodes in the network of biocommunicability of AMR that remain disconnected.

Editors

Some of the journalists identified institutional constraints as important conditions shaping their reporting on AMR, namely getting approval from editors to write on a topic that may be unfamiliar and thus lacking in urgency, newsworthiness, or human interest. For example:

“I generate the story ideas but I have to get approval. (...) Sometimes, with cases like the [UN’s] high level meeting [on AMR], I wrote a few pieces in advance but I did not attend. I don’t think I wrote anything on the day or at the time because my editors weren’t interested. And expressions of concern from...or promises to...I mean, I’m not trying to suggest that having countries to agree, even have a discussion is not important because it gets the problem on the radar for people who need it on the radar, but that doesn’t make it a compelling story for most readers. I can tell you for sure that I wrote a story about what the woman in Nevada, which for a time was our highest read story on the website ever” (Helen Branswell, *STAT*).

“[AMR] is a harder story to sell to our bosses. They’ll say I haven’t heard of that, it cannot be that important (...) I think [declarations and publication of action plans] are more important for the more specialized press than for the community. I think for a general newspaper like mine they’re useful for background, but they get very little coverage. A high-level meeting like that would probably get one story because they published new data. So, there would be one story about how 50 million people could die, or whatever the number was, and that would be the one big story. And there probably would be no follow up. But then we will always have that number and it would be used subsequently in other stories as context” (André Picard, *The Globe and Mail*).

Editors play a crucial role as gatekeepers of information, making sure that news stories are relevant, accurate and timely. However, editors can also hinder public understanding of key public health risks like AMR. The criteria of newsworthiness that journalists and editors use prioritize vivid events with immediate consequences contributes to the invisibility of various forms of slow violence. In the examples above, the journalists explained that they need to “sell” the story to their editor, and unless the story contains some immediate consequence –like the story of the woman in Nevada– editors do not

believe it will be of interest or generate enough online traffic to invest time and resources in writing the story.

Who’s the face of ‘superbugs’?

Unlike chronic diseases that usually have patient associations and advocacy groups, the journalists could not identify any clear advocacy groups or patient associations for AMR in Canada. In fact, they noted that while a human face is needed to make stories about AMR more relatable to readers, this is precisely what this particular health risk is lacking:

“So, the problem is, I know somebody with heart disease, I know somebody with cancer, I know somebody with HIV. Most people don’t know anybody who has AMR, or has died of AMR, and if so, it’s usually somebody who is a little bit older who had some hip transplant, where there’s been a lot of complexities. I think it’s done a disservice when it is not made clear when somebody who is quite old dies of complications from AMR as opposed to being like oh yes something went bad with the hip transplant. Do you know what I mean? There’s not a lot that’s explicit (...) And part of the problem is we don’t know as many people in our personal lives that have AMR” (Sarah Everts, May 27, 2019).

Similarly, the reporters mentioned that the lack of an advocacy or patient group means that there is no pre-packaged information that can facilitate writing about AMR, there are no press releases and no ready-to-use images. Journalists access pre-packaged information in the form of “information subsidies” (Gandy Jr, 1980, p. 106) about health issues through advocates and recurrent sources that seek to attract media and political attention and place their cause in the spotlight. This system of subsidies, which facilitates reporting, pits one disease against the other for media and political attention that could translate into more resources (ibid., pp. 109-110). Thus, lack of pre-packaged information can result in less news coverage:

“I wouldn’t travel to Geneva to cover [a WHO meeting on AMR]. But I would travel, like I just did, to Amsterdam to cover the big AIDS conference. It’s a

different political context because AIDS is the biggest epidemic in history and we have a history of covering it because they do a very good job of selling it media-wise, good packaging, all the researchers in the world get together for one week. A lot of practical things, they know how to sell their story to the media (...) [AMR] is not a hot topic, all the necessary forces have not aligned yet. And every good cause needs a spokesperson, needs a face, who’s the face of superbugs?” (André Picard, *The Globe and Mail*).

“[AMR] gets maybe ignored or it doesn’t get the weight that it should and it’s because really it’s kind of happening, it’s kind of out there, but it’s one of these examples of a story that is kind of ongoing and it’s problematic but we’re just, for whatever reason, not reporting on it. And I think that in some ways [it’s because of] not having a public face to it or not having some sort of urgent news hook associated with it” (Carly Weeks, *The Globe and Mail*).

Dr. Steffanie Strathdee also identified the lack of a human face as a problem for communicating AMR, which she sought to address with her book and the media coverage it attracted, by telling the story of her husband’s infection giving the risk of AMR a “poster child”:

“It’s almost like, my husband became the poster child for the AMR crisis. A reporter actually contacted us to make a documentary about our story and that’s what she said, ‘there’s no human face for superbugs like there is for HIV or cancer until your husband came along, would you be that person for us?’ And we looked at each other and we said ‘hell yeah! We need to do this’” (Steffanie Strathdee, February 7, 2019).

Journalists complained about the lack of a personal narrative, a story of experience with AMR, and actual face recognizable as the face of AMR, which makes it hard for them to write stories that readers will find relatable and relevant. They also mentioned the fact that other diseases have advocates and media kits with all the information to write a news story. In that sense, journalists also blamed people who have lived experience of AMR for not organizing themselves to obtain media representation for their cause.

Hospitals not communicating candidly with media

Effective risk communication is premised on full and early disclosure, which is not only considered an ethical imperative but also the basis for fostering and developing public trust (Greenberg, 2012; Nilsen, 1974). However, hospitals and public health agencies do not automatically comply with this norm when there are outbreaks of infectious diseases or similar health crises, but instead they weigh the public right to know against the patients’ right to privacy. They evaluate the moral obligation to inform the public when doing so could potentially lead to unnecessary panic, particularly when the measurable level of risk is low, but perception of that risk will be high (Greenberg, 2012). Other considerations for hospitals with outbreaks are the risk of scaring away people who need medical intervention and who may avoid the hospital because of outbreak reports, as well as reputational risks for the medical institution, i.e. being labelled a “dirty hospital”.

Akao and Chaplin (2003) argue that hospitals are “one of the most opaque institutions” as lack of transparency makes it impossible for outsiders to evaluate institutional performance (p. 25). The journalists interviewed for this research shared this perception and explained that besides not having current infection surveillance data to report on AMR, hospitals do not communicate their local infection numbers either, but instead become secretive about outbreaks of resistant infections:

“I think hospitals tend to, with any kind of nosocomial risk, they tend to downplay it, so I wouldn’t consider the hospitals’ spokespeople good sources. But within hospitals you find infectious disease specialists who are generally frank and honest about discussing, so that’s who I’d go to as a source rather than the official hospital spokespeople, I guess. Hospitals want to promote the image that their institution is safe and high quality and all that so they’d tend to downplay such problems” (Tom Blackwell, *National Post*).

“It’s not always easy, often you’re writing about stuff retrospectively (...) But sometimes you get tipped off like ‘oh my grandmother is in that hospital where

everybody is sick with this bug’ and that’s how we find out. Hospitals don’t like to advertise that they have outbreaks. But they should, this is information that the public should know to be safe (...) ‘Oh that was just five people, isolated incident’, that’s their favourite word” (André Picard, *The Globe and Mail*).

I discussed this with a member of the communications team at the hospital, who requested confidentiality, who explained how hospitals handle the communication of outbreaks in the wards. They referred as an example to an outbreak of VRE a few years ago and explained that:

“We generally don’t go out with something if it is contained, which it was in the case of VRE. [The medical teams] knew who had contact, they knew how to deal with it (...) So we communicated with the people who needed to know, but we wouldn’t necessarily... because you have to maintain certain level of trust in the institution. It’s not to say that admitting this is not trustworthy, but the way people perceive these things, they might think twice before bringing somebody here when we want them to bring them here and not think twice about it (...) we really want the community to be confident in the services that we provide, how we do it. What underlies that is our reputational record. If there’s a reputational risk then people are less likely to bring their kids, but we’re motivated to make sure that people bring their kids” (Communications officer).

The communications officer also referred to the impossibility to freely inform media about outbreaks happening in the hospital due to privacy laws and the overall impact that informing the public of outbreaks could have:

The difficulty that hospitals have in terms of communicating out is that we’re bound by privacy legislation, so it’s difficult for us to talk specifically about specific cases, unless we’re explicitly given consent to do so, which puts us at a disadvantage just in terms of our being able to tell our story and also a disadvantage because as an institution, who wants to get into a ‘he said, she said’ debate with somebody who is in pain. You don’t want to be perceived as that organization (...) So the question is what’s the benefit of telling the community at large about this if you know that all the players, all the people that have been affected, are being communicated with and it is being handled in an appropriate manner? What is the benefit of making that and issue of public interest and what are the risks of making it a larger issue?”

Hospitals, therefore, have an ethical obligation to balance being open and transparent in disclosing the presence of a serious pathogen against various other

responsibilities, including legal duties to respect patient privacy (see for example Greenberg 2012). Sarah Everts, however, reflected on the need for hospitals to communicate to the media and the general public about outbreaks of resistant infections, and she referred to a story published in *The New York Times* about the “culture of secrecy that shields hospitals with outbreaks of drug-resistant infections” (Jacobs & Richtel, 2019):

“I read in The New York Times about this [resistant] *Candida auris*. And there was an article about it and hospitals want to keep it a secret, right? And so here you have this (...) opportunity to get the public engaged with the topic, here is a situation happening to people right now and perhaps even in your own community and the hospital is trying to keep it a secret, because they are understandably afraid that people are going to stop coming to the hospital (...) what are [journalists] supposed to do when healthcare providers or institutions are trying to keep something secret?” (Sarah Everts, May 27, 2019).

The interviewed journalists lamented that hospitals and healthcare professionals are not sharing information with news media about the incidence of AMR in their institutions and argued this makes impossible for them to fully report on the threat of AMR to public health. Data regarding AMR is usually generated in Canada by the country’s infection surveillance systems, which publish reports periodically. However, the lack of access to personal stories was identified as a key challenge for journalists, a professional practice that they defended, thus placing the blame for lack of patients’ personal data on hospitals.

Authorities not communicating candidly with media

Beyond hospitals not reporting their cases of resistant infections, research participants also mentioned that health authorities do not communicate candidly with reporters about the scope and scale of the risk of AMR in Canada but follow the same pattern of secrecy as many other institutions:

“Government officials don’t tend to have opinions on anything, you know. And the way we...in a news story we have information and then quotes, which are opinions,

so if you cannot quote someone...if you know someone is not going to have an opinion there's nothing to quote” (André Picard, *The Globe and Mail*).

“I'd like to see some numbers and at the federal level in Canada is a real deterrent because people want to know the number of HAIs [healthcare associated infections] like what is it, 8 thousand people die each year of HAIs in Canada, but that doesn't sound so scary. But then if you realize that 50 thousand or 150 thousand, and you put that as a, you know, the whole global scene that 50 million people are going to die by 2050 of AMR, well OK that's a lot. But if you say that's a lot more than cancer, or you say one person every three seconds. You kind of have to make people realize what impact that is because numbers don't necessarily mean the same thing to everybody” (Steffanie Strathdee, February 7, 2019).

“If we call the Public Health Agency of Canada they may send us a statement that is very dry, no one sort of calling attention to this and you cannot do the calling yourself, you need the experts to fill in the blanks and I think in some ways that's missing here. And there's some great people doing things but they don't necessarily know that the media wants to reach them or how to reach them” (Carly Weeks, *The Globe and Mail*).

Additionally, Weeks (April 23, 2019) also explained that many researchers and experts in government organizations, hospitals and universities are doing interesting work on health issues such as AMR, but do not reach out to journalists because of their fear of being misrepresented or simply not knowing that journalists would like to report on their research:

“We know of a couple of people that are doing things, or so and so at this place is actually a leading researcher but we don't know that, and they may be reticent to talk. Sometimes you need to convince people that there is a very important need to do that (...) I think sometimes it's just fear of talking to the media, you know, like the media is going to simplify it or get it wrong. So, it's easier to not talk and I'm just going to do my work. But there is a need to have those discussions” (Carly Weeks, *The Globe and Mail*).

While doctors at the hospital lamented the inaccuracies in media coverage of AMR, journalists expressed frustration that physicians and researchers are not willing to talk to them at all about AMR. This is consistent with previous research showing that scientists feel uneasy talking to news media over fears of being misrepresented (Besley & Nisbet,

2013). This lack of trust also contributes to the lack of media representation of AMR and its co-production as a background risk. Despite this, journalists’ main sources when covering AMR are still public health experts and scientists as shown in the media analysis above.

Competing priorities

In choosing which stories to write, health reporters manage numerous competing priorities, as there is no shortage of health topics to be covered. In this process, journalists consider a combination of cultural and structural factors: the urgency of the topic, whether their editors will approve the stories, the time and resources they have to write the story, and the timeliness of the topic. In this balancing act, AMR does not always rise to the top of the list because it is perceived as not imminent or spectacular enough, or too prospective, which is characteristic of forms of slow violence:

“The biggest challenge is writing something in a way that actually captures the public’s attention because your first step as a journalist is to pitch a story to the editor and you’re pitching a story along with many other competing priorities that day so if it’s not relevant or is not telling something new or interesting then why are we telling that story now (...) So not only do you have to make your story relevant and interesting but you have to also be looking through this lens of all the health stories that are out which are the ones that we are going to be covering today, which are the ones that are really relevant” (Carly Weeks, *The Globe and Mail*).

“Here are a lot of other things to be concerned about, lots of other things being written about, there are other things that are potentially...other threats seem potentially more imminent, like, in the middle of last flu season, for instance, which I think it was not as bad in Canada as it was in the United States, it was horrible in the United States, that was what was grabbing people’s attention more than something like AMR. I think AMR at times feels like a theoretical risk (...) and too far in the future, in some respect” (Helen Branswell, *STAT*).

“If you are that journalist and you do have that health beat, you’re not just writing about AMR, you’re writing about all sorts of things including really bad behaviour on part of a surgeon in said hospital or you know, it’s not like there aren’t other really important health stories, some of which are happening right now in your face, right? And, again, this speaks to the immediacy of some stories and some problems,

and oh it’s going to be really bad in 20 years if we don’t do something now. What’s in your face bleeding is going to get more a bite from your editor than something further down the line” (Sarah Everts).

Besides all these considerations, media coverage of issues perceived as future threats, such as AMR, also suffer due to the structural transformation of the media environment: “the complete catastrophic meltdown of the news industry and fewer reporters even have a health beat in Canada, around the world actually, so fewer bodies of journalists keeping an eye on this” (Sarah Everts, May 27, 2019). In the last ten years the news industry has been through a major crisis that involved the elimination of many specialized news beats and the increase in workload for journalists in most newsrooms. So, priority is given to stories that present an immediate interest for readers, for which finding causes, patients with compelling narratives, and spectacular implications is a fairly straightforward process. As a risk that is perceived as abstract and with consequences far in the future, AMR is co-produced as a non-priority risk.

Explaining scientifically complex topics

A recurrent criticism among physicians and scientists³⁷ of media coverage of AMR is what they perceive as inaccuracy and oversimplification of scientific concepts. In writing about AMR, journalists agreed that they do need to simplify the science to engage a wider readership and acknowledge that it is a difficult task. They also mentioned that in some cases this difficulty deterred them from writing a story at all, particularly if there was no human element to it but only the discovery of a new resistant organism or new mechanism through which resistance is acquired:

“It’s almost impossible to explain many of the stories in ways that readers of newspapers, which is my audience, or news websites, could understand. Many,

³⁷ See chapter 6.

many of the stories would talk about the discovery of resistant genes that can confer resistance to this class of antibiotics, or that class of antibiotics, or multiple classes of antibiotics, and it doesn't mean anything to the average reader. It's almost impossible to explain most of these things. But then actually thinking of a story....I will see something from the Centers for Disease Control and Prevention talking about the discovery of, you know, the discovery of a number of cases of CRE here or something else there and I often will not write because there's no way to explain to people other than they found more bad bacteria, you know, they found more cases of bacteria” (Helen Branswell, *STAT*).

One of the ways in which journalists simplify AMR is through the use of catch phrases and concepts, such as the now popular ‘superbugs’ or the more ominous ‘nightmare bacteria’, that address the problem of succinctly communicating the risk of resistant infections without using what is arguably a dry and less relatable acronym ‘AMR’. However, while health and science journalists understand the practical importance of trading in such terminology, they do so with some regret, recognizing that while it is not an accurate way of reporting, it is a good shortcut to convey the message and capture readers’ attention:

“It's a good term for the media, it's catchy and it's better than ‘antimicrobial resistance’. We like to use this kind of expressions. I think the concept is good. The public needs to understand that there's bugs that you get every day, and that's not a big deal, but the ‘superbugs’, this is something serious, this can kill you. So, I think that kind of terminology is useful. But you have to be careful not to overstate it” (André Picard, *The Globe and Mail*).

“I think that in some ways those types of words become like crutches because they are part of the lexicon, so people go ‘oh a superbug, that sounds bad’ or ‘I've heard of that, that's that thing that grows in hospitals and that's why I'm not taking antibiotics’. And I think it does oversimplify things and I try not to use that in my reporting because I don't feel like it's particularly accurate and I don't think it's really helpful in making people understand what are we actually talking about” (Carly Weeks, *The Globe and Mail*).

“I hate it but it's very useful (...) I have to use it because I can't describe...you know, when you're talking about, for example, an E.coli that does this or a cudsio-pneumonia that does that. First of all, nobody knows what cudsio-pneumonia is (...) most people don't know the different pathogens. And then to explain them that this one has developed the ability to get past this kind of antibiotics, which as I said

before no one knows the types of antibiotics... There’s no easy way to explain things to people and ‘superbugs’, for better or for worse has taken hold” (Helen Branswell, *STAT*).

The journalists, just as the doctors in the hospital, agreed that the term ‘superbugs’ is an oversimplification, necessary due to the complexity of AMR. However, while doctors criticized its use in news stories assuming that journalists did not understand the science behind AMR, journalists felt the need to clarify that they detest that simplistic language, but they need to use it in order to reach broader audiences. In that sense, both healthcare professionals and journalists co-produce the risk of AMR as a wicked problem, far too complex and specialized for the average person to understand. Still, journalists mostly reproduced the biomedical discourse of AMR in the news stories instead of representing the risk of AMR through other ways of knowing it, personal and embodied experiences of AMR.

The anecdote: Making the story relevant

Health journalists often use personal stories to convey human interest and make stories more relevant to their audiences (Galtung & Ruge, 1965; Hinnant et al., 2013). Through the use of personal narratives, i.e. storytelling that describes cause-and-effect relationships between events, and specific framing news media can affect risk behaviour (Shelby & Ernst, 2013) and generate public sympathy for patients and support for particular health policies (Rachul & Caulfield, 2015). There is also evidence that people tend to trust individual experiences with disease more than information disseminated by health authorities and healthcare professionals (Macauda et al., 2011; Yiannakoulis et al., 2017). Helen Branswell explained that “often when I decide to write it’s because I share an anecdote” and noted that “[in] the hierarchy of scientific evidence single cases are way

down but in terms of trying to connect the story for readers, that’s in this case hugely beneficial. So, I find that when there is a case that you can actually describe it makes it much more comprehensible for people.” One such case was a man who in March 2018 was found to have a resistant strain of gonorrhoea and conventional treatment failed. When the doctors treating him published a report on the patient’s case, Branswell saw an opportunity to write about AMR: “I thought OK this is a way to explain to people what the reality of this is. When we talk about “superbugs” and untreatable infections and stuff like that I think sometimes it seems more theoretical and when you have a case like that (...) you can actually tell people ‘see? This is what is actually coming at us! This is what we’re facing if the drugs continue to fail’.”

Tom Blackwell echoed this opinion on the usefulness of anecdotes to write about AMR, but also reflected on the perils of using them in health reporting, such as overrepresenting or generalizing a threat and creating panic, something that doctors at the hospital were also concerned about: “Individual cases can maybe be misleading or scare people. On the other hand they can also be an illustration of what the risks are, so have to put them into context (...) I think you just have to have a particular mindset where you are not out there sensationalizing and issue.” Despite acknowledging the importance of narratives, personal and embodied experience, in order to make news coverage of AMR relatable and relevant for a broader readership, in the analysed news coverage there was almost a complete absence of patients’ or healthcare workers’ or other stakeholders’ personal experience with AMR.

Journalists’ role

Reporters, not advocates

Raising public awareness has been highlighted as a key element for tackling AMR (Interagency Task Force on Antimicrobial Resistance, 2012; Public Health Agency of Canada, 2017; World Health Organization, 2015), which usually involves communication between researchers, policymakers and news media, and seeks to transmit information from experts to non-experts, i.e. fill a perceived lack of knowledge and influence risk behaviour. As explained above, physicians have noted increased awareness among patients, which they credit to media coverage of ‘superbugs.’ Dr. Steffanie Strathdee reflected on her goal to raise public awareness of AMR when writing her memoir:

“I think it’s absolutely critical because most people are totally oblivious to the global rise of AMR and I am an infectious disease epidemiologist and I was blindsided by the fact that it was as big a problem as it is and how quickly the problem has become a global crisis. The bacterial pathogen that infected my husband was an organism that I used to play with in my petri dishes in the 1980s in the University of Toronto as an undergraduate student doing microbiology (...) So, this wimpy bacterium was nevertheless great at acquiring antibiotic-resistant genes. So, in the span of like the mid-1980s to now it’s become like the number one threat to human health on the list of WHO’s worst superbugs, that’s how quickly things have changed. So, I figured if I’m blindsided, and I’m supposed to be somebody who knows something about infectious diseases, then the average person has really gotten their head in the sand, and so do our policymakers” (Steffanie Strathdee, February 9, 2019).

Journalists, however, seldom see themselves as advocates or as having a responsibility to raise awareness about any particular health issue, including AMR. In analysing news coverage of health issues, Briggs and Hallin (2016) identified three models of biocommunicability: biomedical authority, active patient-consumer, and public sphere model. The biomedical authority model refers to news stories citing only scientists and biomedical authorities while the audience is presumed a passive recipient of the information they disseminate (pp. 25–33); this model is comparable to the deficit model of

risk and science communication discussed in Chapter 2. The patient-consumer model uses researchers and institutions of the biomedical industrial complex as sources and positions lay audiences as individuals with agency to make health and medical choices independently, without the supervision or approval of their physicians (pp. 34-39). Finally, the public sphere model approaches audiences not as patients or consumers but as citizen-spectators who make judgements about health issues and are involved in claims-making processes, rather than linear processes of information transmission, in which various parties compete for definitional power (pp. 39-40).

While physicians, public health offices, and health organizations promote a deficit model of communication for raising public awareness of AMR, the interviewed journalists adhered to the active patient-consumer model of biocommunicability in their reporting of AMR. The reporters made clear that it is not their job to raise awareness or educate the public. Helen Branswell explained that “people confuse journalism for advocacy or raising health awareness or some other...that is not my job! (...) I’m not the communications arm of the local public health department.” A similar view was expressed by Tom Blackwell, who added, “we basically look for new interesting stories, so there has to be that element of the new or something that has not been explored in the media, that people aren’t aware of, and there has to be something compelling about it, something people will want to read.” André Picard echoed these same ideas and explained that “we’re in the business of information, more than education. So, providing information and people can do with it as they wish. A lot of times people want journalists to do more of that education role and I think there is a bit of that role, but that is not our primary goal.”

The journalists all agreed that public education is not their job, although they conceded that sometimes their reporting will raise awareness of health issues, such as AMR, and that is why many believe journalists should act as advocates. These views were expressed with defensiveness, suggesting that demarcating a line between advocacy and reporting is part of their professional culture and identity. Discussing these boundaries, Sarah Everts shared some of the same views as the other study participants and related the need to clearly defined journalists’ job as part of finding a clear professional identity at a time in which corporate journalism is in crisis and what it means to be a journalist is being negotiated:

“Journalists are not activists, we report on what is there, so yeah, if there’s no surveillance data we can’t report on that, which is a non-story. So in order to grab onto the story and still report it, because say I’m a health journalist and I think this is an issue, I have to track down someone whose child, brother, sister has died of AMR, and that’s even harder because there’s nobody tracking. To do the right investigative journalism, to get that person that maybe activates the average person or a politician requires work, and it’s good work, it’s worthy work and I think journalists should be doing this, but there are a lot fewer journalists with a lot more things on their plate and it’s not always actually logistically feasible (...) Journalists report the news, we’re not activists, sometimes it appears that way because a lot of journalism is being rebranded, or the whole definition of journalism is in flux right now just because of the collapse of mainstream media” (Sarah Everts, May 27, 2019).

Only one of the interviewed journalists, Carly Weeks (April 23, 2019), considered public education of health risk as a key component of journalistic practice:

“My role is [to] focus on what are the relevant issues that the public should know about, you know, what is something that the public may not be aware of but should be aware of? What is something that has a lot of relevance? Because we’ve been talking about some potentially very serious risks to some people and how do we make sure that there is awareness without sensationalizing things, without overstating things. How do you, basically, increase awareness of the potential risks of the situation, you know, make sure that people understand them and try to communicate that. And we do try to communicate things in a way that is fair and not sensationalized because there is a real risk in health reporting of sensationalising

or overstating something which is sort of the nature of things (Carly Weeks, *The Globe and Mail*).

While the interviewed journalists made clear that it is not their job to raise awareness or educate people about health issues, this is certainly not the case for other health risks that are deemed “hot topics” and for which there is plenty of news coverage telling readers how to protect themselves, for example news coverage during outbreaks of vaccine-preventable diseases, the outbreak of Zika virus in 2016, or the current Covid-19 pandemic. Therefore, the apathy of journalists regarding the risk of AMR is not necessarily part of their professional culture. Still, this lack of interest in reporting on the risk of AMR and the blame shifting in which the reporters engaged, pointing at other stakeholders as responsible for the lack of news coverage, contributes to the co-production of AMR as an abstract and distant risk, i.e. not risky enough. Additionally, in displacing blame to other social actors, journalists reinforce the perception that AMR is far too complex to get media representation.

Reporting preventive measures

One characteristic of news coverage of AMR is the almost complete absence of prevention measures that individuals can take to reduce their risk of infection, in contrast to public health campaigns that usually provide infection prevention and control measures. While explaining how to avoid the health risk is common practice when reporting outbreaks of communicable diseases (e.g., measles, SARS, and flu), vector-borne diseases (e.g., Lyme disease, West Nile virus, and Zika virus), and even chronic diseases (e.g., heart disease, diabetes, and cancer), this is not the case for AMR. Individuals can take various preventive measures such as vaccinations, cooking meat thoroughly, not sharing antibiotics, taking medication as prescribed, and avoiding meat raised with antibiotics,

among other things; however these are underreported in the Canadian news media, while resistant infections continue to be framed as nosocomial complications. Discussing this trend in the news coverage of AMR, Sarah Everts explained that any sort of individual action to avoid a resistant infection seems miniscule compared to the breadth of the problem and the scope of the actions needed to tackle this health risk:

“I think people feel inept in the same way that they feel inept about climate change, you know, when you recycle and you do some other things, but what can you... it’s going to take policy, government policy, nation level policies to actually deal with this problem and so I’m not sure what you’re asking because it’s not like your average person can do anything” (Sarah Everts, May 27, 2019).

For Tom Blackwell (August 28, 2018), the problem with reporting preventive measures does not reside so much in the effect that these measures will have but rather on the journalistic imperative to focus on the novelty factor of the story. In a daily newspaper, journalists have limited space for their stories and so preventive measures can then be left out as they are not considered a key piece in the story:

“In news coverage we have to highlight the new thing, the new element and sometimes we don’t provide enough background. Ideally, you’d want us to include a discussion on what are the possible solutions or what are the underlying reasons for something, but sometimes it gets lost in the process of talking about what is new. And that’s not a good thing but that may be why it happens” (Tom Blackwell, *National Post*).

Yet, for André Picard (August 9, 2018) the problem with reporting preventive measures to reduce the risk of AMR is that, he argues, it is not what journalists do. Instead, educating the public about how to avoid or reduce their risk of resistant infections should be done by other institutions, such as public health authorities and hospitals:

“I think public health agencies, individual hospitals. If you get admitted to the hospital I think you should get a little bit of a pep talk about this stuff, the dangers, and just be aware of it. I don’t think most people know about it. People end up with C. difficile and they say oh, I didn’t know I could get that. And it’s so, so common. Everybody who’s over 60 should probably get a lecture on it’s a big danger being in

this hospital. I always tell people to avoid hospitals, they’re full of sick people! [laughs]” (André Picard, *The Globe and Mail*).

Reporting political responsibility

As a modern risk, the exacerbation of AMR is caused by multiple actors and practices. In the media analysis above, some of the actors blamed for the spread of AMR include medical professionals and hospitals, the agricultural and pharmaceutical industries, and citizens. One actor, however, that is consistently absent from the narrative of responsibility are politicians who are failing to regulate more strictly the production and use of antimicrobials in human medicine, veterinary medicine, and food production. When asked about why news stories in Canadian media seldom refer to the political responsibility behind the risk of AMR, André Picard explained that AMR is not a “big enough story” to start asking why health authorities did not act sooner:

“We probably haven’t gotten there yet. We tend to do the stories on political responsibility... they almost get done retrospectively, so at some point this will be a big enough story to start looking back and ask how did it get so bad. It’s the same with AIDS, with tainted blood, all of these issues. It’s not until they reach certain degree of seriousness that we start asking how did this happen. So, again, we’re not good at context. So, I think that will come but we’re not there yet” (André Picard, *The Globe and Mail*).

Similarly, Carly Weeks (April 23, 2019) explained that health stories that focus on political responsibility are usually retrospective. Additionally, these stories are seldom followed up by busy journalists who have many other issues to report on, so the piece of political responsibility for not acting to tackle AMR never gets addressed:

“I think we often report on something when something bad happens or you hear oh here’s a problem, or here’s one hospital that is dealing with an outbreak, and then we kind of report on it and then drop it. And are we doing enough different stories to uncover problems and understand them, you know you can probably dedicate a week, or two, or more on reporting just on this issue. So, it’s just again, coming back to some of those competing priorities, it’s just so difficult to do it all” (Carly Weeks, *The Globe and Mail*).

Yet for Tom Blackwell (August 28, 2018) political responsibility and lack of political action in tackling the risk of AMR is underreported because antibiotic use for humans is not regulated in Canada;

“A lot of the coverage has revolved around over prescribing antibiotics and that seems like a question for the medical profession. In Canada we don’t regulate, we don’t have government regulation of how doctors conduct themselves as a general rule. Even with, for instance, the whole opioid crisis, I don’t think there’s ever been suggested that government should regulate how doctors can prescribe these drugs even though...and that’s another case where prescribing by doctors is a big part of the problem. But the solutions all come from professional committees issuing guidelines and medical regulators issuing guidelines. It hasn’t been a question of government kind of stepping in and imposing regulations” (Tom Blackwell, *National Post*).

I have conceptualized AMR as a form of slow violence, i.e. it happens out of sight, its effects are dispersed across the globe, and it spreads in time without an end point. If political responsibility and the need for regulation are only reported on *a posteriori*, i.e. after something bad enough happens, then these stories might come too late for the risk of AMR. The need for action to prevent AMR from becoming a pandemic is in the present and, so, reporting on political responsibility and the need for regulation needs to happen now. This temporal incongruity means that AMR is being co-produced as an apolitical risk and therefore no political action is required, which obscures the need for coordinated political cooperation in implementing policies that address and regulate activities that exacerbate the risk of AMR.

AMR is an abstract risk, not news

Approximately 700,000 people die from resistant infections each year worldwide (O’Neill, 2016). The acceleration of AMR is attributed to the accumulation of unregulated use of antibiotics, and more generally of antimicrobials— therefore with very concrete

levels of responsibility. However, AMR is still co-produced in media coverage as an abstract risk, i.e., something that will happen in the future or something that is happening in other parts of the world, and therefore lacks urgency and other health risks are deemed more important. As Sarah Everts (May 27, 2019) explains:

“Of course there’s lots of cases and the cases are growing of perfectly healthy people who are getting AMR infections and die (...) [but] it’s not in front of their face, it’s not happening to somebody that they know, in the same way that it’s really hard to get people to care about climate change, it’s happening somewhere else, and it’s going to happen in the future, happen very badly but it’s not so personal, it has not become personal to a lot of people and I think that that makes it hard for people to relate to it as an issue. They think ‘oh well, if it’s not happened to me’... people are so egocentric and self-centric, ‘if it hasn’t happened to me or somebody else that I know then is it really a big deal?’”

This argument was shared by André Picard, who claimed Canadians are not interested in AMR because they perceive it as nosocomial complications that do not happen here: “in Canada we think oh we’re fine. We have nice, clean hospitals; we have free healthcare” (August 9, 2018). This perception of AMR as happening only in the developing world, as opposed to being both a global and local health threat, was also noted by Dr. Strathdee (February 7, 2019), who added that by framing it as a prospective, i.e., future-oriented uncontrollable problem, news reports actually generate apathy from the general public:

“I think that in the mainstream media [AMR] is portrayed as something that is a problem in other countries, not here, and that it’s a problem for people who are old and sick. But they also present it as being very scary, so it’s doom and gloom. They don’t present any potential solutions. So it’s kind of like someone who would read this, first they walk away with ‘oh this doesn’t affect me. It’s happening to other people, and I’m not that person. And oh it’s scary but there’s nothing I can do.’ So immediately they get scared but then they absolve themselves from any responsibility or accountability and they walk away”.

Like climate change, AMR is usually covered as a problem that is only getting worse and preventive measures at the individual level seem too small, almost irrelevant.

But in contrast to climate change, which causes extreme weather events that are routinely covered in the news, the impact of AMR is not experienced first-hand by most people and outbreaks of resistant infections and other AMR-related events are not as frequent or visible. Furthermore, and just as climate change, AMR is an ‘unsexy problem’ (Kuhlemann, 2019), global in scale and impossible to solve. However, unlike climate change –which can be visually communicated with images of droughts, floods, wildfires, etc.– it is hard to give visual representations of AMR that audiences can make sense of, and thus AMR as a risk is easy to ignore. This poses a challenge for risk communication and contributes to the lack of representational opportunity that limits risk communication of AMR and fuels the perception of it as a future threat instead of a present one. Further reinforcing the idea that AMR is not a current threat or a local risk but something happening far away or far in the future is the fact that, unlike outbreaks of communicable diseases, there is no ‘patient zero’, deaths are spread around the globe and do not follow a pattern of contagion, and when outbreaks happen in hospitals, they are usually hidden from public view. Therefore, AMR is perceived as an invisible risk, waiting for an event that will push it to the surface.

Helen Branswell explained that AMR “suffers from some of the same problem that chronic diseases do in that it’s slow growing and kind of always there. Typically, there isn’t there a flashpoint, or an outbreak. [It is] a slow-moving train wreck. In biological terms it’s probably not slow moving, but it certainly doesn’t have some of the dynamics one would put on the front page all the time.” Tom Blackwell also made reference to AMR being understood “in terms of what could happen if the resistance trend continues (...) if we don’t do something now we’ll have some dire situation where people have routine

operations and get infections and die.” This perception of AMR as too distant or too abstract makes this risk particularly non-newsworthy, and its lack of attractiveness resides in the absence of a compelling narrative. André Picard also referred to this widely shared perception of AMR as too theoretical, especially when contrasted with other health risks that feel more real:

“If you have an Ebola outbreak it’s very immediate and you can almost do the body count, which we get criticized for doing and rightfully so. With the superbugs I think we’re a little too passive. You know, thousands of people die and that’s you know, normal. It’s kind of accepted. So, we cover things differently, not necessarily better. It’s always hard to cover an ongoing issue, whether it is superbugs or AIDS or hepatitis, things that are there all the time killing people are in many ways the hardest thing to cover” (André Picard, *The Globe and Mail*).

Everts referred to yet another dimension that makes AMR fade into the background in terms of newsworthiness:

“There is really a very fundamental way in which antimicrobial resistance is very different to other very hot or important topics and that’s that it’s not very controversial, it’s not like climate change or antivax where you have these dissenting groups, usually politically motivated or motivated by other reasons (...) Generally, everybody accepts it as, well, if they know about it, it’s not controversial. And that in itself is a bit of a challenge, I think, for reporters” (Sarah Everts, May 27, 2019).

The perceived lack of controversy identified by Everts contributes to the co-production of AMR as an apolitical risk, which is even further reinforced by lack of coverage in the media of political responsibility and need for political action to tackle the risk. Additionally, Branswell referred to another challenge when reporting on AMR:

“If you catch Ebola, you live or die but it’s from Ebola. If you have some kind of health problems and go to the hospital for an operation and your health status is not great anyway, and while you’re in the hospital you pick up an infection after your operation and it turns out that the bacteria that infected you are resistant and you develop sepsis and you die, did you die of X or Y? Did the infection kill you? So, I think it’s harder for people to see the damage that [antimicrobial-resistant infections] do. And it’s actually not just bacteria but there’s resistance to antifungals. It’s a very complex problem and nobody knows, think of the acronym

AMR. (...) I mean, people don't even know where the resistance lies. Are you resistant to the bacteria? Or are the bacteria resistant to you? Or are bacteria resistant to drugs? People are confused about the whole idea. It's by far the most difficult thing I write about” (Helen Branswell, *STAT*).

The difficulty in communicating the myriad microorganisms and infections that are encompassed under the umbrella acronym of AMR has already been noted in the academic literature (for example Mendelson, Balasegaram, Jinks, Pulcini, & Sharland, 2017). For journalists, this language limitation was a serious challenge for reporting on the risk of AMR. And even when using the simplified terminology of ‘superbugs,’ reporters mentioned that while it makes the concept more understandable, it still does not capture all of its multiplicity and complexity. AMR is not one disease, its multiple diagnoses, many times secondary infections, which the reporters considered impossible to capture in a news story. This perception of AMR as a risk too convoluted to be clearly communicated co-produced it as a wicked problem and therefore too complicated to even attempt to explain it properly in the news.

CONCLUSION

Medical knowledge is co-produced by various social actors, including healthcare providers and journalists (Briggs & Hallin, 2016), and health risks are enacted through news discourses and the professional and institutional practices and structures in which journalists are embedded, and in the ways in which healthcare professionals communicate the risk to their patients. However, neither doctors nor journalists seem to understand public health in terms of biocommunicability, how various ways of acting, communicating and knowing co-produce health knowledge. They also seem uninterested in the role that modern institutions have in producing this kind of risks. Instead, they engage in blame

shifting and professional boundary work to defend their professional and institutional ways of knowing.

Raising awareness of the risk of AMR is considered a top priority in national and international action plans to tackle this public health risk (Public Health Agency of Canada, 2017; World Health Organization, 2015), and public health agencies, healthcare professionals, and journalists are key actors in the algorithms of risk awareness and education. However, these plans collide with the reality of neither physicians nor journalists considering raising public awareness part of their job.

Physicians considered it important to discuss with their patients the risk of AMR, particularly when prescribing antibiotics, but they felt that it was at times difficult to do it due to time constraints in their daily work. They agreed that all hospital patients should receive information about AMR and correct use of antimicrobials as well as prevention measures but did not consider that to be a task for doctors. The doctors interviewed for this project also referred to the media playing a critical role in raising public awareness of AMR, and acknowledged that despite perceived inaccuracy and simplification, the news media have put the risk of AMR in the public mind, with more positive than negative implications, and credited this increased public awareness with the fact that fewer patients expect to be prescribed antibiotics when not needed. The journalists, however, rejected the role of advocates and referred to professional practices to explain their apathy for the risk of AMR. They, in turn, lamented that experts do not talk to news media and neither produce enough infection surveillance data for the risk to become newsworthy.

Despite considering AMR an apolitical and abstract risk and receiving very limited news coverage when compared to other health risks, AMR was covered in the North

American newspapers through metaphors that evoke an apocalypse in the making, the end of modern medicine, and nature rebelling against human activities. Journalists justified this use of provocative language as the only way to convey to broader audiences the sense of risk in a short news story and without diving into long explanations of complex evolutionary and chemical processes. While the journalists mentioned that more local data could increase media attention, which can potentially be translated into regulatory action, and expressed frustration that public health authorities and hospitals do not communicate candidly with reporters, none of them were familiar with the AMR surveillance systems in Canada.

The journalists also mentioned that lack of controversy is a challenge in reporting on AMR, however, they admitted to having accepted the risk and not pushing to address matters of political responsibility, regulation of antimicrobial use, encouraging antimicrobial stewardship, or empowering individuals to reduce their risk exposure. The way in which the interviewed journalists interpret their role, i.e. writing about new and interesting issues but not with the specific goal of raising public awareness or engaging in issue advocacy, offers some insight into some of the characteristics of the news coverage analysed above, for example the overall small volume of news and why prevention measures that individuals can take are seldom mentioned in news coverage of AMR. These characteristics of news reporting contrast with the risk communication strategies that national and international public health organizations have deployed for the risk of AMR, as journalists openly reject their role as educators and do not rely on a deficit model of risk communication.

CHAPTER 6

FROM SCIENTIFIC DISCOVERY TO PUBLIC HEALTH THREAT: SCIENTIFIC AND PUBLIC HEALTH DISCOURSES OF AMR

Researchers in both academia and industry have increasingly displaced clinicians as the voices of medical authority (Briggs and Hallin, 2016, p. 80), and therefore are key actors with definitional power in the AMR network of biocommunicability. In this chapter I draw, first, on interviews with Canadian scientists doing research on AMR to examine how they define this risk and the way in which they create and circulate knowledge about it. Second, I examine how the risk of AMR is constituted in reports and action plans by the WHO and Canadian public health authorities, and in two WHO websites on AMR. I analyse the various ways in which the risk of AMR is conceptualized and how these definitions are reproduced, as well as how blame and responsibility are apportioned.

RESISTANCE IN THE LAB

I interviewed five Canadian scientists with active research programs on antimicrobial resistance³⁸ to gauge how they understand the production and mobilisation of scientific knowledge, and, more specifically, knowledge about the risk of AMR. I asked them how they generate and disseminate information about AMR, how engaged they were with talking to journalists about their research, and whether they were involved in efforts to raise public awareness of this health risk. This chapter accounts for their role in the co-production of knowledge about AMR and in shaping medical practice and policymaking.

³⁸ Dr. Alex Wong (Carleton University), Dr. Patrick Boerlin (University of Guelph), Dr. Gerard Wright (McMaster University), and two other scientists who requested confidentiality (Scientists 1 and Scientists 2). See chapter 3 for methodological details.

Production and transmission of scientific knowledge

During my hospital observations, medical teams would consult the scientific literature on a regular basis to correlate symptoms with diagnoses, confirm various treatments, length of treatment, or look for alternative ones (see Chapter 4). These studies, published in peer-reviewed journals, were sought particularly during complicated cases. While discussing cases during rounds or after, if a patient’s symptoms were in any way confusing, or if they could not find an adequate diagnosis, or if they were unsure of the adequate length of treatment for a condition, or if the treatment was not working, the doctors would go to the computer stations and begin searches in the medical literature. Sometimes these searches were done by medical students who needed to familiarize themselves with their patients’ conditions, other times it was the staff doctor or the senior resident who asked the team to look for literature on a particular diagnosis or treatment. Another way of accessing medical literature was through the hospital librarian. Medical librarians would approach the teams during rounds and ask them if they needed literature on any topic. Usually it was the medical students and residents who requested literature on the diseases they were treating at the moment, but on a few occasions the staff doctors also asked for studies. Armed with requests, the librarians would then search for the relevant literature and send studies to the doctors, residents and medical students who requested them. When discussing the literature, the medical teams distinguished between clinical studies and case reports; the former are based on the scientific method and considered “scientific evidence,” while the latter are used as insightful experiences recounted by other clinicians when treating similar cases. For example, the following field note describes how medical literature is used during rounds:

Staff [doctor] frequently pulls up literature during rounds to confirm/facilitate certain decisions, for example today they used it to find out whether a drug can cause hypoglycemia, something the drug isn't known for but could be causing it on a particular patient. They also use the literature to adjust dosing of medication (Week 15, day 2).

The medical teams understood scientific and medical knowledge as produced through the scientific method and legitimated through the peer-review and publication process. Scientific knowledge about health risks is produced in a similar manner, for example knowledge about AMR is produced by medical researchers, microbiologists, ecologists, epidemiologists, and other scientists who study various aspects of resistant organisms and resistant infections. Scientific knowledge, however, is not an absolute category but is rather premised on best available knowledge, and it continuously revises its premises in light of new evidence (Hansson, 2017; Michaels, 2008). Additionally, scientific knowledge is not objective but subject to construction, interpretation, and can be vulnerable to political manipulation³⁹ (Jasanoff, 2010; Latour & Woolgar, 1986). In that sense, scientific knowledge is understood here as contingent and can generate controversy among researchers. For example, while most scientists agree that AMR is a serious health risk, some controversy remains about whether antimicrobial resistance affecting humans is caused by antimicrobial use in humans and animals, or whether use in animals is not related to cases involving humans (Phillips, 2003).

The physicians and scientists in this study, however, considered scientific knowledge as objective observations of the natural world. This was expressed by the interviewed scientists, who referred to the production of knowledge of AMR in terms of

³⁹ See Chapter 2 for a discussion of this.

evidence and replicability, the search for ‘facts’ and ‘truth’ as opposed to ‘mere beliefs’, as an objective process. For example:

“It’s a matter of sufficient evidence to convince a researcher that this is true and that their beliefs correspond to the way that things are (...) knowledge is something that happens when we have sufficient evidence to accept a hypothesis, for example, but that might be a different thing from a hypothesis becoming accepted in the field. So, there’s also a matter of actual publication and dissemination for everybody else to find out what somebody has discovered and accept it” (Alex Wong, July 26, 2018).

“It has to be reproducible. The motto in my lab is ‘we do re-search’, which is we do a lot of searching and then we do the ‘re’ part of it, we do it again. So, it takes a fair bit of effort to make sure that we can do it more than once, so it’s not just a single observation, it’s a reproducible observation. The gold standard is that other people in other places can do exactly the same thing and that’s really when it becomes fully accepted knowledge (...) That’s the difference between what we do and just belief. We have to be able to do it more than once” (Gerard Wright, August 24, 2018).

“An acceptance of our hypothesis would be new knowledge. And it is only through that process that we really acquire scientific knowledge. That’s what science is about, and I think that is the only way in which we can generate scientific information” (Patrick Boerlin, August 2, 2018).

The scientists interviewed for this study also emphasized the importance of publishing their research findings and thus its acceptance within the scientific community as ‘knowledge’. Therefore, AMR ‘comes into being’ at three stages during the scientific research process: first, in the experimental phase in the laboratory; second, during the analysis of data and writing of findings; and finally, in the peer-review and publication process. Despite the perception of the experimental process as objective and focused on uncovering ‘truth,’ previous studies have shown that several social factors are implicated the production of scientific knowledge and the peer-review process through which scientific knowledge is validated.

First, the experimental phase involves not only the actual organisms being studied, but also the materials and tools available around the laboratory, the social and institutional

organization in which the scientists are immersed, as well as cultural and methodological choices of the research (Latour & Woolgar, 1986). Similarly, the analysis of data and writing process is not objective either, as scientists’ own biases and interests can influence the process (Caulfield & Condit, 2012). Additionally, the strong emphasis on scientific productivity increases the pressure to publish more and faster. Although cases are rare and there is certainly no evidence of such occurrences in the area of AMR, this is cited as the main cause why some scientists have at some point in their careers fabricated, falsified, plagiarized, or manipulated data (Fanelli, 2010; Tjldink et al., 2014). There is also evidence that clinical and public health research is vulnerable to influence by corporate interests and that self-reporting of corporate ties does not always mitigate bias (Baur et al., 2015).

Second, the peer-review and publication process that gives the study the label of “scientific knowledge” is also susceptible to social influence, as reviewers and journals have their own biases and interests. For example, there is evidence of publication bias through which studies that have positive or “important” findings are more likely to be published in peer-reviewed journals than studies with negative or null findings (Dwan et al., 2008; Godlee & Dickersin, 2003). Additionally, the publication process is faster for studies with positive findings (Godlee & Dickersin, 2003). Gender bias is also present in the peer-review process as women tend to be underrepresented both as editors and reviewers (Helmer et al., 2017). Furthermore, male and female editors tend to have same-gender preference, thus favouring authors of their same gender (*idem*). These socio-cultural aspects of the knowledge production process, however, were not mentioned by the interviewed scientists or by the medical teams, who referred to this process as clear and standardized.

News coverage of AMR: A mixed ecosystem

Scientists are skeptical of health and science reporters’ ability and overall quality of science news. Studies have found that scientists tend to blame news media for many of the misconceptions and misunderstandings about science that publics hold (Besley & Nisbet, 2013; Blok et al., 2008; N. Young & Matthews, 2007). Scientists question reporters’ lack of scientific background (Petersen et al., 2009) and argue that news stories emphasize the views of certain interest groups (Young & Matthews, 2007). Furthermore, most scientists discuss news media in terms of a simple sender-receiver model that conceptualizes audiences as lacking agency to challenge media messages (Davies, 2008; Petersen et al., 2009). In contrast with the ‘hard scientific evidence’, the scientists interviewed for this research referred to news coverage of AMR as being of very mixed quality and expressed concern with the threat of AMR being sensationalized or reported inaccurately. These concerns were similar to those expressed by the hospital doctors as discussed in Chapter 4. Dr. Alex Wong, for example referred to an increase in media attention, which he considered positive for raising awareness of AMR, but mentioned inconsistencies in the accuracy of AMR news stories:

“It seems to me like there has been an increase in coverage in the past few years and on the whole I think that’s a good thing, I think there is a great degree of risk associated with AMR and we need to do things about it and media coverage and public attention and political attention is going to be necessary to do that (...) In terms of the content of articles itself, I think there’s a lot of heterogeneity, sometimes the science is covered well and sometimes it is not, sometimes the risk communication is super sensationalist and sometimes is maybe underplayed” (Alex Wong).

A similar assessment was expressed by the other scientists. Dr. Gerard Wright explained that “there are some very good journalists who take the time to get this right, and then there are some who don’t think about this very much, don’t write about this

appropriately and I think that leads to some of the confusion that’s out there.” Health and science reporters were deemed more reliable in their reporting, because “they are already used to talking to scientists and clinicians so they can help us turn our very arcane language and ideas into something that is more easily understood by people who are not experts in the field.” In that sense, Dr. Wright considered that the role of journalists should be to translate scientific studies into everyday language, again following a deficit model approach to how science is communicated publicly. Another scientist, who requested confidentiality in the reporting of his arguments, expressed skepticism about media coverage of AMR:

“I think that sometimes the coverage is balanced and reliable and sometimes it is sensational. And the reason why I asked for confidentiality is that I’ve had a lot of TV interviews and media interviews and then the story that comes out is really the story of the journalist that they want to write, sometimes they lack understanding and we’d often react to what appeared to be sensationalist articles in the media and try to give a balanced view. The problem of course is that it’s very hard to give a balanced view because the stories would be very much pointing a blaming finger that agriculture is the main source of antimicrobial resistance, and certainly there is contribution there but trying to work out what that contribution is, is difficult. So, I guess that my reaction to what sometimes comes out in the media is (...) being skeptical” (Scientist 2).

The scientists, therefore, believed that news media served largely a translational function, i.e. decoding scientific knowledge in terms understandable to non-experts. For the scientists, public awareness and intention depends on a clear understanding of complex science, and the role of the journalist, in this regard, was to increase the likelihood of this outcome. The journalists interviewed in this study, however, rejected this role stating that their role is not to educate or advocate. They did not subscribe to the deficit model of communication as the scientists did.

Asked whether news stories convey the same sense of urgency and dread with AMR as expressed by international organizations and the O’Neill report (2016), Dr. Patrick Boerlin said “They do, definitely!” He added, however, that the real dimension of the threat of AMR is difficult to gauge. Asked whether scientists were exaggerating the threat of AMR, Dr. Boerlin said: “I don’t know [the magnitude of the risk] myself. It’s extremely difficult to know exactly what the actual level of threat is. Is it overplayed or not by the scientific community in the end? I’m not completely sure.” Dr. Boerlin also referred to the simplification of scientific information in news reports and he attributed this as the cause of much public confusion regarding AMR:

“What is sure is that the press is always oversimplifying, which brings quite a lot of misunderstanding, because one day the whole planet is suddenly going to die of AMR related problems, which is at the moment by far not the case. Suddenly the press comes up with a big story about transmission between animals and humans, when there is not much more evidence for what they present. And that’s a huge problem. I don’t think the press is presenting the facts accurately. The sensationalization of information...it’s much more complex than what the press is presenting”.

Simplifying complex issues such as the global risk of AMR is, as explained by journalists in chapter 5, absolutely necessary in health and science reporting, as audiences have various levels of scientific literacy and reporters have limited space and time for their stories. As Sarah Everts explained:

“You have to simplify things. You see this a lot, just the concepts of evolution and how quickly things develop resistance and (...) it’s one of those very challenging things where there’s not a lot of one sentence, one liners that really hit things home, unless you get hyperbolic as you said, ‘superbugs are gonna get you!’ At some point I just wish more scientists understood the basic premise of what grabs people’s attention (...) But we both are philosophically aligned in that we both strongly believe in facts, so it bothers journalists when scientists are saying things like you’re spinning my story up. It’s pitiful because journalists like facts just as much as scientists and we feel as committed to that” (Sarah Everts, May 27, 2019).

Discussing oversimplification of the risk of AMR in news coverage, the scientists were not as critical of the term “superbug” as hospital doctors were, and saw value in it as an attention-catching word that puts the risk of AMR in the public mind:

“I think that that term makes communicating what we’re concerned about easier, rather than harder, and it is sensational but that’s OK. Most people don’t even know what a bacterium is, and so if that’s a way to start a conversation about what the problem is, I’m totally fine with it (...) it is a good hook to get people interested perhaps in what we’re doing. Because, as I said before, I think it’s an area that hasn’t caught the concern of the public sufficiently. I don’t think people understand just how bad this is and if that term helps it, then great. Maybe it’s not helping, maybe it’s hindering it, I don’t know” (Gerard Wright).

Scientist 1 also considered “superbug” helpful in raising public awareness of AMR, however, noted that the problem with news coverage of AMR resides in it being focused mainly on outbreaks and the underreporting of preventive measures, thus potentially generating unnecessary fear:

“The media are creating this fear of ‘superbugs’, it’s making people aware of this. Outbreaks are recognized and are big in the media, like *E.coli*, and this provides the background for people to learn more about resistance. I’ve seen this in newspaper headlines but not so much discussion or on TV where they discuss problems and debate, no so much. Only when there’s an outbreak it will get covered. I don’t know if people know what we have to do to prevent [AMR]. (...) I think there could be a lot more done in terms of solving the problem instead of just giving numbers [of cases and casualties] because numbers and this scaring kind of situation fade over time when people are exposed to that.” (Scientists 1).

While the scientists were not as critical about media coverage of AMR as the hospital doctors, they still referred to the oversimplification of highly complex scientific processes. They reinforced the role of journalists as translators of specialized knowledge for non-experts. In that sense, scientists –just as the hospital doctors– co-produced AMR as a highly specialized topic. Additionally, they discussed AMR as an object of research, something that needed to be dissected in a lab in order to derive scientific knowledge from

it. This way of conceptualizing AMR validates only one way of knowing the risk, while experiential and cultural ways of knowledge are obscured.

Public awareness of AMR

Raising public awareness of AMR is commonly mentioned as a key component of any plan to tackle AMR. The interviewed scientists also referred to the need for more public awareness of AMR as, they said, most people who do not have direct experience with it do not know about this risk, or if they are aware of it they do not know why it happens or are confused, or they simply cannot understand the scope of the problem. For example:

“People don’t really know what AMR is. People who are not dealing with a disease or with resistance, they know there’s resistance but the consequences are unknown (...) I think that if a person is not directly involved in that, if they haven’t been diagnosed with a resistant infection and had to switch antibiotics to treat that infection, then the risk is very far...it’s something that is there but they think that it doesn’t affect them, and the interest is not as strong as it could be” (Scientists 1).

Dr. Wong also considered raising public awareness an important issue and mentioned that, although people have some understanding of AMR, the risk is still not perceived as a top threat to humanity:

“Sometimes people are less aware than I think they are going to be, but then when I start saying things, when I ask them if they have heard of MRSA or *C. difficile*, they’ll go ‘Oh yeah! I’ve heard of that’. And then I’ll explain that the reason MRSA is a problem is because it’s a resistant infection and that will get tied into that. So, I think people are broadly aware of it although not necessarily aware that it is resistance what is the problem, although they might have heard about a specific bug. Lots of people are aware of AMR more broadly...But if you were to ask people the top 10 threats to humanity, I don’t think many people would list AMR” (Alex Wong).

Other scientists also mentioned lack of scientific literacy as a challenge for raising public awareness of AMR as well as lack of scientific and political leadership in Canada

for tackling this health threat. Dr. Boelin explained that, “people understand that [AMR] is a threat but not how it works. Again, the general population has absolutely no idea of what it means exactly. If you talk to people in the population about antibiotic resistance, they will think that people are resistant to antibiotics, that kind of thing.” Dr. Boerlin, however, said that this lack of scientific understanding was expected as “people are bombarded everyday practically with information on health and antibiotic resistance is just one of them. How much time can they dedicate to educate themselves and document themselves is probably very limited.”

Another scientist, also discussing the importance of raising public awareness of AMR, referred to the need for experts to communicate directly with citizens, instead of through the news media. He explained,

“I think [raising public awareness of AMR is] important. I’m not sure in Canada we have scientific organizations that do it, but in Europe there’re movements promoted by scientists to help increase public awareness of antibiotics and antibiotic resistance. There are a number of groups supporting public awareness of antibiotic resistance and I think it is important, with things like make sure you finish your course of antibiotics, or don’t expect to get antibiotics if you just have a sore throat necessarily. Messages like that are going out” (Scientist 2).

Scientist 2 also mentioned that in the agricultural industry awareness of AMR is increasing, although “there is still a lot of denial. Like climate change that some people agree with it and others deny it. So, it’s taken a long time to get the agriculture community to recognize the issue.” They added that this increased awareness is in part “because of the politics and all, some of the major restaurants or chains, like McDonald’s, and some of the major animal producers are now antibiotic-free and there are huge markets for this in place, which I think are maybe even more influential than regulation”. For Scientist 2, then, raising public awareness of AMR constituted transmitting scientific understandings to fill a

knowledge gap. This corresponds to the classic biomedical understanding of science communication, from experts to non-experts, that seeks to educate. This is a one-way mode of communication that supports one way of knowing the risk of AMR, which the doctors at the hospital also promoted.

Communicating scientific findings

Although the interviewed scientists mentioned the need for public awareness, they seldom mentioned the role that scientists can play in stimulating such awareness. Instead they referred to peer-reviewed papers and conference presentations as the standard way for communicating their research findings:

“There are various levels: the scientific peer-reviewed literature is really for the people in the field where it is very, very detailed and lots of effort goes into that; and then seminars and research talks to broader audiences of scientists sort of expands the impact; and then, of course, the public is even more so. So, it’s kind of like an inverted pyramid, if you will” (Gerard Wright).

“Our standard way is just through papers and conference presentations. The research we do is pretty fundamental and that’s sort of the standard of that kind of communication. We also do some work with government agencies and we have some projects with the Canada Food Inspection Agency, most of our activities is with scientists in those agencies but we also have contact with some policy kind of people in those departments” (Alex Wong).

The imperative to publish in peer-reviewed journals was clearly explained by Dr. Boerlin: “As scientists, if you don’t publish, you die.” Wong, however, expressed frustration over research being done but the findings not being properly disseminated. While dissemination is usually considered a key aspect of research projects there seldom is a communication strategy in place. He explained:

“My experience working with this group on environmental AMR (...) they asked us to put together a document and then we’ll disseminate that document through various websites. But then, when we talk of it as a group, the risk is that the white paper will get lost in a shelf and not actually do anything. And so, what’s not clear to me is what else needs to happen to get the message across, get these things acted

upon. (...) I don't think that just scientists is enough for policy to happen, so clearly there needs to be push and pull from other sources too.”

In trying to publish their findings, either by writing for peer-reviewed journals or doing conference presentations, as well as when delivering public talks, the scientists explained the need to frame their research findings according to the audience they are addressing. Dr. Wright and Dr. Wong, for example, explained that they highlight different aspects of their research to make it appealing for other scientists in various specialties, funding agencies, and journals:

“In order to put the results in context when I'm talking to clinicians or other scientists, I have to figure out what they're interested in, so when speaking to clinicians then of course I want to make the connection between what we're doing in the lab and how that affects them. If I'm talking to chemists who don't really worry too much about...I mean their research is generally not directly related to health, then they're more interested on the chemical aspects of what we're doing, the impacts of molecules and how they're made, for example. So, AMR provides a really interesting focal point because it allows you to reach into all these different areas, and so you just have to tailor your message according to your audience. It's absolutely of no use to me to speak to a bunch of clinicians about the detailed mechanistic enzymology of resistance because you'll lose them after the first slide. The same goes if I'm speaking to chemists about microbes that cause disease over and over again, and the various strains and how these things get impacted, because it's too much for them, it's not what they're interested in. So, part of my job is to try to tailor the message” (Gerard Wright).

“I think when scientists talk about AMR we want to emphasise how important what we do is, we want to get people reading our stuff and we want to attract grant funding and whatnot, so we tend to pull out the most dire statistics and predictions and make things sound really terrible and then I think it also feeds into the media portraying things in potentially sensationalistic ways. But I think that it can also go the other way, scientists are people too, so if we see these things in the media, the sensationalism over and over again we're more likely to portray them that way when we write about it” (Alex Wong).

Storytelling, using anecdotes and stories, has been recognized as an effective way of communicating science to non-expert audiences, but also as potentially having negative impact on public understanding of science (Caulfield et al., 2019; Dahlstrom, 2014; Green

et al., 2018). Narratives facilitate understanding, interest, and engagement from lay people. Stories are also intrinsically persuasive (Dahlstrom, 2014) and by using vivid language generate mental images that transport listeners into the storyteller’s world (Green & Brock, 2000; Green et al., 2018). Thus, in the process of producing scientific knowledge, scientists are faced with similar challenges as journalists and resort to similar rhetorical strategies to make their studies relevant and interesting, such as storytelling and framing.

The framing of “scientific knowledge” can also lead to hype, not only in the news media, but also in scientific fora. Dr. Boerlin, for example, explained that in trying to get papers published, scientists “try to sell our stuff and sometimes we step over and make not true claims, but assumptions, simplifying the thing to a point where it may sound as if it is a public health issue while we have not completely proven it.” This confirms what Caulfield and Condit (2012) found in terms of scientific studies being hyped in media coverage as well as by scientists themselves, who sometimes make exaggerated claims about the implications of their studies in the scientific literature.

Communicating with journalists

A recurrent challenge for journalists who want to report on the risk of AMR is that scientists do not want to talk to them or “they don’t necessarily know that the media wants to reach them or how to reach them” (Carly Weeks, April 23, 2019). When asked if they communicate their research findings to reporters or engage in media interviews the scientists had mixed views, and while some see communicating with journalists as important to the work they do, others mistrusted how they or their research would be portrayed. Dr. Wright, for example, said that scientists believe news coverage of AMR is important, however seem to be failing in capturing enough attention:

“The public pays for most of the research that happens in our lab and so it’s very important for us to be able to communicate what that means to the public as much as possible. So I don’t write things on purpose hoping that David Suzuki will come to see us, but sometimes it happens (...) the antibiotic resistance area, I think it’s probably one of the most significant health crises we’re facing in the world today, and hardly anybody knows about it. I mean, every once in a while, there’s something in the newspaper about it but more people know about Ebola which affects a tiny, tiny number of people, than they do about AMR which is affecting literally everyone on the planet at this stage. So, I think there’s a desire in the field to try to get the attention of the public and the journalists because we think that the crisis is so significant. On the other hand, we don’t seem to be succeeding. And it’s not like it’s a terribly complicated story, but it is hard to get out there” (Gerard Wright).

A similar opinion was expressed by Dr. Wong, who explained that media coverage of scientific research “can be useful for risk communication, you know AMR or something we need to be concerned about and media is how we, or other people try to communicate to the wider public about what the risks are.” This view supports a deficit model view, in which journalists are expected to contribute in making public perceptions of risk as similar to those of experts as possible. Wong also added that media coverage “can be also useful for sort of advertising purposes, look we’re here and this is what we do, and potentially that’s good for us and for the institution. I think those are some of the good things that can come out of media attention, but you need to be a little bit careful with that.”

Other scientists do not feel comfortable talking with journalists. Dr. Boerlin, for example, explained that he actively avoids any media attention because “I think the miscommunication, the misuse of information is a bit scary for me and the lack of control that we have of the final output of what we communicate to the public, that’s scary to me.” This tendency of scientists to avoid speaking with reporters due to fears of misrepresentation was also mentioned by journalists as a limitation to their capacity to report on the risk of AMR. Dr. Boerlin, however, mentioned that this is a personal aversion

and by no means representative of most scientists who, he believes, are invested in getting attention from the media and influencing media coverage of scientific issues:

“I think scientists definitely influence [media coverage] (...) there are two types of scientists, those who engage with the media and those who avoid it. And those who seek contact with the media are the main influencers. In my experience, there are very few [journalists] in the media who are really documenting themselves first, seriously, and who have read in breadth and depth on the subject before putting it forward. They usually use these [scientists] who seek the attention of the press (...) who make noise and who are in contact with the media (...) And there’s another thing that also plays a big role and that is funding, because the more noise you make, the more likely you’re to get funding. And it probably plays a big role in terms of what the press is speaking about. So, in terms of getting things out to the media I think it’s probably influenced by seeking attention and seeking to be successful in funding.”

Many funding agencies also now require scientists to disseminate and translate their findings and the scientists interviewed in this study referred to the need to attract funding as an important motivation for engaging with journalists and the public. But other scientists, like Dr. Boerlin, consider engaging with media unnecessary and he expressed fears of being misrepresented by journalists, and instead prefers to communicate directly with stakeholders as needed.

Communicating with non-expert publics

Communicating their research to lay stakeholders was deemed important by the scientists who saw value in engaging directly with them in order to increase awareness of the risk of AMR. Dr. Gerard Wright, for example, said he talks to non-experts “as much as possible” and referred to engaging in a variety of activities to that end, including “talking to my neighbours to giving lectures in libraries and to the public. I’ve done it several times. And speaking to media and what have you to try to spread the message out. So, I think it’s really, really important that we do that”. Scientist 2 expressed a similar view and explained that “it’s actually is easy to talk to lay audiences about [antimicrobial] resistance because

they’re really interested in resistance and related issues, and on what is being done”. They explained that they also engage in a variety of activities to reach non-experts and resorting to anecdotes and personal stories to make the topic more relatable:

“I’ve given talks to interested citizens, retired people who go to talks and actually they are very interested. Some don’t have the background and don’t know about bacteria and some lack the understanding but most of them are very interested in the topic (...) One of the ways of talking to the public about AMR that is very impactful is actually talking to patients who have MRSA or other very serious resistant infections and that’s something people can relate to because it’s kind of you and I getting an infection and then what are the impacts for you and your family. So, the individual stories are probably far more understandable than talking about resistance and trying to paint a broader picture. The challenge is taking that one case, one experience and trying to make it into a broader issue of resistance, not just what happened to him or her, and how that can translate to policy changes. The problem is then that some stories, these individual cases, instead of data, persuade the media that policy changes will actually be a bad thing” (Scientists 2)

For Scientist 1 raising public awareness is key for tackling the risk of AMR, but they did not see it as something that needs to happen in news coverage. Instead, they put their efforts in engaging directly with the public:

“I think it is very important that the public becomes aware of what’s been happening in the last 20 years and that we’re in the process of losing one of our...one of the biggest achievements in medicine, antibiotics which can cure a lot of infectious diseases, bacterial infections, that we’re losing that. And the awareness has to be there for [the public] to use less substances that cause antimicrobial resistance, and that they are aware of that and that everybody can actually do something to reduce the risk. So, I’m not able to speak to newspapers or it’s not important for me to speak to newspapers but my surroundings, students, open science fairs, when public is there, is the basis” (Scientists 1).

Despite their expressed enthusiasm for communicating about the risk of AMR, the scientists identified several challenges they face when doing it, from diverting time and attention from their research, to addressing stakeholders with varying degrees of scientific literacy. Dr. Wright considered this one of the main challenges when addressing non-experts. He explained that “when I give public talks I try to make sure that I start out

without assuming a lot of knowledge [in the audience] and then build on that to reach the final conclusion that I want to tell them about, which is this AMR crisis.” A second challenge mentioned by Wright is expressed differently:

“One of the solutions to AMR is vaccination. But, of course, if you mention that in a talk then people get upset because of the terrible anti-vaxx issues that have come up. (...) I take it as an opportunity sometimes to help teach the challenges and successes of vaccination. But at least on one occasion I ended up with someone shouting at me that I was part of some conspiracy to make people sick, which is of course the opposite of what I’ve been trying to do for the last 25 years” (Gerard Wright).

Dr. Boerlin, a researcher at the Ontario Veterinary College at the University of Guelph whose research focuses on resistant bacteria in animals, is used to holding information sessions with stakeholders in the agricultural industry, such as farmers and cattle breeders. He explained that when talking to non-expert stakeholders he must balance the need to raise awareness of the problem but try to not generate panic:

“It is important to not simplify it too much but not make it too threatening. I think that is one of the major challenges, the balance between making clear there is a problem and identifying the problem, and explaining it so that it’s taken seriously, and minimizing it too much so that stakeholders, the industry, whoever takes advantage of it for not doing anything. It’s a difficult balance I find in communicating AMR. The other challenge, of course, is bringing down complex topics, particularly the field in which I work which is molecular epidemiology, it’s really deep into molecular stuff, which for stakeholders is extremely difficult to understand. So, simplifying it to a level where they can follow our thought process and they understand what we’re talking about, is a very difficult thing” (Patrick Boerlin).

The interviewed scientists referred to a series of challenges when addressing non-experts that resemble those expressed by journalists when writing stories about AMR, principally the need to capture the attention of a heterogeneous audience with varying levels of education and scientific literacy. Additionally, and similarly to what the interviewed journalists discussed, the scientists also said they use personal narratives and

anecdotes to make the risk of AMR relatable to those who may not even be aware of the possibility of resistance as a health threat. However, scientists assumed that their role when communicating with non-experts is to educate them, and not necessarily foster a dialogue. This approach co-produces AMR as a scientific problem, too complex for non-experts to understand, and it is similar to how doctors in the hospital referred to it. This contrasts with the way in which journalists interpret their role but also with the way in which they co-produce AMR, i.e. as an abstract risk that is not a priority.

Communicating with policymakers

Scientists interviewed for this project also spoke to the opportunities and challenges of communicating research findings to policymakers. These communications can be either because the scientists are seeking interest from government officials in their research or because the policymakers ask scientists, as experts on AMR, to produce technical reports that might inform the development of a new policy or regulation. The scientists explained that when communicating with policymakers they frame their findings differently, mostly emphasizing the social and economic costs of AMR:

“Going to a conference and talking to other scientists you usually set it up in terms of...I’m an evolutionary biologist, so in terms of certain fundamental evolutionary principles, and probably say something along the lines of...give some of the health risk background. But if I’m pitching to a policymaker then yeah, I’ll lead with the health risk and how to address these health risks you need to ask these questions (...) if I’m applying for a grant and it would be helpful to have a policy-maker on board so that the knowledge actually gets used in a practical way (...) I think it’s generally smiled on if reviewers see in your CV that you’ve done some outreach I think that can help” (Alex Wong).

“Policy-makers is a different thing, because then usually you’re talking about non-experts in government whose job is to try to translate this kind of information into some kind of policy and, as I said before, it has to be seen as a significant problem before it gets turned into policy. So, certainly at the Public Health Agency of Canada and in Public Health Ontario, which are the ones I’m most familiar with, everybody knows this is an issue and is one of the items on their agenda. But again

there’s no resources, no significant amount of resources behind it (...) So when I go and talk to policy makers in Ottawa they say ‘well, we don’t disagree with you but the biggest challenge we have as a country is opioids, people are dying everyday’, and I get that. But AMR is kind of like global warming, it’s a very, very big, very, very broad crisis that most people don’t see every day. It’s slowly increasing everywhere around the world, but it rarely affects you directly. So, when you have something that is slow moving like this, even if it’s inevitable what the outcome is going to be, it’s very easy to ignore as a decision maker, as a policy maker” (Gerard Wright).

Dr. Wright also explained that engaging Canadian policymakers is particularly challenging because there is insufficient data regarding how the risk of AMR is affecting Canadians:

“When you’re talking to elected officials, when they ask what’s the impact on Canadians, you don’t have that information, you can only extrapolate from other places. So the European Union, for example, does this very well, their surveillance networks are very impressive, getting that information is super easy, even as a non-European I can go to their website and click on what’s the percentage of salmonella that is drug resistant in France, or across Europe and I can get that information with clicks of a mouse. There’s no such thing in Canada, which makes communication incredibly difficult, what’s the scope of the problem, etc. So, we really need that.”

Dr. Wright is a member of Expert Panel on AMR convened by the Council of Canadian Academies (CCA), by request of the Public Health Agency of Canada. It released its much-awaited report on the socio-economic impact of AMR in Canada (Council of Canadian Academies, 2019) at the time of writing. Dr. Wright explained that “when I visit Ottawa and meet with our elected officials, they’re always obviously interested in health impacts but, frankly, they’re really interested in economic impacts. So, how is this going to affect us directly, and we don’t have any good data.” Another scientist interviewed for this study, considered the report a step forward as “we’re moving beyond the blaming and the ‘what the heck did you do!’” The report seeks to be “more thoughtful and collaborative and identify the problems and deal with the risks one by one instead of pointing fingers and I think that is being actually a huge change”.

Thus, the scientists also faced –similarly to journalists– the challenge of pitching AMR as an important problem, but instead of trying to persuade editors, they seek the attention of policymakers. In communicating the risk of AMR to different stakeholders, the scientists modulated their presentations based on what they assumed was their audience’s level of scientific understanding. In many cases, they immediately assumed that people are uneducated and thus assumed the role of educators, trying to fill this void with scientific facts. Despite recognizing the need to communicate to various stakeholders, they expressed suspicion about talking to reporters, who are capable of reaching much broader audiences than scientists. The aversion to talking to journalists despite the urgency of the risk suggests that scientists perceive this as something “real scientists” would not do, which was also expressed by the scornful tone of some of the interviewed scientists when referring to colleagues who seek media attention.

Furthermore, the difficulties scientists face to get the attention of policymakers and have it translated into political action is characteristic of forms of slow violence, such as AMR. In his examination of slow violence, Rob Nixon (2013) addresses this issue:

How can leaders be goaded to avert catastrophe when the political rewards of their actions will not accrue to them but will be reaped on someone else’s watch decades, even centuries, from now? (...) Many politicians— and indeed many voters— routinely treat environmental action as critical yet not urgent. And so, generation after generation of two or four-year cycle politicians add to the pileup of deferrable actions deferred. With rare exceptions, in the domain of slow violence “yes, but not now, not yet” becomes the modus operandi” (p. 9).

This is indeed the case of the risk of AMR; a threat that is co-produced as urgent but not urgent enough, that has terrible implications but seems too abstract, that is affecting the global population but it is not visible enough, that it should be acted on but most likely doing so will not bring any immediate political benefits.

DIRE WARNINGS AND POLITICAL (IN)ACTION

The UN and the WHO have been calling for coordinated international action to combat AMR for years, developing plans and suggesting policy changes for countries to adapt to their own context. The United Kingdom has also shown leadership by commissioning the O’Neill report (2016), which assessed the spread of resistant infections globally and suggested comprehensive recommendations. However, lack of political action in tackling AMR is a common trend worldwide, which was noted by the World Health Organization in 2015 when it stated that “despite proposals and initiatives over many years to combat antimicrobial resistance, progress has been slow, in part because of, on the one hand, inadequate monitoring and reporting at national, regional and global levels, and, on the other, inadequate recognition by all stakeholders of the need for action in their respective areas” (p. 5). This assessment of delay and slow reaction to the threat of AMR was again expressed in 2019 by the United Nations (UN News, 2019) as it published the report “No time to wait: Securing the future from drug-resistant infections” (Interagency Coordination Group on Antimicrobial Resistance, 2019).

Efforts to tackle AMR in Canada include a federal action plan (Public Health Agency of Canada, 2014) and a pan-Canadian framework (Public Health Agency of Canada, 2017) which will guide the national action plan, still being developed at the time of writing. Canada also has AMR surveillance systems in place, including the Canadian Nosocomial Infection Surveillance Program (CNISP), the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), and the Canadian Antimicrobial Resistance Surveillance System (CARSS). These efforts, however, have been criticized as inadequate, uncoordinated, and needing more funding and cooperation between the federal

and provincial/territorial governments (Canadian Medical Association & Association of Medical Microbiology and Infectious Disease Canada, 2019). Furthermore, and as most national and international action plans, Canadian efforts are also undermined by political apathy (Patrick, 2019). These concerns were expressed by the two scientists who are also members of the Council of Canadian Academies Expert Panel on Antimicrobial Resistance, which is examining the economic cost of AMR in Canada and is due to release a report by the end of 2019. Dr. Wright explained that:

“The Pan-Canadian Framework for Antibiotic Resistance recognizes [the need for infection surveillance], it’s one of the five pillars of what they recognize as being important, so surveillance and communication and such, but right now that’s just a piece of paper, there’s no effort to resource that framework. And therefore, we’re not going to see a change. And again, if we go back to our earlier conversation, it’s frustrating because we’ve seen, us as scientists and as clinicians, we have somehow failed to get this message out, that this is a very important problem to the point that these decision makers understand that they need to invest in surveillance, for example, because that is a very important part of the puzzle. And I’m not actually sure how we bridge that gap.”

Similarly, the other member of the panel 2 explained, “regulation is a critical issue” for dealing with AMR, adding “and you kind of wonder, because it is a no brainer, you wonder why it has taken so long in Canada and the United States to acknowledge the problem and change the regulations.” In Canada, antibiotic use is not regulated by the federal government, it is under the purview of provincial and territorial governments. The scientist added that “governments don’t like regulation anyway; it’s complicated with antibiotics and so they prefer voluntary agreements. It’s not totally a political problem but it’s highly political.” As a risk that requires political action, AMR also becomes controversial due to various interests that can become obstacles to political action; this political aspect of AMR was not recognized by the interviewed journalists who understood the risk as non-controversial. Scientist and writer Dr. Steffanie Strathdee, however,

discussed AMR as a profoundly political issue, and expressed frustration over the fact that the Pan-Canadian Framework was announced in 2017 and there still is no action plan to implement it:

“I think that in Canada there’s huge variation by province and I think that there is a lack of awareness. And also, when I ask people about this, they said that there’s been a lot of talk, that the development of frameworks and guidelines... but you know, how long does that take? It’s been years that they’ve had this framework and only this year they are talking about putting it into action, and I think that part of the reason that they’re putting it into action is that the public is starting to get concerned. And that’s what I want to do, I want to put this higher up in people’s agenda. So, I think that policymakers are kind of like there’s the tail wagging the dog, they’ll go to whatever public pressure is putting them on.”

Therefore, AMR becomes deeply political as it demands coordinated action across jurisdictions but there are too many interests interfering and not enough political commitment to actually put policy into action to tackle the risk. Dr. Strathdee also referred to the United Kingdom as an example of political commitment to reducing the risk of AMR infections through innovative policies to improve antibiotic use:

“I think that if you look at someone like [chief medical officer] Dame Sally Davies in the United Kingdom, this is on her radar, she’s made it a high priority and she’s tackling it with a multi-front effort. So, letters being sent to physicians who are overprescribing, changing the incentive structure for pharmaceutical companies away from the per prescription compensation to one that is reliant on the value that government places on different antibiotics. I mean, those are really innovative approaches.”

Despite the limitations and lack of funding, documents produced by the WHO and public health offices have an influential definitional role as they provide the language to discuss AMR in the news, in public awareness campaigns, in hospitals and doctors’ offices, and also in policymaking. In other words, they define the risk, assign blame and responsibility, and lay out steps for managing the risk. I analysed seven major policy documents, reports on AMR surveillance, and national and international action plans on

antimicrobial resistance produced by Government of Canada and WHO. The analysis focused on how the risk of AMR was defined, whether there were blameworthy agents identified, who was listed as ‘at risk’, who is given a voice and whose knowledge is prioritized, and what measures were put forward for prevention and containment. I also examined the WHO’s website for antimicrobial resistance (World Health Organization, 2018a), the website for the World Antibiotic Awareness Week 2018 (World Health Organization, 2018b), and the AWaRe online campaign for antimicrobial stewardship (World Health Organization, 2019c).

AMR as a multidimensional risk

AMR is defined in the analysed documents and websites as a human-caused public health threat of global proportions that endangers modern medicine, and with consequences for international development and the global economy. Additionally, all of these documents and sites describe AMR as a health risk that is happening now, with concrete negative impacts on people’s health and global economy, and that will only worsen if policy changes are not adopted urgently. The way in which AMR is defined and framed in these documents has broadened over time. All documents defined AMR primarily as a nosocomial risk and highlighted the economic impact of the threat, although this was most common in early documents; other frames, such as threats to food security and the environment were more common in later documents. The broadening definition of the risk of AMR shows that concerns about the consequences of resistance have expanded as there is more research on the threat but also as new resistant organisms emerge. The WHO defines AMR as a global threat caused by “systematic misuse” of antimicrobials “in human medicine and food production”, and requiring strong international cooperation to avoid “a

post-antibiotic era in which common infections could once again kill” (World Health Organization, 2015, p. VII). It urgently calls for global action because “we cannot allow hard-won gains for health to be eroded by the failure of our mainstay medicines” (ibid.). Similarly, UN member states defined AMR as a public health risk, a threat to development, and a threat to modern medicine, caused by inappropriate use of antimicrobials in public health, animal, food and agriculture sectors, lack of access to healthcare, and antimicrobial residues in the environment (United Nations, 2016, p. 2). In this political declaration, the UN refers to AMR as “the greatest and most urgent global risk requiring increased attention and coherence at the international, national and regional levels” (ibid.). The declaration also mentions that AMR threatens medical achievements such as reducing infectious diseases, access to medicines, safe water and sanitation, immunization, improvements in veterinary medicine and the introduction of new antimicrobials, treatment of sexually transmitted diseases and other infections, as well as surgery and chemotherapy (ibid.). Similar definitions appear in the WHO’s website on AMR (World Health Organization, 2019a) and in the World Antibiotic Awareness Week 2018 website (World Health Organization, 2018b). The O’Neill report (2016) defines AMR as a global crisis that “has increasingly become a problem in recent times because overuse of antimicrobials” which has “increased the rate at which resistance is developing and spreading, but we lack new drugs to challenge these new superbugs. This results in us facing a growing enemy with a largely depleted armoury” (p. 10). The report explains that while AMR is usually related to healthcare settings, “over the last decade resistant infections have been seen in the wider community too” (ibid.). In Canada, the federal framework on antimicrobial resistance, the government of Canada addresses AMR as a global public health concern and

as a national threat with deep societal and economic costs and a wide array of negative implications for the public healthcare system, global trade, agriculture, environment and health sectors, requiring a coordinated local, national and international strategy (Public Health Agency of Canada, 2014, pp. 1, 5–6). Additionally, this document clearly explains that AMR is not a health threat that can be solved, but only managed: “Microbes will always continue to adapt to treatments, causing naturally occurring antimicrobial resistance. Managing this reality requires the ongoing development of new approaches” (p. 11). The Pan-Canadian Framework for Action (Public Health Agency of Canada, 2017) defines AMR as a risk “exacerbated by the widespread use of antimicrobials in human and veterinary medicine and in the agricultural industry” (p. i), with implications for human and animal health, food security, the environment and the economy (ibid.). It is described as a global health and economic threat.

In a report, the Interagency Coordination Group on AMR (2019) also defined AMR as a “global crisis” and called for urgent action, but unlike other documents it gives a broader list of situations and activities that cause the risk:

The misuse and overuse of existing antimicrobials in humans, animals and plants are accelerating the development and spread of antimicrobial resistance. Inadequate access to clean water, sanitation and hygiene in health care facilities, farms, schools, households and community settings; poor infection and disease prevention; lack of equitable access to affordable and quality-assured antimicrobials, vaccines and diagnostics; weak health, food and feed production, food safety and waste management systems are increasing the burden of infectious disease in animals and humans and contributing to the emergence and spread of drug-resistant pathogens (p. 1)

The report also states that, “the economic impact of uncontrolled antimicrobial resistance would also be catastrophic,” (p. 5) and compares this impact on the global economy to the 2008-09 global financial crisis (p. 1). This economic crisis would be caused

by a dramatic increase in “health care expenditures; impact on food and feed production, trade and livelihoods; and increased poverty and inequality” (ibid.). The report also mentions the growing impact of AMR on the environment caused by the spread of resistant organisms in manure and waste for hospitals and pharmaceutical manufacturing; commercial agriculture; and fish and seafood farming (p. 5). The report warns that the environmental impact of AMR could be fuelled by climate change (ibid.).

A few weeks after the Interagency report was published, the Chief Public Health Officer of Canada published the report “Handle with Care” (Chief Public Health Officer of Canada, 2019), which examines the causes of unnecessary antibiotic prescriptions in Canada. AMR is defined as a public health risk caused by misuse of antimicrobials and is framed mainly as a problem between physicians and patients that relates to how prescriptions are decided, and drugs taken. The report explains that antibiotic prescriptions are not simple medical decisions but instead are driven by both medical and socio-cultural factors, such as the type of infection, availability of the drugs, expectations of what antibiotics do, professional guidelines, institutional practices, and doctor-patient relations. The report states that AMR is a common medical problem in Canada but still below the rates of other countries, although these rates are increasing fast. AMR is also an economic problem with negative impact on the healthcare system:

“Many Canadians know someone who has been impacted by antibiotic-resistant infections. Antibiotic resistance makes it harder to fight infections, leading to more and longer hospital stays, which increase health care costs (...) Progress has been made in Canada and rates of antibiotic resistance are lower than in many other countries in the world” (p. 7).

Also in 2019 the WHO released AWaRe, a tool designed to improve antibiotic stewardship (World Health Organization, 2019c). In its website, which is addressed to

policymakers, healthcare professionals, farmers, and the broader public, antibiotics are classified into three groups: Access, Watch, and Reserve⁴⁰. The goal of this tool is to reduce the use of Watch Group and Reserve Group antibiotics (the antibiotics most crucial for human medicine and at higher risk of resistance), and to increase the use of Access antibiotics where availability is low. The website also includes facts about AMR around the world, access to other WHO websites explaining their antibiotic classification, and access to a global list of essential medicines. The website frames AMR as the consequence of antibiotic misuse and requiring immediate action in order to preserve antibiotic effectiveness.

The analysed documents and websites, therefore, co-produce AMR as a political risk that requires negotiation between countries, various levels governments, and between government and industry. Despite the widespread nature of the threat, the documents and websites also frame the risk of AMR as one that can be tackled, that is not out of control yet, that can be mitigated through immediate political and individual action. This aspect, however, will be further developed when discussing preventive measures below.

Many layers of blame

In defining the risk of AMR, the analysed documents also assigned blame to various social actors for contributing to the spread of the risk. The groups most often blamed for causing are medical professionals for unnecessary prescriptions (Chief Public Health Officer of Canada, 2019; O’Neill, 2016; Public Health Agency of Canada, 2014, 2017; World Health Organization, 2015); agricultural industry for giving antibiotics to

⁴⁰Access: the antibiotic of choice for the 25 most common infections; Watch: list of the “highest-priority critically important” antibiotics for human and veterinary use, recommended only for specific, limited indications; Reserve: last-resort antibiotics to use when everything else has failed (World Health Organization, 2019c).

animals for growth promotion and spraying crops preventively (O’Neill, 2016; Public Health Agency of Canada, 2014, 2017; World Health Organization, 2015); pharmaceutical industry for not developing new, affordable antibiotics (O’Neill, 2016; Public Health Agency of Canada, 2017; World Health Organization, 2015); patients for demanding unneeded antibiotics and/or not taking them as prescribed (Chief Public Health Officer of Canada, 2019; O’Neill, 2016; Public Health Agency of Canada, 2014); and policy-makers for not acting promptly at the national and international level (Interagency Coordination Group on Antimicrobial Resistance, 2019; O’Neill, 2016; World Health Organization, 2015).

For example, the “Handle with Care” report (Chief Public Health Officer of Canada, 2019) explains that many times physicians do not take the time to talk to their patients about resistance and instead assume that patients are expecting antibiotics when research has shown many times they just need reassurance (p. 11). Doctors are also blamed for not following voluntary stewardship guidelines and defaulting to antibiotic prescriptions to save time instead of waiting for diagnostic test results (pp. 11-12). The document also puts blame on patients for having unrealistic expectations of what antibiotics do: “Antibiotic prescriptions are so routine that patients sometimes expect a prescription as a regular part of their medical visit” (p. 13).

In some documents blame is distributed across many sectors and activities. For example, the WHO (2015) mentions that the circulation of drug-resistant organisms can be facilitated by “trade, travel and both human and animal migration” (p. 2). Similarly, the Canadian federal framework on AMR mentions “travel, medical tourism, increased international food production, and shipment of food and animals between countries” as

activities causing the spread of existing and emerging resistant organisms (Public Health Agency of Canada, 2014, p. 5).

The Interagency report (Interagency Coordination Group on Antimicrobial Resistance, 2019) blames health professionals and patients for “poor medical prescribing practices and patient adherence to therapies”, and it blames governments for “weak regulation and oversight including over-the-counter sales, and the proliferation of substandard and falsified antimicrobials” (p. 4). It also assigns blame to the agriculture industry for use of antimicrobials for growth promotion in animals and crops “without appropriate indication and in the absence of good agricultural practices to prevent infectious diseases on farms” (ibid.).

Most importantly, the report states that “the current global response to antimicrobial resistance is inadequate” (p. 7). The document reminds readers that the Global Action Plan on Antimicrobial Resistance (World Health Organization, 2015) tasked governments with developing and implementing their own national action plans, to which member states of the UN committed, “but efforts to implement national action plans are currently too slow and must be accelerated” (p. 6). The report states that lack of political commitment and stakeholder involvement globally and nationally are to blame for the lack of action (p. 7). It also argues that AMR in plants and animals should be receiving more attention, as well as the environmental impact of AMR (ibid.). The document also highlights that some countries lack a “compelling narrative to engage policy-makers and the general public in a way that links antimicrobial resistance to core national health and economic interests” (ibid.). This lack of engaging narrative was noted by the interviewed journalists and scientists, who found it difficult to make AMR a relevant issue in Canada. Furthermore, the

report underscores the need for “stronger leadership, coordination and accountability” at the national and international level (p. 7).

The AWaRe website states that AMR is caused by unnecessary prescriptions and patients not taking antibiotics as prescribed, as well as by overuse in agriculture (World Health Organization, 2019c), but does not detail the way in which these activities led to the spread of resistance, instead focuses on how to tackle the problem with antibiotic stewardship with various recommendations for healthcare providers, policy-makers, industry and the public.

The analysed documents and website, thus, co-produce the risk AMR as not just a natural development but as created by human activities. In this process, they also framed the risk as multidimensional, created by multiple interconnected actors and activities, and thus recommending that actions to tackle AMR also span various industries and practices.

Everyone is at risk

All the documents convey the idea that AMR is a global problem that puts everyone at risk. The documents mention specific groups at risk, including every nation (Interagency Coordination Group on Antimicrobial Resistance, 2019; Public Health Agency of Canada, 2017; World Health Organization, 2015, 2019a, 2019c); vulnerable populations (United Nations, 2016); patients (Chief Public Health Officer of Canada, 2019; World Health Organization, 2018b), food workers (World Health Organization, 2015), and all Canadians (Chief Public Health Officer of Canada, 2019; Public Health Agency of Canada, 2014).

The WHO (2015, 2019c) emphasizes that the risk of AMR is not distributed evenly across the world; instead, low-income countries are the most affected, as common infections such as malaria, pneumonia and dysentery, which are prevalent in these places,

can no longer be cured with previously used antibiotics (2015, p. 2). Similarly, the UN member states referred to the increased risk faced by populations in the developing world but noted that in these places lack of access to antibiotics when needed cause more deaths than AMR (United Nations, 2016, p. 3). The Pan-Canadian framework also refers to human practices that exacerbate and spread AMR, such as air travel, which puts every single country in danger.

In framing AMR as affecting so many different groups the documents and websites co-produce AMR as global, ubiquitous, but also invisible. The interviewed journalists mentioned that repeated warnings by the WHO about outbreaks that were deemed catastrophic but then turned out to be mild had made them skeptical of new warnings. In that sense, warnings about a risk that is a slow for of violence and which will be most catastrophic in the future, usually are not considered important or urgent enough to be covered in the news or to gain traction with policymakers and citizens.

Expert and lay knowledge

All of the reports, plans, and strategies are based on peer-reviewed studies, infection surveillance reports, and formal economic assessments. Therefore, expert knowledge is prioritized in these documents as providing the evidence for policies and measures they suggest. As a modern risk, AMR is a process that occurs at a microscopic level and thus cannot be perceived with the senses, which leads to the risk being defined mainly by expert voices (Beck, 2009, pp. 29–36), while lay persons are expected to accept expert definitions and decisions.

Only one document included the experience of patients and healthcare providers in order to clarify various points or to make them more relatable. The report published by

Canada’s Chief Public Health Officer (2019), addressed to the general public and healthcare providers, includes vignettes besides the main text with anecdotes that illustrate the point being made. For example, when discussing lack of healthcare as a driver of AMR, a vignette by a physician reads:

“In my experience working in Newfoundland, community context matters and access to health care can impact antibiotic use. We hear from some patients that they stockpile antibiotics at home for use and sharing when needed. We also hear about physicians giving antibiotics by phone without examining patients. There are some incredibly remote areas, where a physician is not regularly available. This lack of access may lead to stockpiling of antibiotics in anticipation.” (p. 13)

When discussing the benefit of delayed prescriptions to improve antibiotic use, another vignette describing a patient’s experience reads:

“After we arrived at the clinic, my daughter was seen fairly quickly by a doctor and a medical student. Almost immediately, I was told that my daughter had an ear infection, that kids get these all the time, and then received a prescription for an antibiotic called amoxicillin. The doctor and the medical student left the room immediately after. The whole encounter lasted less than five minutes and I felt very rushed and unimportant. There was no opportunity to discuss alternative options. I did not feel comfortable to voice my concerns to the doctor because I did not want to make her look bad in front of her medical student. I took the prescription but did not get it filled. Instead, I went home, gave my daughter a Tylenol, and had her rest. A day or two later, she was feeling better” (p. 11).

These vignettes sought to make the risk of AMR more concrete and relatable for medical workers and non-experts. Through personal narratives the vignettes expressed alternative ways of knowing AMR beyond the biomedical discourse, including a mother’s experiential knowledge as equivalent in value to a physician’s knowledge. Both vignettes explained the risk of AMR through descriptions of situations that the reader could easily understand and even relate to. As a reader of these vignettes, I thought they were very effective in making the risk more concrete and relevant for the general population.

Everybody is responsible

The analysed documents and websites assign responsibility for dealing with the risk of AMR to the same actors who are blamed for causing the spread of resistance, namely governments, healthcare professionals, patients, and agricultural industry. Additionally, researchers in both industry and academia are also exhorted to examine social and scientific aspects of AMR and to develop new vaccines, antimicrobials, and diagnostic tools. In its “Global Action Plan on Antimicrobial Resistance” the WHO (2015) tasks governments with the responsibility of regulating antibiotic use in humans and animals (p. 3), and pharmaceuticals and academia with developing new drugs, techniques and diagnostic tools (p. 4). The document states that pharmaceuticals are not investing in new antibiotics, which is a “serious market failure” as “investment in the development of new antimicrobial medicines, as well as, diagnostic tools and vaccines is urgently needed” (p. 11). The WHO also exhorts governments to highly regulate the use of any new antimicrobials through a public health framework of stewardship (*ibid.*). Additionally, the plan calls for the private and public sectors to partner up to ensure equitable access to healthcare and fair pricing for “the poorest populations” (p. 4).

Similarly, the O’Neill report (2016) puts responsibility on all governments and states that “there is no excuse for not taking action now” (p. 14) as all nations will sooner or later deal with the costs of AMR. The Interagency report warns that there is “no time to wait” and that “unless the world acts urgently, antimicrobial resistance will have disastrous impact within a generation” (Interagency Coordination Group on Antimicrobial Resistance, 2019, p. 1), thus laying responsibility on all governments to act at a local and global level in a coordinated manner.

In Canada, the federal framework on AMR highlights the need for coordinated action between the federal and provincial/territorial governments, as well as the need for Canada to be involved in international efforts to tackle this global threat (Public Health Agency of Canada, 2014, p. 3). In that sense, the framework is described as “an important step in responding to the global call for action on antimicrobial resistance” (p. 5). The document outlines federal responsibilities, including resistance surveillance, regulating the approval of antimicrobials in Canada, and biosecurity, among other things (p. 6), but also assigns provincial and territorial governments a key role in managing AMR through their delivery of health care, approval of antimicrobials for medical coverage, and regulation of antimicrobial use in agriculture and veterinary medicine (p. 7). The framework also refers to the role that citizens can play in managing the risk of AMR: “Through increased awareness and use of simple and effective day-to-day practices such as good hand hygiene the public plays a key role in infection prevention and control” (p. 9).

Similarly, the Pan-Canadian framework identified the need of coordinated action between governments, public and private sector, and the public. The document states that “the complexity of AMR is enormous, and addressing it is beyond the capability and responsibility of any one government, agency or organization” (p. 3). The document identifies several actors as responsible for tackling the risk of AMR: federal, provincial and territorial governments, academia, human and animal health professionals, industry, and the public (p. 7). This need for the involvement of various social actors was reiterated two years later by the Chief Public Health Officer of Canada (2019).

While the Pan-Canadian framework takes a broader approach to AMR, by suggesting that Canada “must take coordinated action domestically and globally” against

AMR (Public Health Agency of Canada, 2017, p. i), the report “Handle with Care” (Chief Public Health Officer of Canada, 2019) states that AMR needs to be addressed domestically by “changing our prescribing behaviours” (p. 2) and identifies government, healthcare professionals and the general public as responsible for tackling the risk of AMR. Government is mainly tasked with increasing access to healthcare (p. 13), while healthcare providers and the public are encouraged to be antimicrobial stewards. Emphasis is given to the need for doctors to teach patients about antibiotics and the risks of taking them. And patients are urged to question antibiotic prescriptions, asking their physician whether the drug is needed, if it is the most appropriate one, and what are the risks of taking antibiotics (pp. 14-15). There is therefore a shared responsibility for managing the risk of AMR in which expert knowledge can be questioned, i.e. doctors are not prescribing correctly so the patient should ask to discuss the treatment decision, as the prescription could be generating more risk. Pharmacists are also tasked with engaging in educating people about how to take and dispose of antibiotics safely.

The AWaRe website urges national governments to “act together with urgency” by adopting national antibiotic stewardship programs aligned with the WHO’s antibiotic categorization and to monitor closely antibiotic use in the community and hospitals. It also calls on healthcare providers to prescribe according to these categories and to practice “watchful observation”, i.e. to observe how the infection progresses before prescribing antibiotics. The website also addresses patients in one of the links it provides and explains that to keep antibiotics effective “we need to take them only when needed and strictly as directed by doctor” (aware.essentialmeds.org/groups).

In the websites examined for this study, governments, healthcare professionals, veterinarians, and the general population are tasked with using antimicrobials responsibly. For example, the World Antibiotic Awareness Week 2018 (World Health Organization, 2018b) offers a series of resources such as infographics, animated images, videos, and even an online game to raise awareness of judicious antimicrobial use in medical professionals and patients. Some of the messages conveyed in these resources include that AMR affects people of all ages in every country; preventing AMR with good hand hygiene; not sharing antibiotics; consulting with a doctor before taking antibiotics; the fact that AMR circulates among humans, animals and the environment; and that antibiotics do not cure viral infections. There is also an infographic on how to use antibiotics in surgery.

Preventing AMR

The examined documents and websites all provide a list of preventive measures engaging a wide array of social actors at various scales. These measures seek to reduce the spread of AMR while preserving the efficacy of antimicrobials. There are 12 main preventive measures suggested:

1. Implementation of national antimicrobial resistance action plans;
2. Stronger political leadership, advocacy, coordination and accountability;
3. Improving awareness of AMR through effective communication, education and training;
4. Increasing infection surveillance and regulatory frameworks for reporting infections;
5. Promoting research and innovation with economic incentives;
6. Avoiding infection through effective sanitation, hygiene and infection prevention measures;
7. Improving food safety;
8. Optimizing the use of antimicrobials in human and animal health, i.e. antimicrobial stewardship;
9. Stopping the use of antimicrobials of last resort in human medicine for growth promotion in farming;

10. Increasing investment in new medicines, diagnostic tools, and vaccines;
11. Ensuring equitable access to health care and affordable antimicrobials;
12. Adopting a One Health approach, i.e. “recognizing the interconnectedness of humans, animals and the environment” (Public Health Agency of Canada, 2017, p. i).

The key priority for tackling AMR is acting fast and in a coordinated manner. In that sense, the Interagency report states that the development and implementation of national action plans is urgent, and while many countries (including Canada) have developed plans, they have not implemented them. The report states that these plans are often not funded or prioritized because countries have not developed robust investment cases that estimate the costs of inaction (p. 6). This suggests that AMR is still not understood as an economic threat, which was also mentioned by Gerard Wright, who explained that finding an exact dollar amount for the cost of AMR would help engaging Canadian policymakers.

Improving public awareness of AMR is another top priority identified across all of these documents. For example, the WHO (2015) called for “public communication programs that target different audiences in human health, animal health and agricultural practice as well as consumers” (p. 8). This recommendation has been echoed in all other policy documents and reports, reiterating the importance of increasing public awareness of AMR to improve antimicrobial use and reduce the spread of resistance (Chief Public Health Officer of Canada, 2019, p. 17; Interagency Coordination Group on Antimicrobial Resistance, 2019; Public Health Agency of Canada, 2014, 2017; United Nations, 2016, 2016, p. 4).

Similarly, the Canadian federal framework states that “public awareness activities help Canadians understand the benefits and risks of antimicrobials, and why the use of antimicrobials is not always appropriate for the treatment of infectious diseases” (Public

Health Agency of Canada, 2014, p. 9). To that end, the framework established the Antimicrobial Resistance Awareness Campaign, and online communication strategy that takes place annually in November during Antibiotic Awareness Week. The O’Neill report also urges to “improve global awareness of AMR across the board, so that patients and farmers do not demand, and clinicians and veterinarians do not prescribe, antibiotics when they are not needed, and so that policy makers ensure that policies to tackle AMR are taken forward now” (O’Neill, 2016, p. 4).

The Pan-Canadian Framework (2017) highlights that “medical and veterinary health professionals need ongoing training and support to effectively communicate with patients and clients about the risk and benefits” of antimicrobial use, which must be complemented with increased public awareness about appropriate use of antimicrobials for sustained antimicrobial stewardship (p. 18). Similarly, the report by the Canadian Chief Public Health Officer (2019) considers greater public awareness to be a key aspect for improving antimicrobial use and thus reducing the risk of AMR. The report suggests risk communication campaigns targeted at specific audiences (elderly, parents of young children, youth, teachers, etc.) instead of broad communication efforts. Additionally, the document suggests risk awareness campaigns directed at healthcare professionals. However, the report warns against passive transfer of information and suggests coupling these communication efforts with organizational interventions, such as patient education and shared decision making regarding treatment (p. 17), thus moving away from the deficit model of risk communication that prevails in the other documents and highlighting the need to consider patient experience.

The report also puts emphasis on improving doctor-patient relationships and encourages physicians to strengthen relations of trust with patients by listening to patient needs and concerns. Also important is shared decision making about treatment as passive sharing of information is not enough to reduce antibiotic use. For example:

“Saving time can be a motivating factor for both patients and healthcare providers. In busy clinics, healthcare providers may have little time for each patient and writing a prescription can be a fast way to conclude a doctor’s office visit. This time pressure can affect the relationship, as there may be less time for healthcare providers to share information and for patients to ask questions” (p. 11)

Infection surveillance is highlighted in most of the documents (Public Health Agency of Canada, 2014, pp. 8–9, 2017, pp. 10–12; World Health Organization, 2015, p. 9), particularly the need for standardized methods of infection surveillance and a system for sharing surveillance data globally. The WHO (2015) called for antimicrobial use data in developing countries, where these drugs can be bought over the counter, and for evidence-based prescribing practices along with the use of diagnostic tests before prescribing (p. 16). Similarly, the federal framework for AMR (Public Health Agency of Canada, 2014) describes as one of its goals to detect and monitor infection trends and threats to inform policy making (p. 8). This framework also calls for the strengthening of the Canadian Nosocomial Infection Surveillance Program (CNISP) and the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) and established the Canadian Antimicrobial Resistance Surveillance System (CARSS), which expands surveillance activities in hospitals and, particularly, in the community. The document further states that “Canada has well-established, strong surveillance systems for antimicrobial resistance and use” (p. 8). The O’Neill report also includes infection surveillance as one of the key actions to be taken against the risk of AMR, and highlights the need for properly funded

surveillance programs: “Surveillance is one of the cornerstones of infectious disease management, yet has until recently been often ignored and remains under-resourced in the fight against AMR” (O’Neill, 2016, p. 5).

Antimicrobial stewardship is a key component of AMR risk management. For example, the AWaRe website suggests five measures countries can adopt to improve antimicrobial stewardship, including using the suggested antibiotic categories not only in medical practice but also for medical training; updating national prescription guidelines in human and animal medicine; and monitoring antibiotic consumption in the community and hospitals (World Health Organization, 2019c). Similarly, the Canadian federal framework states that Health Canada (2014) would increase oversight of antimicrobial use in food animal production and phase out the use of antibiotics for growth promotion (p. 10).

Antimicrobial stewardship is also at the centre of the AMR strategy outlined in the O’Neil report (2016), which explains that:

“At the heart of the problem of rising drug resistance is rapidly growing global demand for antibiotics, something that is necessary to improve access to life-saving medicines with economic development, but all too often reflects excessive and unnecessary use rather than genuine medical need. More consumption of antibiotics directly leads to more drug resistance. Thus, by reducing unnecessary consumption, we can have a powerful impact on resistance” (p. 17).

The report also outlines research into new antimicrobials as a cornerstone of the global strategy to tackle AMR (pp. 52-60) and argues for better incentives to promote investment for new drugs and improving existing ones. The Interagency report also highlights the importance of developing new antimicrobials and the need to fund this research, but it warns that new drugs are not enough, instead any new antimicrobials should be made accessible to anyone who needs them but used in a “responsible and sustainable manner” (Interagency Coordination Group on Antimicrobial Resistance, 2019, p. 7).

As new resistant organisms emerge, new prevention measures are included in reports and action plans. For example, the report “Handle with Care” (Chief Public Health Officer of Canada, 2019) includes a new measure for preventing AMR, the use of condoms to reduce the risk of resistant gonorrhoea, which has been a threat since identified in 2016. The O’Neill report (2016), recognising that the risk of AMR does not affect all countries equally and that needs and resources are not the same either, states:

All countries need to act. Some in the developing world will need to focus on improving the basics first, by expanding access to clean water and sanitation. For other countries the focus will be to reduce infections in health and care settings, such as limiting superbugs in hospitals. The simplest way that all of us can help counter the spread of infections is by proper hand washing (p. 4).

Other preventive measures in this report include doctors handing out delayed prescriptions, i.e. intended to be filled in a few days if symptoms persist, thus allowing time for diagnostic results and for the body to fight back, as well as “viral prescriptions”, i.e. instructions for managing viral infections, such as rest, drinking plenty of fluids, and taking over-the-counter pain relief medication. Doctors are also encouraged to stay up to date on antibiotic prescription guidelines and with local antibiotic resistance patterns, so that if necessary, they can prescribe the right drug in the right dose and for the right amount of time (pp. 15-17). Another measure mentioned in the report is the need for inter-professional association coordination involving medical associations, pharmacist associations and nurse associations. These groups should work together and with government to develop guidelines that are coordinated and that can be implemented in health curricula too (p. 17).

The documents and websites sometimes resort to the use of catastrophe frames and torqued language to demand global action or face a prospective AMR apocalypse: “there is

no time to wait” (Interagency Coordination Group on Antimicrobial Resistance, 2019); “the world is running out of antibiotics” (World Health Organization, 2019a); and “change can’t wait. Our time with antibiotics is running out” (World Health Organization, 2018b). Additionally, some of the documents deployed war metaphors and refer to resistant organisms as ‘superbugs,’ particularly those materials targeted at general audiences (see for example Chief Public Health Officer of Canada, 2019; World Health Organization, 2018b, 2019c). This framing sought to increase the perception of risk about AMR. Nerlich and James (2009) argue that the ‘catastrophe frame’ is a rhetorical tool used to alert the public and policymakers about the urgency of the situation and need for action, which can lead to securing funding for more research and policy implementation; however, it can also induce fear, promote misinformation, and generate undesired behavioural changes (pp. 583-5).

The analysis of policy documents, reports, and public awareness websites shows that AMR is not merely described as a public health threat. Instead, AMR emerges as a multifaceted and complex problem: it is a public health crisis, a political problem, an economic threat (locally, nationally and globally), and an environmental risk. As such, the documents adopt a One Health approach, defining AMR as a health risk produced at the intersection of human-animal-environment relations. Additionally, AMR is framed as a regulatory problem, as the actions of many social groups need to be regulated, including cultural prescription practices, agricultural use of antimicrobials, and regulating public access to antimicrobials. Furthermore, these reports suggest the need for cultural change in the way that antimicrobials have been understood as a silver bullet and prescriptions expected and delivered regardless of whether the drugs are necessary or not.

The documents also convey the idea that AMR is an unprecedented global health risk and express urgency and need for immediate, global, coordinated action. All of the documents also highlight the need to raise public awareness, improve infection surveillance, and follow antibiotic stewardship guidelines. These documents outline clear preventive measures to be taken by various sectors, including individuals. Despite this, political action has been slow in Canada and across the world. Additionally, and as shown in chapter 5, media coverage of AMR does not convey the same sense of urgency for action, and public awareness of AMR is slowly increasing but remains low, with health organizations being perceived as “crying wolf”. Tom Blackwell explained that “The WHO has that problem of, not overstating a problem, but being overly dramatic and then perhaps their dire warnings don’t come to pass and then people become skeptical. When you’re talking about something that is going to happen in the future and you keep hearing the same warnings, it sometimes blunts the impact of those warnings.”

CONCLUSION

In this chapter I examined how the risk of AMR is conceptualized and enacted as an object of scientific inquiry, as scientific knowledge, and as a policy and regulatory problem. The discourses and practices involved in these processes are involved in the co-production of AMR as a public health risk by defining the risk in different ways, as well as assigning blame and responsibility to a variety of actors.

Health risk communication initiatives tend to be premised on a deficit model of communication (Abraham, 2009), i.e. a one-way transmission of information from experts to non-experts in order to correct public (mis)perceptions of risk and to guide better risk avoiding behaviour. In this sense, Lupton (2012) argues that, “state-sponsored health

education campaigns in the mass media are conducted to warn the public about health risks, based on the assumption that knowledge and awareness of the danger of certain activities will result in avoidance of these activities” (p. 33). Thus, risks emerge through messaging that reproduces and normalizes the imperative of self-care and the responsibility to monitor the behaviour of others (Lupton, 2013). Davis and colleagues (2017) analysed public awareness campaigns developed by health agencies with global agenda-setting power, including the WHO, and found that these risk messages position the individual as morally responsible for the preservation of antibiotics by exhorting the public to forgo antibiotic treatments (immediate individual benefit) so that vulnerable others can have access to them (ibid., p. 3). The analysis presented in this chapter confirms these findings. The analysed documents and websites suggest a high level of anxiety about AMR from national and international health organizations. Following a deficit model of risk communication, these documents first express concern about a risk that they deem of acute importance and in need of immediate action. Then, the documents provide scientific information about the risk to raise public anxiety about it. This is followed by a list of prevention measures and policies that outline desirable and undesirable behaviours for institutions and individuals in order to minimize the risk. Through these prevention measures, health organizations aim to shape public risk behaviour by exhorting to self-regulation and the monitoring of others. These documents position the individual (healthcare provider, patient, farmer, veterinarian, etc.) at the centre of prevention efforts, thus making individuals responsible for not exposing themselves or others to the risk, while monitoring the way in which others behave. In that sense, public health risk communication and public awareness campaigns are a mechanism of governmentality.

They operate in the same way as risk messages posted in bulletin boards in hospital hallways sought to compel health workers to perform cleansing rituals aimed at minimizing risk. Similarly, these documents seek to compel individuals to follow certain risk prevention guidelines, industries to voluntarily regulate their use of antimicrobials, and governments to act in a coordinated manner to tackle the risk from various angles.

The risk of AMR was defined broadly by scientists and health organizations as a priority threat to humanity that needs to be addressed with urgency. While the scientists focused on AMR as an object of inquiry to reveal facts and truth about the natural world, the documents and websites adopted a broader focus by conceptualizing AMR as a global problem with economic, political and environmental implications, and requiring international cooperation.

Despite these different definitions of AMR, scientists and global health actors assigned blame and responsibility in a similar manner. AMR was considered to be caused by a wide array of social actors (including health professionals, food industry, travel industry, patients, hospitals, etc.), and required solutions from the same assemblage of actors. Additionally, raising public awareness, media attention, and political interests in AMR were considered by scientists and global health organizations as key elements for tackling this risk. There were, however, key differences in how they thought this might be achieved. Scientists were critical of media coverage of AMR as not always accurate and seldom providing important context; however, they mentioned facing similar challenges as journalists when trying to communicate about the risk of AMR to both expert and lay audiences, namely the need to make AMR relevant and understandable, needing to use elements of storytelling. Journalists were ambiguous about their role in raising awareness,

expressing discomfort at the notion that they might be used in advocacy and public education, while acknowledging the seriousness of the issue and their role within the broader communications environment.

CHAPTER 7

CONCLUSION

This dissertation asked **how are public health risks co-produced and what are the implications of this constructivist approach for how we communicate risk about antimicrobial resistance?** I advanced three main arguments. First, narratives and definitions of risk are not absolute or fixed, but socially co-produced in the discourses and practices of various global, national and local actors. Second, the production of knowledge about risks is not a linear process but one in which various definitions, interests, and practices are involved, and influence one another. Finally, conceptualizing risk as a social and cultural co-production provides a more robust and nuanced understanding of how risks are perceived by different stakeholders than is offered in traditional models of risk communication, particularly in relation to attributions of responsibility, blame, victimhood, and resource allocation. Using the risk of AMR as a current exemplar of a modern risk, the concepts of biocommunicability and biomediatization, and through ethnography of risk, I charted and analyzed a network of biocommunicability of AMR. I identified 4 key nodes in this network: hospital workers; journalists and news media; lab scientists; and public health discourse. These are actors with definitional power and, therefore, crucial nodes in the network of biocommunicability of AMR. I conceptualized antimicrobial resistance not as a health risk that people understand in different ways, but rather as a risk that has multiple dimensions, and that emerges in the myriad practices and discourses of AMR performed by different social actors. In this sense, what we collectively understand as AMR is the assemblage of these many dimensions in which the risk is lived, experienced, talked about,

and acted on. Therefore, AMR is a multidimensional risk with personal, economic, political, and occupational implications. The hospital is presented here as the symbolic “epicentre of AMR,” where the multiple dimensions of the risk converged, through public health and institutional policies, IPAC routines and technologies of prevention, biomedical knowledge and cultural medical practices, individual and professional perceptions of risk. In the rest of the chapter I outline the main findings, limitations, and implications of this study.

KEY FINDINGS

First, the risk of AMR is co-produced through processes of negotiation between different and co-existing types of knowledge, including expert scientific assessments, situational and embodied experience, and emotional memories. In this co-production expert knowledge and biomedical knowledge are one component, but not necessarily the most influential on risk perceptions. In fact, my analysis shows that individual and occupational understandings about the risk of AMR were informed by the ways in which biomedical knowledge is refracted through professional practice, situated experiences, and cultural understandings of infection prevention and control. Oftentimes individuals discussed the risk from one of these perspectives while acting based on another one (e.g. acknowledging the importance of IPAC measures but not following them rigorously). While this apparent contradiction was sometimes acknowledged, other times it was not, which suggests that individuals negotiate different ways of knowing and acting upon risks –it’s not that they see these different ways of knowing as contradictions but as coexisting. For example, the risk of AMR emerges in the hospital wards as a mechanism of governmentality—expressed in IPAC guidelines, posters on the walls, technologies and rituals of prevention, and

hospital policies- which aim to regulate hospital workers’ behaviour. My analysis shows, however, that while healthcare professionals understand AMR as a personal and professional risk they face on a daily basis, they negotiate this perception of risk with other priorities, such their patients’ comfort and safety, and practical solutions to the fast pace of work in the ward. Thus, persistent cultural understandings of antimicrobials as silver bullets, long-standing prescription practices, and the high demands of doing work in a pediatric hospital, prevail over the demands and principles of antimicrobial stewardship. These multiple instances of negotiation could only be captured in long periods of observation in the wards, which afforded me the possibility to immerse myself in hospital culture to witness and understand them. In this context of continual negotiation, biomedical knowledge was not always the predominant way of knowing the risk of AMR; instead, socio-cultural understandings of the risk combined with practical constraints on how hospital work gets done took precedence in many cases.

Second, risks are multifaceted and co-produced from various points of view, through mechanisms of control and negotiation shaped by experience, values, beliefs, and cultural practices. Instead of fixed knowledge transmitted from experts to non-experts, as the deficit model of risk communication contends, various cultural understandings of risk co-exist and even influence each other. My analysis shows that the risk of AMR is co-produced as a personal risk, a professional risk, a global risk, and a political risk; sometimes these various dimensions co-exist in the same spaces. In that sense the network of biocommunicability for AMR emerged as fragmented, showing different discursive bubbles that do not always interact with or align to each other. Public health authorities and global health organizations communicate guidelines based on peer-reviewed science and

direct policymakers to act on the basis of these guidelines. However, lack of political commitment is one of the main challenges to implementing measures to tackle AMR, because policymakers do not understand the risk as urgent and are juggling myriad other health priorities without infinite resources. Similarly, journalists reject the role of educators or translators of scientific knowledge, and do not believe AMR meets all of the standard ‘news values’ which guide the translation of health issues into health events worthy of coverage. Medical professionals and scientists criticize the limited media attention to AMR, and lament that the coverage which does exist does not “accurately” capture scientific knowledge and unnecessarily generates anxiety and panic. At the same time, doctors and nurses negotiate their own understanding of AMR and risk behaviour with expert knowledge and socio-cultural ways of knowing, i.e. experiential and embodied knowledge that is many times at odds with hospital policies. These experiences of medical professionals with the risk of AMR, as well as the experience of patients affected by antimicrobial resistant infections remain absent from all of the previous discourses; despite this, journalists complain that AMR lacks a compelling narrative.

Third, these different ways of knowing the risk of AMR seldom make connections. Instead, the stakeholders in this study engaged in intense boundary work, mentioning what is and what is not the nature of their job, to justify why certain ways of knowledge were preferred over others and why, overall, AMR is not “risky enough.” For example, doctors believe nurses or pharmacists should be the ones discussing AMR with patients; journalists argue that it is not their job to educate or raise awareness about AMR and that scientists need to do a better job of framing it; scientists reflected on the importance of

communicating with non-expert stakeholders but see lack of scientific literacy in journalists and citizens as a barrier for communicating the risk of AMR.

Fourth, these arguments led participants to also engage in blame shifting, further polarizing different ways of knowing the risk of AMR. This global blame game suggests an aversion to thinking of health in biocommunicable terms, as co-produced and the role of modern institutions in producing these kinds of risks. Instead, and perhaps unsurprisingly, stakeholders are focused on their own professional approaches and institutional ways of knowing. As a consequence, the risk of AMR continues to be communicated as an abstraction with implications far away in time, and not as a present global threat affecting people everywhere. In the hospital, AMR was enacted as a background risk, which typically comes to the foreground only in mandated antimicrobial stewardship meetings. In news coverage, AMR is communicated as an important future risk in a perpetual present, and journalists understand it as lacking the basic elements to be newsworthy, i.e. human interest, locality, rapid spread, local surveillance data, personal narratives, and so on. Scientists discuss AMR as an object of research and scientific knowledge production, but do not relate it to lived experiences of AMR. Due to this lack of compelling narrative that could ground the risk of AMR by making it more concrete and relatable, this threat continues to be understood as just one of myriad other risks to population health.

Lastly, throughout this dissertation there is an evident tension between risk communication, i.e. the accurate one-way transmission of expert knowledge to non-expert populations, and the constructionist approach to risk, i.e. socially and culturally co-produced. The former is premised on the deficit model of communication, the idea that the public lacks the scientific literacy required to assess risks “correctly” and adjust their

behaviour accordingly, and so risk messages seek to fill this knowledge gap with expert information (Abraham, 2009; Lupton, 2013; Slovic, 2000). My analysis shows that various stakeholders in the network of biocommunicability of AMR reified, and in that sense co-produced, the deficit model of communication through narratives and actions that keep creating the conditions in which the supposed knowledge deficit is circulated.

For example, public health organizations commonly follow a deficit model approach to risk communication. Their reports and policies and communication campaigns are based on expert scientific knowledge and emphasize the dire situation that global public health is facing and the need to raise public awareness of AMR. By reproducing biomedical understandings of risk and prevention measures they seek to shape individual behaviour to minimize the risk of exposure to AMR. Following the idea that giving more information to the public will improve risk prevention, these organizations task news media with the dual role of translation and dissemination, i.e. educating their audiences about the risk of AMR and prevention measures. Similarly, doctors at the hospital and the scientists interviewed in this study were critical of media coverage and frustrated that journalists were not doing enough to educate the public. Journalists, however, do not practice risk communication, nor is it their job to educate the public about health risks. The interviewed journalists instead stressed the need to make their stories relevant by using narratives and personal experience—their task is one of storytelling, not science-telling. Despite this, the media analysis presented in Chapter 5 shows that much of the news coverage privileges established biomedical framing about AMR and its risks to public health.

LIMITATIONS AND FUTURE RESEARCH

As resistant pathogens continue to emerge and spread around the globe, cultural analyses of how complex public health risks are co-produced by various social actors become even more important. In this dissertation I examined how some key actors are involved in the co-production of a public health risk, but inevitably other actors were not included in the analysis due to time and scale constraints. First, industry actors –such as pharmaceutical companies and farmers–play an important role in defining the risk of AMR and are many times involved in policy-making processes. As the analysis above shows, they are also directly implicated in and affected by narratives that blame them for exacerbating the risk of AMR. Future research could examine how these actors are implicated in the network of biocommunicability of AMR, including their own cultural and professional practices, as well as economic interests.

A second limitation of this study is the absence of patient experience with AMR, which are also consistently absent in news reports and policy documents. AMR is more than an object of biomedical curiosity and investigation: it is an embodied experience, sometimes a personal tragedy that can lead to isolation, economic loss and uncertainty, and emotional trauma. These personal experiences are not always easy to identify, as resistant infections can carry stigma, particularly when the infections are visible and hard to manage, such as MRSA⁴¹. In this study I sought to recruit people living with MRSA

⁴¹MRSA is any strain of *S. aureus* that has evolved multiple drug resistance to beta-lactam antibiotics, i.e. a broad spectrum group which includes some penicillin derivatives, such as methicillin and oxacillin (Gurusamy et al., 2013). MRSA causes infections in humans that are hard to treat. It began as a hospital-acquired infection, affecting people with open wounds, invasive devices such as catheters, and weakened immune systems, but now MRSA can also be community-acquired as well as livestock-acquired. MRSA needs urgent treatment as it can otherwise be fatal (Pastagia et al., 2012). For example, in the case of MRSA pneumonia or osteomyelitis, and depending on the location of the infection and the susceptibility of the particular strain causing it, the infection can be treated with a combination of oral and intravenous antibiotics (Liu et al., 2011).

infections through a Facebook support group. Five people living with MRSA⁴² shared their experience of AMR with me. While these experiences are situated in a specific socio-cultural context and cannot be generalized, they provide ways of understanding how AMR is enacted not only as a health problem, but as a lived experience with physical, social, economic, political and emotional implications. I present some of these initial experiences below, but a much deeper analysis is urgently needed.

For example, the patients expressed frustration over lack of information about AMR both in the news media and from experts and public health agencies – in their view, neither news media or public health organizations sufficiently understand or address patients’ questions and concerns. While their experience with resistant infections has been life-altering, patients also expressed despair over lack of physician awareness of AMR and antibiotic treatments that fail over and over. For example, Support group member 5 said “a lot of doctors are not well educated and will prescribe the wrong types of antibiotics that simply do not work.” Their disappointment with healthcare providers, public health authorities, and media outlets led the support group members who participated in this study to social media support groups, where they seek and share alternative therapies, diets and hygiene rituals to manage the symptoms of their infection.

Support group members shared experiences of loss and fear related to their MRSA infection, particularly economic hardship and emotional distress. While these experiences are situated in a specific socio-cultural context, and so cannot be generalized, they provide ways of understanding how AMR is enacted not only as a health problem, but as something

⁴²The participants are 3 women and 2 men; 3 of them have college degrees and 2 have high school diplomas; their ages are 21, 31, 40, 43 and 62. All participants live in different states in the United States. Four participants have recurrent MRSA infections, while one of them had the infection only once. One participant was unemployed.

people live with every day of their lives. MRSA has impacted these individuals in profound ways, affecting their physical and emotional wellbeing, and harming their relationships and economic stability. They referred to the emotional and social impact of the infection in their lives, including fear, anxiety and social isolation:

“When I have MRSA, my life pretty much is put on hold while trying to get rid of the infection, deal with the illness from it, and all the hospital stays, and doctor's office visits, not to mention side effects from medication. At one point my daughter would not allow my grandchildren to visit until I had clearance from my doctor” (Support group member 1).

“This has given me a lot of anxiety for being around people for one (...) I am afraid of the contagion MRSA brings. I have a partner and a little one around the house, so I am constantly concerned for their safety. It has also made me a very meticulous person at house cleaning (...) I always wear long sleeves. Unfortunately, wounds can end up anywhere, and I do not like to show that I am sick. I truly feel like a leper most days. I also get ready longer because I have to dress the wound if it's leaking and find comfortable clothes even if it's not. It literally consumes my every thought (...) I don't hang out with people anymore because I am either tired or afraid, and I know my family is supportive, but they tire of hearing me talk about my illness. I feel closer to the abscess on my skin than I do other human beings (...) I AM VERY AFRAID. I deep clean with a lot of disinfectants and antibacterial solutions, but I also limit my contact with others. I used to love to give hugs, but I do not appreciate their warmth anymore”. (Support group member 2).

“I feel, at times, like I have the Bubonic plague; I'm an Untouchable. While I was on antibiotics and fighting the infections, I didn't want my husband to touch me. It's affected our sex life somewhat too. He caught me scrubbing my skin with Hibicleanse once before we were planning on being intimate together, asked me “What's that medicine smell?” Well.....you don't really want to know! Nothing ruins the moment quite like the medicine smell of Hibicleanse” (Support group member 5).

The support group participants also referred to the stigma that having MRSA carries, making them feel both self-conscious and ashamed. They explained their fear of being judged by family members, friends, colleagues, and even healthcare providers. They expressed frustration with healthcare providers for a variety of reasons, including misdiagnoses, failure of treatment, feeling like AMR was caused by bad prescription

practices, not following IPAC procedures, feeling like many physicians are not aware of MRSA, do not give them instructions on how to manage their infections, and do not understand what they are going through. All of these experiences contributed to a general sense of helplessness among support group participants vis-à-vis their MRSA infection, which pushed them to do their own research online and find alternative treatments and comfort in group discussion forums.

The five support group participants were recruited through a Facebook MRSA support group, so this is a very small sample of social media savvy support group participants who have a clear motivation to seek support online. Their responses, however, shed light into the reasons why people seek out information about AMR online and the type of information they get and share. For example, to “learn alternative means to prevent further outbreaks and natural remedies to stop small spots and boils before they become a serious infection needing to be drained again” (Support group member 5). The need to find alternative therapies to treat MRSA shows lack of trust in the medical treatment prescribed by their physician and could possibly be a reaction to the perceived lack of information regarding how to prevent new flare-ups and the spreading of infection. In that sense, four of the five support group participants said they followed alternative dietary regimes or treatments they had found online. For example:

“I followed the guidelines my doctor gave me as well and created my own regimen for prevention of further outbreaks. I went through a 21-day Detox program to boost immune system and restore gut health after a total of 24 days on strong antibiotics. I’ve changed my diet to cut out a lot of sugar, processed foods, excess caffeine, white flours, alcohol. I eat vegetarian a lot more now after my detox diet and drink less coffee” (Support group member 5).

“I also follow a strict Paleo diet (or anti-inflammatory) because I don’t know if it helps the disease or not but it definitely helps my pain level” (Support group member 2).

“[I] take apple cider vinegar before meals often and also take an apple cider vinegar supplement, I also take magnesium, potassium, calcium, l carnitine, probiotics, vitamin d, vitamin b 12 sometimes, garlic, and turmeric.” (Support group member 3).

Although the support group participants said they follow their physicians’ recommendations, they are drawn to social media in search of new information on MRSA, where clinically unproven treatments for AMR infections are widely shared, thus creating their own regimes for treating and managing the symptoms of their infection. Most of the “alternative treatments” the support group participants said to follow and share online refer to lifestyle changes, such as adopting a specific diet or restricting/increasing consumption of some types of food (e.g. sugar, carbohydrates, fruits and vegetables). This confirms what other studies have shown regarding people seeking and sharing information on social media about conditions prone to stigma as well as information for managing chronic illnesses, with Facebook group member highly valuing personal experiences, opinions and advice over clinical evidence (De Choudhury et al., 2014; Zhang et al., 2013).

Further research could examine the role of social media in addressing patients’ concerns and challenging conventional forms of risk communication of AMR. Ethnographic research could also focus on physician-patient communication to shed light on the impact of cultural understandings of infection management and control, antibiotic treatments, and home and personal cleanliness –including ideas of toxicity and “detoxing”.

A third limitation of this study is the scope of the media analysis. Here I examined news coverage of AMR in North American newspapers (print and online versions). However, people also get health and risk information from other sources, including social media, specialized websites, and even entertainment media. Future research could examine

how the risk of AMR is co-produced by personal narratives expressed on Facebook, Twitter, Reddit and other sites, by popular science books and comics, and how these accounts impact public perception of AMR, of antibiotic use, and of infection prevention measures.

Finally, this study has focused mainly on the Canadian context. Further research could look at how the risk of AMR is co-produced in other regions of the world that are greatly affected by AMR, or that do not have a public health system. Examining how the risk of AMR is understood in different regional contexts could also contribute to better understanding broader cultural milieus in which the risk is co-produced, and map a wider, international network of biocommunicability

THEORETICAL, METHODOLOGICAL AND PRACTICAL IMPLICATIONS

This study has opened up the ways in which health risks can be conceptualized beyond biomedical knowledge, by showing the processes through which the risk of AMR is co-produced among stakeholders, their cultural understandings, lived experience, and situational knowledge. Furthermore, these various ways of knowing risks coexist; therefore, a revalidation of experiential knowledge and a critical examination of the sites and processes of negotiation is needed in to make visible how risks are constructed and their impact on people’s lives.

Examining how risks emerge as a co-production can pose a methodological challenge. Researchers must find creative ways to immerse themselves in their participants’ context and experience. As shown in this study, gaining access to the field can mean navigating institutional, epistemological, and ethical barriers. In my case, these barriers led to considering the role of emotional labour in qualitative research as well as reflecting on

the ways in which researchers can negotiate access to sites that do not share the same epistemological and methodological assumptions. By having to dwell in the emotional and embodied entanglements of professional life in institutions, this research also advances ways for conducting interdisciplinary research and understanding these methodological hurdles as a key aspect of the broader production of knowledge. In that sense, the “risk” in risk communication tends to be distant, over analysed, even sanitized, but the lived nature of risk, as this study shows, is hard, messy, and affective.

From a risk communication perspective, understanding risks as co-produced by various ways of knowing and acting offers a more productive perspective than the objectivist approach in which the deficit model of communication is so deeply embedded. Charting a network of biocommunicability for AMR allowed me to challenge assumptions of IPAC protocols as objective and universal and problematize this form of risk communication in healthcare settings by shedding light on the ongoing negotiation between expert knowledge, personal beliefs, cultural understandings, and institutional structures that affect how healthcare workers understand the risk of AMR. Similarly, this network of biocommunicability has surfaced the disconnect between how public health agencies, physicians and scientists interpret the role of news media and how journalists understand it themselves. Thus, assigning in reports and action plans a key role for journalists in reinforcing governmentality by raising public awareness of public health risks and educating citizens on infection prevention is not a realistic expectation.

My charting of the network of biocommunicability of AMR, however, has been partial, as no research project can encompass all aspects of the object of study. Several other stakeholders could be added to the network and the interaction with these new nodes

examined. These potential nodes include patients, farmers, food industry, pharmaceutical industry, healthcare professionals in the community, provincial/territorial and regional public health authorities, among others. Furthermore, this theoretical and methodological approach could be used in studying the co-production of other risks, expanding current understandings of emerging and established threats to public health.

POSTSCRIPT

I finished writing and defended this dissertation during the early stages of the Covid-19 pandemic. This disease, caused by the coronavirus SARS-CoV-2, is a new health threat that brings with it many uncertainties and anxieties, particularly because of its rapid global spread. Covid-19 is an example of a spectacular health risk, it is the focus of constant debate and media attention. It is visually impactful, and it is everywhere. And it has infected more than 7 million people across the world, of which over 400,000 have died. However, there are many aspects of Covid-19 that remain unknown, including how the virus went from infecting animals to infecting humans, where were the first human infections, forms of transmission, and if and when a vaccine will be available. In this context media discourse of Covid-19 tries to make sense of the outbreak and the unprecedented scope of the risk, searching for elements that can lead to a clear “outbreak narrative” (Wald, 2008). As our knowledge of Covid-19 remains limited and research is ongoing, public health policies are fluid as the risk is constantly being redefined.

As entire countries remain in lock-down, having stopped most aspects of public life to reduce the risk of infection, people worry about staying healthy and keeping their loved ones safe, about their jobs, about the state of the economy, and so on. These anxieties are fuelled by an avalanche of information, and misinformation, circulated every day on Covid-19, from public health communication campaigns to news coverage, from medical advice to the conspiracy theories spread through social media.

The risk of Covid-19 can be understood as a co-production involving scientists and public health experts, healthcare professionals, patients, businesses, educators, parents, students, people in quarantine and those contesting it, among others. Understanding the risk of Covid-19 as a co-produced phenomenon would permit us to examine a network of biocommunicability and the ways in which various ways of knowing and acting are affecting public understanding of the risk as well as decision-making around it. This approach would expose cultural understandings of isolation and physical distancing, challenge assumptions about individual’s compliance with public health guidelines, and examine relations of (dis)trust between experts and non-experts which impact public perception of risk. It would also allow to examine how healthcare professionals are

negotiating IPAC and professional guidelines with situated experience and individual perceptions of risk. Such an analysis would also assess the impact of scientific uncertainty on public perception and understanding of novel health risks, problematize public health communication efforts, and examine how political leaders are balancing the risk of Covid-19 with economic and political interests.

The Covid-19 pandemic poses several implications for how the risk of AMR is understood, discussed, and enacted. First, IPAC measures in hospitals have been intensified in the wake of Covid-19, which could result in an overhaul of IPAC protocols in healthcare settings to increase compliance, and also to address the challenges, fears and concerns that healthcare professionals face on a daily basis in relation to infection prevention and control. Second, the outbreak of Covid-19 has increased antibiotic use, as many patients are also affected by secondary bacterial pneumonia infections, thus potentially intensifying the evolution of resistance. Additionally, some patients who are particularly vulnerable to Covid-19 are also at increased risk of AMR, i.e. elderly, immunocompromised individuals, among others. Long hospitalizations due to Covid-19 also increase patients' risk of hospital-acquired resistant infections. Third, due to the extensive media attention that Covid-19 has attracted, many other health risks have lost importance in the public agenda. The risk of AMR, already perceived as abstract or far away in the future, will likely draw even less media, political, and public attention.

Finally, the outbreak of Covid-19 will have detrimental impacts for researchers seeking to do field work in healthcare settings. I feel profoundly fortunate to have been able to conduct field work in a hospital but, as explained in this dissertation, I faced multiple challenges in accessing the hospital as a field site and maintaining that access. These barriers will only intensify as a consequence of Covid-19 as hospitals have doubled their IPAC measures and accessing the wards for research now seems unrealistic. As social distancing and the use of face masks become normalized in all levels of society, researchers will encounter increased methodological challenges for accessing institutions and participants. Additionally, ethnography relies on the research ability to read non-verbal cues and facial expressions. The use of face masks and shields create new burdens and demand the development of new skills in participant observation.

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APPENDIX 1: INTERVIEW GUIDES

* All interviews were open-ended and lasted between 30 and 60 minutes. The following are basic question guides, but other questions were allowed to emerge during the conversation.

1. GUIDE FOR INTERVIEWS WITH JOURNALISTS

A. General questions:

1. When do you decide to write a story/book about antimicrobial resistance (AMR)?
2. What type of sources do you use for a story on AMR?
3. What makes AMR relevant? Why do you think it needs to be communicated?
4. How do you make AMR relevant to your readers?
5. What do you seek when writing stories/book about AMR?
6. How do you interpret your work as journalist: transmission of risk information, public education, raising awareness, empowering people, changing risk behaviour, telling a good story, other?
7. How do you achieve that?
8. What do you think of the term “superbugs”? What is the purpose of this term?
9. Is the focus of the story on the science, on the infected, on public health officials, on prevention and control?

B. Event-related⁴³ questions:

1. What is the importance of these events in shaping public understanding of AMR?
2. In writing about these cases, what was your goal?
3. What is AMR in these stories?
4. Who are your sources and why?
5. Do you seek information from other sources beyond officials and experts?
6. How does writing about AMR compares to writing about a viral outbreak, such as measles or Zika?

⁴³ First case of colistin-resistant *E. coli* in the US (May 2016); UN’s high-level meeting on AMR (Sept 2016) Nevada woman dies of MDR infection after trip to India (Jan 2017); WHO publishes list of most dangerous bacteria (Feb 17, 2017); CDC publishes report on over 200 cases of infection caused by “nightmare bacteria” in US (Apr 2018).

7. Most stories tend to be either political (hard news about meetings and policy) or describe a case of infection, but almost never relate the information to the presence of resistant bacteria in the community. Why?
8. In the last 15 years coverage of AMR has resorted to belligerent language (at war with, arsenal, fighting, hunting, etc.), why is that?
9. Coverage has also tended to simplify AMR by referring to “superbugs” and now “nightmare bacteria”, seldom explaining the evolutionary process behind it. Why do you think that is?
10. Preventive measures that can be taken by individuals as well as clear responsibility in terms of causing the spread of AMR and controlling it are usually also underreported. Why is that?

2. GUIDE FOR INTERVIEWS WITH SCIENTISTS

1. Do you require confidentiality or could I use your name in my dissertation and subsequent publications?
2. When does an observation, a finding on antimicrobial resistance (AMR) become scientific knowledge?
3. When and how does AMR become a health risk?
4. How do you communicate your research on AMR?
5. In communicating your research, do you frame AMR as scientific knowledge, health risk, or both? Why?
6. Do you communicate your research directly to lay publics/patients? If so, how?
7. Do you see any benefits in engaging directly with the public to raise awareness of the risk?
8. Scientific studies, particularly those related to human health, get media coverage. And I’ve seen many news reports quoting you. Is getting media attention for your a priority for you in communicating about the risk of AMR? Why?
9. Do you reach out to media outlets for coverage of your research? How?
10. Do you write titles and abstracts that seek to attract journalists’ interest?

11. Do you think the way that scientists communicate AMR is influenced by the way in which health agencies and media communicate it? For example, in the use of language and framing.
12. Do you think the opposite is true? Are media reports of AMR influenced by scientific publications?
13. How are terms like ‘superbugs’ or ‘nightmare bacteria’ perceived by scientists? Do they help or do more damage?
14. Do you communicate your research directly to health authorities and health organizations?
15. Do you think that society at large is sufficiently aware of the risk posed by AMR?
16. How would you describe the work you do as member of the Expert Panel on the Potential Socio-economic Impacts of Antimicrobial Resistance in Canada?
17. Most policy making and communication of AMR is informed by scientists and scientific studies. Do you think that the experience of health care providers and patients who have suffered a resistant infection or live with one should be taken into consideration in policy making and risk communication efforts?

3. GUIDE FOR INTERVIEWS WITH DOCTORS

1. Do you get special training at the hospital on how to avoid or contain the spread of resistant infections? Explain.
2. Are there any preventive measures in the official protocols that you skip? Why?
3. As a physician, do you think you have the responsibility to inform your patients about the risk of AMR in general and in the hospital?
4. Have you ever felt pressured by patients to prescribe antibiotics? How do you handle it?
5. Do you feel pressured by the hospital to reduce your antibiotic prescriptions?
6. How useful do you find stewardship rounds? Is there anything you would change?
7. Do you always take IDs advice regarding antibiotic prescriptions or are there instances in which you disagree or go with other specialists’ advice?
8. Do you use Spectrum frequently? Is it useful?

9. Has the hospital ever solicited your feedback regarding Spectrum or the development of AMR preventive measures?
10. Do you feel at risk of contracting a resistant infection? How do you cope?
11. Do you feel concerned about bringing home a resistant infection?
12. Do you think doctors get blamed for the spread of AMR?
13. Do you think the hospital does enough to raise the awareness of hospital workers about the risk of acquiring a resistant infection and of spreading it?

4. GUIDE FOR INTERVIEWS WITH NURSES

1. What are the regular infection control policies and procedures that you must follow during your workday?
2. Do you feel at risk of acquiring a resistant infection?
3. Do you receive training on how to avoid becoming infected with a resistant infection?
4. Do you find the training useful? How so?
5. Does the training address all of your concerns or are there any aspects that you are still worried about after the training?
6. Can you remember any instance in which you have felt at risk of infection and didn't know what to do?
7. How do you care for patients with resistant infections? What extra precautions do you take?
8. Do you think your patients and their families have enough awareness of AMR?
9. Is it hard to get them to comply with prevention measures?
10. Are there any preventive measures you take to reduce the risk of resistant infections that are not outlined in official protocols? Which ones and why?
11. Are there any preventive measures in the protocols that you skip because they aren't useful or don't make sense? Which ones?
12. Are you concerned that you could bring a resistant infection home? If so, how do you cope with this worry?

13. Do you feel like you are a risk to your patients, that you could transmit a resistant infection to them?
14. Do you think nurses are blamed for outbreaks at hospitals in general? By managers? By media? By patients? Are doctors blamed?
15. Antibiotic stewardship is the judicious use of antibiotics. Do you think nurses have a role to play in it?

5. GUIDE FOR INTERVIEWS WITH COMMUNICATION OFFICERS

1. Does the hospital communicate regularly with news outlets? If not how often and in which cases?
2. Do you have a protocol for communicating outbreaks or higher incidence of hospital acquired infections? For example, the VRE outbreak in oncology a couple of years ago.
3. In case of an AMR outbreak at the hospital, what would be the objectives of your communications with media outlets?
4. Many journalists I’ve interviewed have mentioned that hospitals tend to be very closed when it comes to outbreaks of hospital-acquired infections, in fact they talked about a culture of secrecy. Would you agree with that assessment? Or would you say there is transparency when it comes to outbreaks of hospital-acquired infections?
5. AMR is usually understood as a hospital complication and media have reproduced narratives of the “dirty hospital” as a cause of AMR. How do you manage reputation and prevent these kinds of media depictions when informing of cases of AMR at the hospital?

APPENDIX 2: MRSA SUPPORT GROUP QUESTIONNAIRE

Please complete the following personal information. Your answers can be as broad or specific as you feel comfortable answering.

1. Age:
2. Occupation:
3. Location:

The purpose of this questionnaire is to gain insight into your experience living with and managing a resistant infection. I am interested in your personal experience, opinions, feelings, anecdotes, and ideas.

Please answer the following 16 questions in as much detail as you feel comfortable giving. Feel free to provide examples if needed.

1. When did you first notice your MRSA infection and decided to go to the doctor?
2. Where do you think you got it?
3. How were you diagnosed and treated?
4. How has this infection affected your life? (please give examples)
5. Do you have any routines related to the treatment of your infection? (please give examples)
6. What are your main sources of information regarding MRSA and why?
7. Are you concerned of spreading the infection to caregivers and family? If so, how do you avoid spreading the infection?
8. Have your family, work and social relations changed due to this illness? (please give examples)
9. Has this illness had an economic impact for you?
10. Have you stayed at the hospital because of MRSA? If so, did you, your visitors and healthcare providers followed any particular prevention protocols or routines to prevent spreading the infection?
11. If you have been hospitalized because of MRSA, were you given instructions on how to manage your infection when you were discharged?
12. Why do are you part of a patient support group? Explain.

13. MRSA is a resistant infection. Where you aware of antimicrobial resistant (AMR) infections before you got one? When did you became aware of AMR and how?

14. Did you feel at risk of contracting a resistant infection before you were diagnosed? Explain.

15. Do you think there is sufficient public awareness of AMR? What do you think people should know about AMR?

16. Do you feel like you have enough information and support to manage your infection? Explain.

17. What do you think of the way AMR is communicated by health authorities and media? Explain.

18. Who do you think is responsible for managing (or solving) the risk of resistant infections and why?

Thank you!

APPENDIX 3: CODEBOOK FOR MEDIA ANALYSIS

Code	Description
1.Blame	Refers to actors blaming or feeling blamed for AMR
a. Blaming	When someone is blamed for causing AMR.
i. Doctors	Blaming doctors for their prescription practices, etc.
ii. Everyone	Blaming is not directed to a specific actor or group but rather to everyone
iii. Hospitals	Blaming hospitals for lack of hygiene, or for spreading infection, or not controlling it, etc.
iv. Industry	Agroindustry, farmers use of antibiotics
v. Medical system	Blaming of the health system and its current practices
vi. Nurses	Blaming nurses for lack of rigorous hygiene routines
vii. Patients	Blaming patients for not taking full prescriptions, demanding antibiotics, etc.
viii. Pharmaceuticals	Blaming pharmaceuticals for not investing in developing new antibiotics
ix. Government and regulatory agencies	Blaming government and regulatory agencies for lack of regulation of antimicrobial use
2. Causes	Causes of AMR
a. Antibiotic use in farming	AMR caused by antibiotic use in farming
b. Antibiotic use in humans	AMR caused by antibiotic use in humans
c. Evolutionary process	AMR caused by an evolutionary process
d. International travel	AMR caused by international travel
e. Lack of new antibiotics	AMR caused by lack of new antibiotics
f. Poor hygiene	AMR caused by poor hygiene
g. Use of antimicrobial gels	AMR caused by antibiotic use of antimicrobial gels
3.Description	Definition of AMR

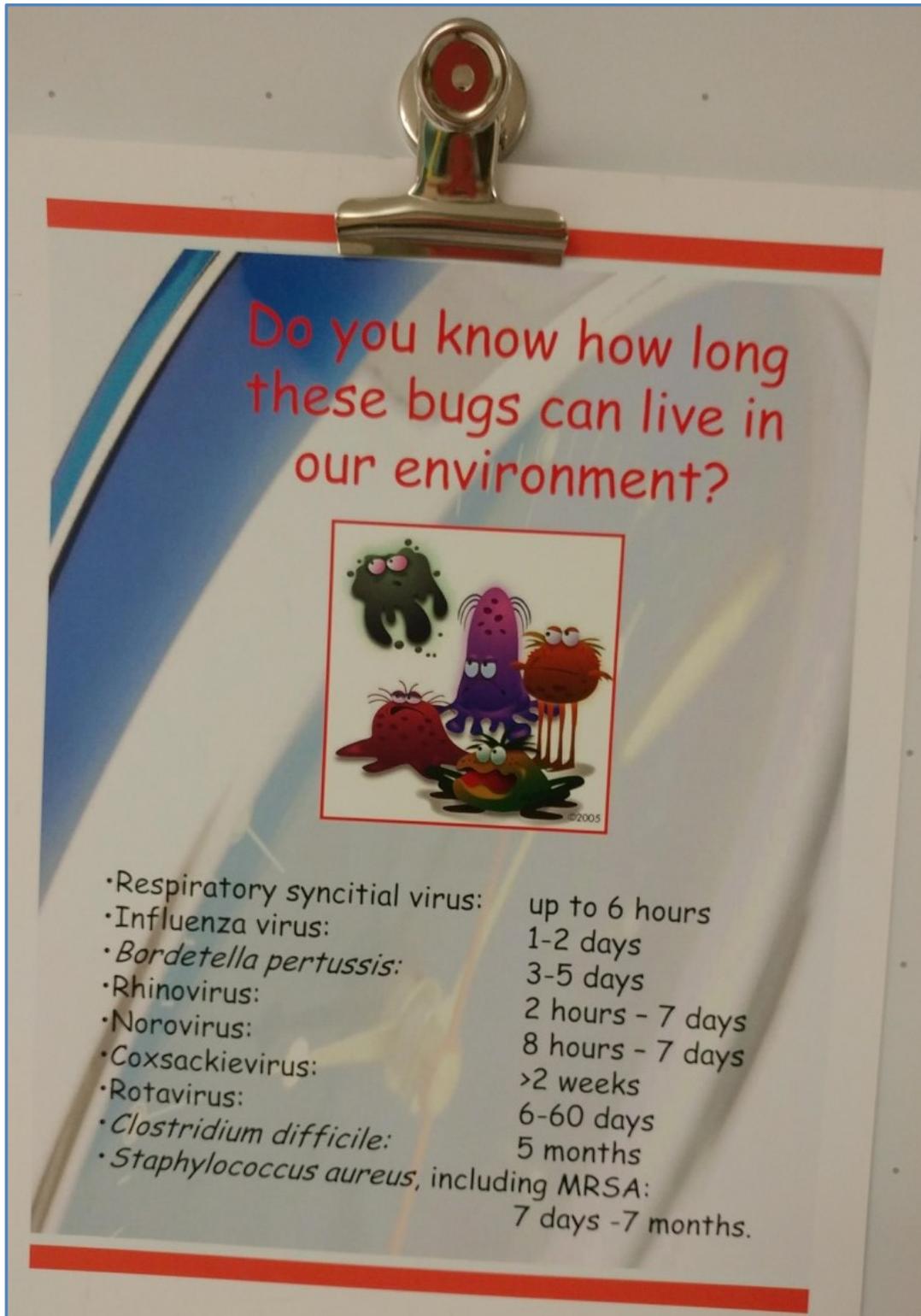
a. Anthropomorphic qualities	When resistant bacteria are given anthropomorphic qualities. E.g. they outsmart us, they are taking revenge, etc.
b. Apocalyptic scenario	When hyperbolic terms are used to describe the consequences of AMR
c. At war	Whenever humans are described as being at war with AMR
d. Community acquired	Whenever it was mentioned that there are community acquired strains of AMR
e. Global crisis	A global threat affecting every nation.
f. Medical mystery	Cases of resistant infections described as medical mysteries with unknown causes
g. National security threat	AMR described as a national security threat
h. Nightmare bacteria	Whenever AMR was described as “nightmare bacteria”
i. Nosocomial condition	AMR described exclusively as a hospital/healthcare setting complication
j. Public health problem	AMR described as affecting the population at large and as a public health issue
k. Silent threat	Whenever AMR was described as a “silent threat”
l. Superbug	Whenever AMR is defined as a "superbug"
m. Tragedy of the commons	Whenever doctors were said to prescribe for the benefit of the patient but disregarding broader consequences
4.Economic impact	References to the economic impact of AMR
a. Global economy	When there was reference to AMR affecting global economy
b. Hospital costs	When reference is made to AMR causing longer hospital stays and higher hospital costs
5.Political action	When concrete political actions were mentioned (meetings, summits, declarations, etc.)

6. Prevention	Preventive measures to avoid the spread of AMR.
a. Antibiotic stewardship	Judicious use of antibiotics
b. Awareness campaigns	Risk communication campaigns to raise public awareness of the threat
c. Clean water	Access to clean water
d. Hygiene	Need for proper hygiene
e. New treatments	Development of new antibiotic treatments
f. Proper cooking	Making sure food is properly cooked
g. Regulating antimicrobial products	Government regulation for use of antimicrobials in general
h. Regulating use in farming	Government regulation for use of antimicrobials in farming
i. Regulating use in humans	Government regulation for use of antimicrobials in humans
j. Research	More research on new antibiotics
k. Responsible use of antibiotics	
l. Shorter hospital stays	Reducing the number of days spent in hospital
m. Surveillance	Surveillance of infections and outbreaks
n. Vaccines	Vaccinating to prevent diseases
7. Publication	Title of the publication
a. Globe and Mail	
b. National Post	
c. New York Times	
d. Ottawa Sun	
e. Toronto Star	
f. Vancouver Sun	
g. Washington Post	
h. Winnipeg Free Press	
8. Reflexivity	When there is criticism of modern medical practices.
a. Alternatives suggested	When a preventive measure or solution that differs from what experts recommend is suggested

b. Challenging expert knowledge	When expert knowledge is directly questioned
c. Change in practices	When it was suggested that a professional or industrial practice needed to be changed
d. Modern medicine	AMR as a consequence of modern medicine
9.Risk	Populations at risk
a. Elderly	Individuals over 65 years of age
b. Everyone	No particular group is identified as being at risk, instead all people are said to be at risk
c. Food workers	People who work in the food industry
d. Hospital patients	Any hospital patient
e. Long-term care patients	Patients with long-term hospital stays specifically.
f. Infants	Children under one year of age
10. Sources	Sources used in media coverage and awareness campaigns
a. Advocates	A source identified as working with an organization working on raising awareness of AMR and/or developing recommendations and/or doing research
b. Doctors	A source identified as a physician
c. Economic agencies	Such as WTO, etc.
d. Health agencies	Such as WHO, CDC, PHAC, etc.
e. Health officials	Spokesperson or other officials for health agencies
f. Politicians	Anyone holding public office
g. Scientific studies	When a scientific study was mentioned
h. Scientists	When scientists were quoted

APPENDIX 4:

Do you know how long these bugs can live in our environment? (Inpatient unit, bulletin board)



Do you know how long these bugs can live in our environment?



•Respiratory syncytial virus: up to 6 hours
•Influenza virus: 1-2 days
•*Bordetella pertussis*: 3-5 days
•Rhinovirus: 2 hours - 7 days
•Norovirus: 8 hours - 7 days
•Coxsackievirus: >2 weeks
•Rotavirus: 6-60 days
•*Clostridium difficile*: 5 months
•*Staphylococcus aureus*, including MRSA: 7 days -7 months.

APPENDIX 5:

Droplet-Contact precautions posted on patient's door (Inpatient unit).

STOP **DROPLET-CONTACT** **GOUTTELETTES-** **CONTACT** **STOP**

Family / Visitors: Speak with nurse before entering room
Famille / Visiteurs: Consultez infirmière avant d'entrer

<p>Gown If contact with patient or patient environment</p>		<p>Blouse Si contact avec le patient ou son environnement</p>
<p>Mask and Eye Protection or Face Shield Wear within 2 metres of patient</p>		<p>Masque et protection oculaire ou écran facial Portez dans un rayon de 2 mètres du patient</p>
<p>Gloves When entering patient room or space</p>		<p>Gants À l'entrée de la chambre ou de l'espace du patient</p>
<p>Patient Transport Patient to wear surgical mask during transport* Staff to wear gown and gloves if risk of contamination *if patient unable to wear mask, staff to wear mask and eye protection</p>		<p>Transport du patient Patient doit porter un masque chirurgical* Personnel doit porter blouse et gants en cas de contamination *si le patient n'est pas en mesure de porter un masque, le personnel doit porter un masque et une protection oculaire.</p>