Clinical Equipment Standardisation and Its Impact on Patient Safety

by

Kimberley Greenwood, B.A.Sc.

A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial fulfillment of the degree of:

Master of Applied Science in Biomedical Engineering

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Your file *Votre référence*
ISBN: 978-0-494-81713-1
Our file *Notre référence*
ISBN: 978-0-494-81713-1

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Clinical Equipment Standardisation and Its Impact on Patient Safety

submitted by

Kimberley Greenwood, B.A.Sc.

in partial fulfillment of the requirements for
the degree of Master of Applied Science in Biomedical Engineering

Chair, Howard Schwartz, Department of Systems and Computer Engineering

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December 2010

Abstract

The research conducted for this thesis has evaluated and proven how specific measurement tools can gauge clinical equipment standardisation, allowing for comparative benchmarking; and that by improving these benchmarks; a reduction in clinical errors will result. Evidence has already been provided by Charles Vincent[1] and many others that conclusively illustrate the link between improved health system results and a reduction in clinician errors.

This study has researched the level of equipment standardisation, the number of clinical user errors and adverse patient events for two common medical devices: syringe pumps and physiological monitors at the Children's Hospital of Eastern Ontario (CHEO), in Ottawa, Ontario, Canada.

Under certain conditions this link was found to be valid but can be impacted by other factors. There was not sufficient data found from this observational study to show that patient adverse events that involved the selected equipment decreased by improved standardisation of these devices.

Acknowledgement

I would like to thank Dr. Monique Frize for her encouragement, support and guidance throughout my research as my thesis advisor. I must also thank Dr. Donald Russell who first encouraged me to enrol in Graduate Studies at Carleton University and Dr. Andy Adler for his mentoring as my academic advisor. I must also recognise all of the staff at the Children's Hospital of Eastern Ontario who helped and advised my research.

I certainly must not forget my family's role in this endeavour, my dear wife Emilia along with my two sons and fellow students Jonathan and William, all of them provided me with support and encouragement throughout this challenge.

Lastly, to my brother Stephen, who has shown me what true resolve and courage is and how strong the human spirit really is in the presence of overwhelming odds during his personal fight with cancer.

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Acronyms

FDA – Food and Drug Administration
EDI – Entropy Diversity Index
CHEO – The Children’s Hospital of Eastern Ontario
MPS – Harvard Medical Practice Study
NPSF – National Patient Safety Foundation
IOM – Institute of Medicine
FMEA – Failure Mode and Effects Analysis
IV – Intravenous Therapy
ECG – Electrocardiograph
CO₂ – Carbon Dioxide
EEG – Electroencephalograph
CRT – Cathode Ray Tube
LCD – Liquid Crystal Display
USB – Universal Serial Bus
AE – Adverse Event
Q1 - 1st quarter fiscal year
Q2 - 2nd quarter fiscal year
Q3 - 3rd quarter fiscal year
Q4 – 4th quarter fiscal year
HIS –Hospital Information System

Chapter 1: Introduction

Development of medical devices in the last half century underpinned advances in healthcare and enabled lower mortality rates and lengthened life spans. The sophistication and the integration of these medical devices, however, placed new stresses on clinicians, especially for those who were not receptive to new technology. Creators of medical devices failed to realize that their user-interfaces, while seemingly simple and straightforward, were actually problematic and complex. Some of this confusion is derived from mixing different makes and models of devices within an environment that has slight differences in operational characteristics. A by-product of the confusion can be an increase in medical errors.

Since publishing the book “To Err is Human: Building a Safer Health System” [2] in 2000, the patient safety movement has grown at a rapid rate. This fact is hardly surprising after reviewing the stark statistics. Approximately one in six Canadians experience preventable adverse medical events annually with about 2.8 percent or 117,600 of these individuals incurring an injury per year [3]. The adverse event factor that attracts both public and professional interest is medication errors and as a result of this publicity, infusion pumps and their medication safety software have received the majority of the interest in the research community in the last few years over other key common clinical equipment such as ventilators and physiological monitors, which also account for a substantial number of fatalities.

The FDA recently released data which states that an average of 11,200 adverse events and 100 deaths occur in the United States from infusion devices alone, based on annual data between 2004 and 2009[4]. One French study published in 2001 found that infusion pumps accounted for thirty percent and physiological monitors accounted for twelve percent of adverse event deaths per year in critical care and surgical patients.[5] Closer to home, the Canadian Adverse Events Study of 2004[6] stated that somewhere between 9,250 and 23,550 patient deaths occurred per year in Canada from preventable adverse events in surgical and critical care environments.

A medical adverse event has been defined as an unintended injury caused by medical management rather than the disease process. Medical management includes the failure to treat, diagnose or provision of an incorrect treatment or diagnosis [7]. The causation of an adverse event is measured on a six point scale, where a value of one on the scale denotes no evidence of an event, through to six which provides certain evidence of causation of an adverse event. Normally, only adverse events with a scoring of four or more are documented in adverse event reports [8]. The outcome of the adverse event may or may not inflict injury on the patient and is ranked on a categorical scale from negligible to severe in impact.

The rate of adverse events identified in recent studies ranges in the neighbourhood of eight to twelve percent per patient stay in hospital in the industrialised nations [9]. About seventy percent of all cases of adverse events can be classified as minor in nature, producing either no injury or negative long term impact to the patient [10]. When presented with these two facts, one would then conclude this situation to be clear cut and we need to only address the smaller percentage of adverse events incidents that actually

cause harm. Not to discount the importance of the harmful adverse events, for they certainly need to be addressed, the other minor adverse events also have a substantial impact the healthcare system as well. Knowing that the most recently reported cost of healthcare in Canada was in the year 2008 and totalled 172 billion dollars [11], it can be estimated that these minor adverse events cost the Canadian healthcare system about five billion dollars in extended hospital stays and associated other costs, whereas the major adverse events which came close to the two billion dollar mark [12].

To respond to this challenge, clinical engineers have already identified issues which they can strive to resolve and consequentially make their contribution in reducing adverse events. Wilson et al. [13] illustrated that half of their evaluated incidents in the Australian Health Care Study found to have caused the adverse events were a result of information processing errors or commonly referred to today as cognitive errors. Clinical Engineering Departments must now re-evaluate their priorities from traditional issues, such as electrical safety, and focus more attention more broadly on patient safety. [14] Key topics such as equipment standardisation and human factors engineering need more attention in today's healthcare setting.

A number of recent publications have focused on human factors engineering in healthcare and they all identify the need for equipment standardisation, especially when it relates to the commonly used devices such as infusion pumps or physiological monitors, to reduce the likelihood of an increase in patient adverse events. [15, 16, 17]. Using different brands or models, amongst the already plentiful volume of clinical equipment within a healthcare facility, has shown to increase the likelihood of medical error. James Reason has theorised that humans try to reduce their mental workload by remaining in

rule-based behaviour as much as possible and this is the primary reason for the occurrence of patient adverse events [18]. If a vital sign alarm is sounded, what would be the first reaction of the clinician: To reset the alarm or check the patient's condition? A lot depends upon the individuals, their training and the working environment at that specific point in time.

Rule-based behaviour is the intermediate of the three levels of human behaviour: skill, rule, and knowledge; each requires gradually more cognitive resources. [19] Skill-based behaviour requires minimal mental effort and is typically of long-duration and for routine type tasks. Rule-based behaviour uses skills acquired through training or readily available instruction to perform scheduled tasks which involve moderate cognitive skills. Individuals are tested to their limits only when unforeseen events occur, regardless of mental capacity and training. At this time, knowledge-based skills require critical thinking to solve complex or uncommon problems.

When equipment tends to be too diverse within a specific clinical setting, the individual clinician must use higher levels of cognitive or knowledge-based resources. The fallout of this situation is an above average level of cognitive fatigue for the clinicians working in this specific setting. This fact does not conclusively prove to cause more adverse events, but when this factor is coupled with more than a full patient load and inexperienced staff, the result could indeed end in more adverse events and or patient injuries. Since control over the patient census and retaining a high number of clinical staff are both daunting tasks for the clinical manager, there are only two options available that could reduce the likelihood of adverse events: Development of an effective and

proactive medical equipment standardisation; and implementation of effective decision-support systems that can direct the equipment user out of a rule-based skill loop.

Clinical decision-support systems (CDSS) are currently in an early stage of development. CDSS are knowledge based systems that base treatment or diagnosis recommendations through inconsistencies in the available patient data. It will be at least another decade before the impact of decision-support systems will be felt by industrialised countries' healthcare systems. To make an immediate impact on minimising patient adverse events, medical equipment standardisation and routine staff training on common medical devices needs to be studied as an immediate method for reducing adverse events.

If equipment standardisation is to be prioritized for action, there will be a need to measure the success of the endeavour. A small department with minimal equipment needs only a basic inventory to complete this exercise. This approach fails when a healthcare facility has an extensive array of clinical equipment, numbering in the thousands. Recently, this problem confronted a number of English facilities; for instance, by 2005, the Oxford Radcliffe Hospital System used as many as thirty four different models of infusion pumps. [20] This example was likely the result of purchases made gradually over a number of years in a health system that assigned acquisitions to the lowest bidder. In this scenario, equipment standardisation was never a priority. The likelihood of clinical staff becoming comfortable and competent with this large and diverse group of infusion devices is low.

The Oxford Radcliffe hospital system, however, attempted to rectify this problem. Two members of Oxford Radcliff Medical Physics and Clinical Engineering group, G.W.

Brindle and C.W. Gibson, experimented with the use of the diversity indices to quantify the vast assortment of infusion pumps. They found that the use of the Shannon Entropy Diversity Index (EDI) produced numerical values, which measured the status of standardisation over time. Their studies validated efforts within the Oxford Radcliffe hospital system to improve infusion pump standardisation by finding a reliable benchmarking indicator to measure standardisation improvement. [21] Unfortunately, since this study's publication in 2007, no others have contributed further research in this area. No researcher has attempted to link these indices to other patient indicators such as patient adverse event reports or equipment maintenance history data.

The Standards of Practice for Clinical Engineering in Canada [22], last updated in 2007, fails to refer specifically to management of these large fleets of common medical devices, and the importance of standardisation, although mention is clearly made about the need for involvement of Clinical Engineering in the management of the acquisition of clinical equipment. In the United States, the accrediting body for healthcare organisations, the Joint Commission on Accreditation of Healthcare Organisations (JCAHO), requires all hospitals to have a Medical Equipment Management Plan as part of their Environment of Care Standard of 2009. This standard states that all healthcare centres must have this plan in place “that promotes the safe use and effective use of medical equipment” and “should cover processes for the selection and acquisition of medical equipment”. [23] This standard, however, fails to specifically tackle the issue of equipment standardisation, but it encourages the use of effective management techniques to enable the availability of the appropriate medical devices when required for patient care.

This study has validated a potential standardisation measurement tool's ability to measure the level of standardisation within two groups of like clinical devices through an observational study conducted over a five year period at The Children's Hospital of Eastern Ontario in Ottawa, Ontario, Canada. Once this tool was identified and validated, it was used to measure the level of standardisation of two distinctly different clinical devices, the physiological monitors and the syringe pumps. The resulting device standardisation measurements over time were then compared against clinical user error statistics and the adverse event reports over a five year period to identify if a relationship exists between equipment standardisation and either clinical user errors or adverse events.

Chapter 2 provides an account of the patient safety movement and illustrates the link between patient safety and both human factors engineering and clinical equipment standardisation. Next, a promising method to evaluate the degree of standardisation or diversity of clinical equipment within a defined sample size is discussed. This index, commonly known the Shannon Entropy Diversity Index (EDI), [24] has been successfully implemented in communication theory, ecological studies, and genetics to measure commonality for a specific entity within a defined sample. Finally, the second chapter concludes with a review of the history of infusion devices and physiological monitors, and introduces the reader to the devices' technological development, and to current trends.

Chapter 3 details data collection methodology of this study from the CHEO clinical equipment management and patient incident tracking systems. The time periods for which data analysis was conducted is identified along with criteria for the inclusion and exclusion of data into this study.

Chapter 4 presents and explains the results and identifies reproducible trends in the EDI versus the equipment user problems and the patient adverse event data collected.

Chapter 5 provides a conclusion drawn from the summarised results. It also discusses whether the problem statement, which asks if there is a possible link between patient adverse event indicators and the concept that standardisation improves patient safety by reducing human factors issues in specific medical devices, was validated or disproved. Lastly the contributions to knowledge developed from this study are detailed. This chapter ends with potential future research work that could result as an outcome from the observations and conclusions drawn from this study.

This thesis reports on the impact of standardisation of more commonly used medical devices in today's healthcare setting and will answer the question "Will clinician operator error be reduced, and will patient adverse events be minimised by limiting the diversity of commonly used clinical equipment in a healthcare setting?"

This tool will allow the clinical engineer to monitor progress in equipment standardisation on key clinical devices in a healthcare facility. This work reduces the potential of patient risk by decreasing the chance of user errors occurring by minimising the number of like devices in active service in a facility at any given time. This approach reduces the chance of cognitive errors from occurring by the clinical user. By reducing the number of different devices in service at any given time, one also reduces ongoing operational and maintenance costs in a facility by reducing inventory and training costs. This tool will also provide a method for justifying further capital funding for clinical equipment if equipment replacement plans are not meeting planned objectives.

Chapter 2: Background

The patient safety movement has impacted all involved in healthcare in the last decade. One of this movement's mandates is to examine medical product design and use as well as how these products affect patients. A detailed look at the history of the patient movement and its achievements is outlined.

Next, the two devices that are investigated in this study, the infusion pump and the physiological monitor, are reviewed with a history of the technical developments of the two devices that bring them to their present state. Finally, background on the EDI is reviewed along with a discussion of its application to device standardisation.

2.1 Patient Safety

Every worker in the medical field has been made aware of the importance of patient safety but few really understand their role in keeping patients free from accidental injury. Many problems are systematic problems lying dormant, waiting to happen at some time in the future. The early work of Schimmel with "The hazards of hospitalization"[25] in 1964 estimated that serious adverse accidents occurred in about 5% of the patient admissions, but these findings were kept within the medical community and did not reach the scrutiny of public opinion. It was not until the Harvard Medical Practice Study (MPS) in 1991 [26] that the public at large became aware of the number of preventable adverse events in healthcare. The MPS study used data from New York State

in 1984 and concluded 3.7 % of hospital patients suffered an adverse event and 14 % of these events resulted in fatalities.

From this point in time and throughout that decade, concern continued to escalate around safety in healthcare. Further study found that these adverse events resulted from errors. Healthcare quickly found parallels in the aviation and nuclear power industries and found applicability with the lessons learned from these two groups. [27] Research focused on cognitive psychology and human factors engineering to evaluate and redesign systems to reduce human errors. This research led to the founding of the National Patient Safety Foundation (NPSF) in 1996. This organisation's mandate was to lead safety research through a non-punitive reporting system in the United States. In spite of this ongoing attention, many American hospitals still did not give patient safety attention.

This situation changed with the release of the U.S. National Academy of Sciences' Institute of Medicine (IOM) report, "To Err is Human" [28] in late 1999. This study took the data from the earlier Harvard MPS work and other more recent studies and concluded from this data that somewhere between 44,000 and 98,000 unnecessary deaths occurred annually in the United States from error, and that the majority of the fatalities were preventable. The media caught on to this story and it remained in the public eye for some time, forcing action by politicians and the healthcare leadership. As a result of all of this attention, federal funding was provided specifically for patient safety research and all stakeholders throughout the United States realised action was needed to change practices to improve healthcare safety. The National Quality Forum, a public-private partnership, was established to design and implement standards for quality care and the mandatory reporting of errors. The accrediting body for U.S. hospitals, the JCAHO, then required all

hospitals to implement their evidence-based safe practices known as the National Patient Safety Goals.

Every U.S. hospital now has a patient safety program in place and the results have been clear: in the two year period from July 2004 to June 2006, 3,100 hospitals joined the “100,000” Lives program [29] which resulted in a drop in patient mortality of 122,000 patients, mostly due to newly developed patient safety practices. Great Britain followed a parallel course with the release of “Supporting Doctors, Protecting Patients” by the Department of Health in 1999 [30] and the founding of the National Patient Safety Agency in 2001.

Many countries now follow the U.S. and Britons to develop patient safety programs for their health systems. Canada was delayed in reacting on patient safety; the first clear action was the establishment of a committee on Patient Safety by the Royal College of Physicians and Surgeons in 2001, but the government of Canada did not take any action on this issue until the Patient Safety Institute was established by Health Canada in 2003. Since that time, considerable progress has been made in Canada with the collaboration of the federal and provincial health authorities and the arms-length accreditation body for Canadian health facilities, Accreditation Canada. It took sometime for hospital boards to get past the hurdle of full disclosure by Canadian hospitals. An initiative such as the Ontario Ministry of Health and Long Term Care Patient Safety Indicator program was launched in 2008 and has now expanded to nine indicators in 2010. These patient safety indicators are presently focused on various infection rates, hand hygiene and patient mortality rates. Participation in the indicator program is mandatory for all Ontario hospitals and they must regularly report their results on these

benchmarks publicly. This move has forced all healthcare facilities in this province to prioritize patient safety initiatives. Recently, it has been estimated that about 10% of hospitalised patients are presently involved in a treatment induced injury globally [31]; this is an improvement over prior performance, but leaves more room for improvement.

Equipment standardisation has been identified [32] as an important step in improving safety, but why is this so? The human thought process tends to be error prone and imperfect. This is why all patient safety literature suggests that a systems approach must be taken to minimise the likelihood of patient harm by reducing the reliance on short term memory. All equipment should have specific procedures developed to clearly outline operation and use. If equipment is standardised, the operating procedures may be straightforward, thereby reducing the likelihood of error.

James Reason's "Swiss cheese model" [33] is a good approach to visualising system errors. It simply states that many holes in a single slice do not necessarily cause an adverse system outcome. Only when the slices are put together and a hole exists through the entire block does an error trajectory exist.

Reason [34] also coined the terms 'active error' and 'latent error' to describe the two types of human error. Active errors are acts that occur at the human-device interface; they are normally short lived and typically relate to lapses or mistakes by an individual. Latent errors are system errors that can also cause harm to the patient. Latent errors are errors that lie dormant within a system waiting to happen. There is tendency to blame the individual for these errors, but in fact they are system-design errors which were not identified by the device or process design team. Donald Norman identifies latent errors well in the statement: "If an error is possible someone will make it!" [35]

Highly effective organisations proactively look for these potential trouble spots and work to correct them before they cause harm. These potential problems could be a single step in a complex procedure or a stand-alone device with an unintentionally designed flaw. A good example of a potential latent error would be the kilograms or pounds selector switch on a digital weight scale. The clinician may take a weight reading using this scale and use the weight measurement to calculate the correct dosage for a specific drug. If the clinician confuses the measurement standard, it would mean the drug dosage calculation would be too high or too low by a factor of 2.2. This is not such a hard situation to imagine when one keeps in mind that anyone under forty in Canada may not appreciate the significance of the error since they were trained only in the metric system. The systems approach would mitigate this type of potential problem from occurring. The systems approach focuses on the environment people work in and builds defences to eliminate or reduce the adverse effects of the fault. To correct and prevent this type of problem from occurring again, one must, in the future, only purchase new metric weight measuring scales. Existing weight scales that had the ability to switch from pounds to kilograms should either be modified to eliminate the pounds function or be replaced as soon as possible.

The scale scenario illustrates why all new equipment to be purchased by a healthcare facility should receive a human factors review prior to approval being given to purchase a specific device. Price should not be the key determinant in any clinical device selection process. Immediate savings sometimes create larger problems down the road. Failure Mode Error Analysis (FMEA) should be conducted on all newly adopted clinical

procedures before they are put into general use; similarly, this should be done for any newly identified sources of error within a healthcare facility.

Lack of equipment standardisation can be clearly categorised as a latent error. Having several different devices performing the same function complicates operator procedures and increases the chance of human error. This is why equipment standardisation was implemented successfully in the airline industry. Unfortunately, the measurement of device commonality or diversity is not necessarily clear, especially when confronted with a large inventory in several different locations, in a large metropolitan teaching hospital system.

2.2 Infusion Devices

Intravenous therapy started with gravity delivery of hydration fluids, medication, and nutritional and blood products from a reservoir, initially made from glass and, later made from plastic. Rubber, then plastic tubing carried the contents of the reservoir into the circulation system by means of a catheter. In 1956, the Harvard Corporation developed the syringe pump to administer drugs in a controlled manner by driving the fluid from the syringe. The syringe pump was initially limited to critical care for adult and paediatric patients.

In 1969, the IVAC Corporation developed the first infusion controller that counted the drops accumulated in the intravenous (IV) drip chamber and regulated the preset drop rate by pinching the tubing. [36] This method worked better with low viscosity fluids, than with those with a thick consistency such as glucose solutions or blood products. A year later, IVAC redesigned the IV controller and added a peristaltic

pump that massaged the IV tubing which, in turn, pushed the fluid in the tubing into the patient's circulatory system. Further refinements came with the development of the volumetric infusion pump in 1974 by IMED which improved the accuracy of the fluid delivery to approximately 2%; it also was the first pump that controlled occlusion pressure; limiting occlusion pressure was a serious safety concern with infusion pump technology. Early peristaltic infusion pumps were capable of generating high pressure in IV lines that would either injure the patient or burst the IV line. Another safety concern involving the infusion pump at that time was IV flow runaway. This phenomenon occurred when IV lines are inadvertently left wide open. A free flowing IV line causes the patient to receive either a drug overdose or a fluid overload. Infusion delivery calculation errors result from mathematical calculation errors between the set drop rate of the device and the drops per millilitre size of the IV set used for the therapy administration. Finally, the last major error related to the insertion of the IV tubing in the wrong direction in the infusion drive mechanism. This action would draw blood out instead of pushing fluid into the patient. Infusion pump manufacturers introduced safety mechanisms in the 1970s and 1980s to counter these aforementioned problems.

Throughout the 1980s and 1990s, infusion device technology improved with the addition of several safeguards to reduce patient injury. With the introduction of these technologies, amongst others, healthcare professionals saw an increase in the survival of acutely ill patients and longer life spans in general. One resultant from this positive outcome was an older patient population requiring increasingly complex care. By 2000, critical care patients commonly had five to ten infusion pumps attached. Rare cases required more pumps. Central IV lines connected the multiple number of IV pumps to the

patients. Many safety problems arose from the proliferation of this technology. Examples include: the chemical reaction that results from the mixing of multiple drugs in the central line; human errors involving the IV line and infusion flow rates or the enteral feeding line and the central line; and non-invasive blood pressure hose connection to central lines.

Infusion pump manufacturers realised that these new concerns had to be addressed. Some chose to modify existing designs, while others embraced the human factors and patient safety movements. The latter launched massive redesign projects to develop the “smart pump”. Smart pumps have an intuitively designed human interface with modifiable drug libraries incorporated within their design. The drug library or Drug Error Reduction System (DERS) includes comprehensive menus with safety limit parameters that do not allow the user to easily override these settings. All transactions, system warnings, and alarms recorded within the memory of the pump can be extracted at a later time for review and analysis using drug library software. Improvements to this technology recently introduced include wireless technology and an HL7 interface to the user’s electronic health records (EHR) where they exist.

These improvements provide further flexibility allowing immediate and simultaneous library and software updates to be applied, transmission of selected datasets directly to the patient’s file in the EHR, and device tracking. While these improvements made the infusion pump safer to use, Hankins states “Making the technology available will not be sufficient to ensure its successful use” [37]. A potential for human error lingers through the potential to override safety features by clinical staff and from library programming errors by pharmacy staff. To reduce the frequency of these problems, a

well-designed review and quality assurance process is necessary. Implementing DERS is one step in developing an optimally safe drug, fluid, blood products, and an enteral feeding delivery system. Recent research [38, 39] reveals that DERS systems only provide marginal improvements in safety: approximately a 4% reduction in drug delivery errors. Theorists predict that only when infusion devices are fully interfaced with electronic health records and with computerised order entry systems, the pharmacy information system, and barcoded medication administration, will IV safety be optimised. [40] Unfortunately, the majority of health facilities in the industrialised world are not close to implementing this level of technology at this point in time, let alone in the rest of the world. It will still take a few years before North America implements these options and lead to the benefits of an IV safety system described above.

2.3 Physiological Monitors

Physiological monitors measure various parameters either by direct measurement of an electrical signal or by an electrical or electro-mechanical transducer. Today's monitors can measure a number of parameters that include ECG, pulse rate, respiration, both invasive and non-invasive blood pressure, temperature, noninvasive measurement of the blood oxygen saturation, oxygen gas concentration, transcutaneous blood CO₂ concentration, expiratory gas CO₂ concentration, cardiac output, and EEG. There are several sparsely used parameters such as bispectral index and co-oximetry which are available, but their use varies from one organisation to another.

The origin of the bedside physiological monitor dates back to the 1950s, around the same time that intensive care units were created in hospitals to better manage the care of patients with complex disorders.[41] Early monitors were developed by companies such as Sanborn, Cambridge Instrument, Electrodyne, Dallons, and Levinthal. These monitors were built around oscilloscopes called cardioscopes. These early devices did not have heart rate measurement or alarm capabilities, and with the relatively limited persistence on the cathode ray tube screen, the waveform would fade before it had travelled across its three to five inch screen. If ECG waveform interpretation had to be done, either a thermal printer was attached to the monitor or the patient was linked to an electrocardiograph. There were few cardiac monitors in 1950-era intensive care; they were often placed on a resuscitation cart with a cardiac pacing unit and a defibrillator. Measuring the heart rate from this device involved a calculation of the beat-to-beat distance divided by the chart recorder's speed until the development of the cardiometers in the 1960s. During the late 1950s and the 1960s, the number of physiological parameters expanded to include invasive blood pressure, temperature, cardiac output along with oxygen and carbon dioxide concentration in the blood. As the 1960s progressed, the size of the cathode ray tube (CRT) display doubled in size and the feature of waveform persistence was incorporated on to the display creating the effect of memory for the physiological signal through the entire sweep cycle of the display. [42] The introduction of central stations allowed the monitoring of all patients in a clinical unit at the bedside and at the nursing station. New monitors at that time incorporated physiological alarm systems.

The 1970s saw monitoring equipment become more commonplace in most hospitals, with the rapid growth of digital electronics in most hospitals. Parameters monitored by this equipment expanded to include non-invasive blood pressure, non-invasive blood oxygen saturation, and transcutaneous measurement of the partial arterial pressure of carbon dioxide and oxygen in the blood. Datascope and Tektronix manufactured the first portable transport monitors. This decade saw further development of the monitors as a result of microprocessors reaching maturity; it was also due to emergence of commercially marketed electronic health records such as the COSTAR system [43]

By the 1980s, physiological monitors had colour displays capable of displaying two to six waveforms. Bedside monitors were now able to analyse cardiac arrhythmias. Remote viewing of patient data from other bedsides was also possible. The introduction of membrane switches provided less chance of infection and thereby allowed data entry away from the central station. Later in the same decade, Hewlett Packard introduced the Merlin series of monitors which was the first “hot swappable” modular system available on the market. This distinct feature allowed parameter modules to be moved as required between bedsides. Many of these modules can still be found in service today, nearly twenty years later, as each successive generation of this monitor family has retained compatibility with previous models. [44]

The major monitoring manufacturers developed a new design strategy in the 1990s. The LCD display replaced the bulky CRT; the LCD reduced the overall weight of and power consumption for the device. As a result, specific bedside, critical care, and transport monitors were no longer necessary since the monitor could be configured as

necessary. Manufacturers had begun to develop internal battery packs that were lightweight, compact and much more efficient. Therefore, the monitor could remain with patients throughout their entire stay. Interfacing other medical devices to the monitors was now possible; they could also display data. [45]

By the 21st century, physiological monitors revolved around the personal computer and were connected to the internet. This online capability allowed the clinician to remotely view in real time the waveforms and the trends. Ten years later, monitors became wireless, and as this technology developed, it could be used to monitor vital signs remotely. Monitor displays now have the resolution to display ultrasound and radiographic images at the bedside. Additional parameters and functions can be added to the monitor through a USB connector. Additional parameters will be added in the future by this method and will likely follow the current trend of adding non-invasive sensing technologies. [46]

The once minimal three or four parameter bedside physiological monitor has now developed into a viewing system that allows the clinician to see laboratory and diagnostic test results along with patient documentation. The device continues to simultaneously monitor, document several physiological parameters, and record the function of several external devices such as ventilators or infusion pumps. Real-time data acquisition and analysis of physiological trends is now a commonplace function. A simple stand-alone medical device has transformed into a single component within a complex web of functions to support care of the patient. One concern this complex system creates is the increased probability of error in patient care since all of these functions have become interwoven and are complex.

2.4 Entropy Diversity Index (EDI)

The standardisation of commonly used clinical equipment throughout a healthcare organisation simplifies clinician and nurse training, eases servicing of the devices by maintenance staff, and reduces overhead costs by minimising consumable inventory size. To date there is limited data available to illustrate that standardisation of clinical equipment improves patient safety by reducing medical errors, using conclusive numerical data. In many cases, analysis is conducted in a subjective manner and it is difficult to cross-correlate this information in a manner that will give any consistent findings.

Claude Shannon investigated the statistical repetitiveness of characters within a text and developed a method of determining a numerical measure of the uncertainty of the repetitiveness of a random variable or entropy in his research work around information communication theory. This concept was successfully applied to measure species diversity within a defined area by E.H. Simpson in 1949. [47] A method originally used to measure biodiversity in ecological environments, EDI [48] can also be applied to measure equipment diversity within an entity. This was successfully tested by Brindle and Gibson in 2007 [49] to evaluate infusion device diversity or standardisation within a multi-site hospital system known as the Oxford Radcliffe Hospitals in the United Kingdom. Steady efforts from the year 2000 to standardise their inventory of infusion pumps within the Oxford hospital system has seen a drop in EDI from 2.6 to 1.9 by the year 2005. This approach of measuring equipment standardisation provides a convenient tool that can work consistently with either a small or large diverse inventories providing valid benchmarks. Entropy, stated simply, can be defined as the measurement of the

diversity or disorder of a given sample. The EDI is a statistic used to compare several different samplings of the same product in different locations. The EDI can be calculated by:

$$E = - \sum p_i \ln (p_i) \quad (2.1)$$

$$\text{and } p_i = n_i / (\sum n_i) \quad (2.2)$$

Where p_i is the fraction of the individuals belonging to the i -th species and n_i are the individuals within the i -th sample. In the case of equipment and its diversity at a facility or group of facilities, the formula would translate to:

$$p_i = n_i / (\sum n_i) = \frac{\text{Number of units of a specific model}}{\text{Total number of specific devices}} \quad (2.3)$$

$$E_i = p_i \ln (p_i) \quad (2.1)$$

$$E = \sum (E_1 + E_2 + E_3 + \dots + E_i) \quad (2.4)$$

There are several other types of entropy and diversity measurement tools such as the Simpson, Berger-Parker, the Gini and the Renyi indices but to date the Shannon EDI has been the method of choice in the fields of communication theory, ecology and genetics research. Table 2.1 illustrates the various major indices and their key value.

Index	Purpose
Simpson [50]	Measure evenness of diversity.
Shannon [51]	Measures richness or abundance of diversity.
Berger – Parker [52]	Assesses the dominance of one type within a community.
Gini [53]	Measures equality within a sample. 0= Perfect Equality 1= Perfect Inequality
Renyi Entropy [54]	Quantifies only <u>entropy</u> not diversity. It can measure only the number of different types of make and model of device amongst a sample.

Table 2.1 The Major Entropy and Diversity Measurement Tools

A key goal of this work is to validate a tool that will index the measurement of the entropy and the diversity of a known sample of like medical devices or in other words index the number of different makes and models and the inventory dominance of each make and model the within a defined population.

The Shannon method indexes the level of diversity and the size of each make and model type amongst a defined sample population. The Simpson method indexes the spread or range of diversity within a population. Therefore, the Simpson method could only evaluate the spread of make and model types within a defined group. The Berger - Parker method indexes the dominance of one group within a population so this measurement tool could identify which make and model type dominates a specific population. The Gini method indexes the equality of the groups within a population hence it could only identify when a specific make and model of device is not or is the only

make and model present within a specific sample. The Renyi method measures the variation in the number of different types of makes and models amongst a defined population. The Renyi Index does not factor the dominance of the different types within a specified sample. Since this study is attempting to index both the diversity and the concentration of makes and models of medical devices within a defined inventory, all but the Shannon method must be ruled out as an effective means of measuring the level of disorder or entropy and the diversity of makes and models of devices amongst a defined inventory.

The ability to quantify the diversity of a specific device numerically allows comparison of this factor against other indicators such as documented user problems and patient incident reports. This key indicator can then be used to prove or disprove a link between equipment standardisation and patient safety.

The extracted inventory census information, by year, and by defined area will be used to calculate the EDI as illustrated by Brindle and Gibson [55]. Calculating the EDI for a defined sample is a straightforward exercise. First the total number of like devices within the sample is calculated. An example of a device with the same function is the syringe pumps. The sample could be a single department, an entire facility or several facilities on different sites. Next, the sum of each specific manufacturer and model of each like device is determined. Once these numbers are available, they are divided by the total number of like devices to find the ratio of each different make and model of device to the grand total of devices within the study. The number of ratios will correspond to the number of different manufacturers and models of the like devices within the sample.

Finally, to calculate the Entropy Diversity Index, the negative sum of all ratios, multiplied by the natural logarithm of the same ratio, is done.

If the first column of Figure A3.1 is used as an example, then we will have six different types of devices and a total of 134 devices, then:

$$P1 = 6/134 = 0.0448$$

$$P2 = 29/134 = 0.2164$$

$$P3 = 7/134 = 0.0522$$

$$P4 = 35/134 = 0.2612$$

$$P5 = 10/134 = 0.0746$$

$$P6 = 47/134 = 0.3507$$

Then:

$$E = -[[0.0448 \ln (0.0448)] + [0.2164 \ln (0.2164)] + [0.0522 \ln (0.0522)] + [0.2612 \ln (0.2612)] + [0.0746 \ln (0.0746)] + [0.3507 \ln (0.3507)]] = 1.53$$

Chapter 3: Methodology

Before extensive data collection could be made on this study, an Ethics Committee approval of the use of patient medical record information from the CHEO adverse event reporting system was obtained from both CHEO and Carleton University. A patient adverse event report is the documentation completed in a standardised report format to document a suspected or actual patient incident where harm has or nearly has been caused to a patient. The specifics of the particular incident are documented along with actions to correct the negative outcomes of the incident and action plans to permanently prevent a reoccurrence of the incident are all usually documented within a incident report.

While all CHEO patient adverse event reports were reviewed in detail within the prescribed five year time span; no specific patient identifiers such as name, patient number, or date of birth were recorded. This study's interest is in the precise details of the equipment involved, the outcome, and the determined root causes of each event, if available.

Information pertaining to the medical equipment inventory and maintenance history of both the syringe pumps and physiological monitors used at CHEO over the determined period of data collection are confidential corporate records. Permission for the use and publication of this data within the boundary of this study has been obtained from the Executive Vice President and Chief Financial Officer of the Children's Hospital of Eastern Ontario, Mr. Gerard Bisson.

After initial review, the collected data from both information systems come from a sixty-five month period between April 1, 2005 and August 31, 2010. Collecting at least five years of data establishes reliability and can identify any reproducible trends from the datasets. Normally, information is documented in the Canadian healthcare system by fiscal year, from April 1st to March 31st of the next calendar year; and it was decided it would be best to collect the research information, by fiscal year over five years since all departments at CHEO compile their statistics based on hospital fiscal year. This approach worked well in the case of physiological monitors but taking this direction with the syringe pumps could result in inconclusive results because the syringe pump fleet was replaced in the fiscal year of 2009/10. Therefore, an additional period of five months of data was collected in the hope that this extra data would give more definitive results in the case of the syringe pumps.

A five step course of action was conducted in the data collection process. It is important to note that all these components were undertaken in concert to enable the most efficient use of time. The above mentioned steps included:

- I. The CHEO physiological monitor and syringe pump inventory was reviewed to collect data categorised by year, make, model, serial number, and patient unit over a five year period from April 1, 2005 to August 31, 2010 from the CHEO Biomedical Engineering ServicePlus enterprise management system. Equipment that was either added or removed from the operational equipment inventory had its change in operational status documented on a quarterly incremental basis. The dates where each device was placed into active service and if applicable, the date of decommissioning of each device, were

documented. These dates will allow the determination of the size of each different population of make and model of the specific device type within a specific time period. These numbers are used to calculate the EDI for each specified time period.

- II. As the inventory list was being completed, a detailed review of the equipment service histories was conducted, identifying and documenting each instance of a user problem and each equipment failure by device make, model, and year, for the period from April 1, 2005 to August 30, 2010 from the CHEO Biomedical Engineering ServicePlus system. Data identified as potential instances for the inclusion of suspected user problems was screened by reviewing the user reported problem description and the comments made by the technologist who performed the operational assessment; it was determined if the equipment exhibited the reported user-problem or not. Usually, when the technical evaluation of the device is being performed, if the problem is not reproducible or it is obvious by comments made in the user description that the problem is connected to operator error, the technologist comments accordingly in the work completed section of the work order. A detailed review of all work orders in the entire history for each of the devices accepted into this study had to be carried out, as task code identifiers were not implemented when the ServicePlus system was set-up in 1999. Task codes provide an alphanumerical code that represents a specific task and are usually documented in a specific field within a work order. Adding task codes provides a quick and effective evaluation of work service histories on

equipment. This feature was not implemented at that time because it would have added too much time to the entry of each work order, thereby pushing documentation overheads to an unacceptable level.

If the technologist comments documented on each work order are not clearly identifiable as a user problem, the specific event was not accepted as a valid user problem. The occurrence of user problems is documented by increasing the number in the year column in which the event occurred by one each time a problem is encountered in the specific device summary spreadsheet. This spreadsheet is illustrated in Appendix 1. The sixth year of data is actually the partial year of data from April 1 to August 31, 2010. The first operational date of service and the date of device decommissioning are also recorded for each device. This information is recorded to allow for the EDI calculations by fiscal year once the inventory data is compiled.

Once the data collection was completed in this phase, the inventory statistics were summarized by device model; department and user problems could then be summarized by department and year in a separate spreadsheet. Once this spreadsheet was completed, it was expanded to add the EDI calculations by department and year. Aggregated total EDI calculations were added to the spreadsheet at this time. Taking this approach provides an excellent decision-support tool that aided in the decision making process on how to best determine which way to proceed with this EDI data, either focusing on individual departments and years, or on the total inventory EDI calculations by year.

III. In the next phase, a review of the incident report database was done manually and electronically, as the CHEO Risk Management electronic adverse events database was phased-in one department at a time during fiscal year 2007. All records prior to this date were kept in hardcopy format only and each report predating the electronic system required a manual review and the reports had to be vetted for inclusion into this study. This manual review was conducted for the years 2005/6, 2006/7 and partially for fiscal year 2007/8, as some of the data is retained in the manual record system and the remainder of the records for this year were available on the electronic adverse events system along with the years 2008/9, 2009/10 and 2010/11.

The review of the electronic record system was conducted for the period of from April 1, 2008 to August 30, 2010. Any incident record with the word monitor or pump was reviewed for inclusion as a documented user issue with a physiological monitor. Once the detailed reports for all events involving pumps or monitors were available, these reports were reviewed to screen out any incidents that did not directly involve syringe pumps or physiological monitoring equipment. Once a final summary of these events for these specific devices was available, the incidents were analyzed to determine if these adverse events were likely caused by user error or equipment failure. Once this work was finished, the data was summarized in tabular format for later comparison with the EDI data. Figure 3.1 illustrates the relationship of EDI value against the state of the inventory and the distribution type.

<i>Distribution Type</i>	<i>Inventory State</i>	<i>EDI Value</i>
	Disorganized Inventory	3
Uniform		2
Narrow	Organized Inventory	1
		0

Figure 3.1 - Relationship between EDI Value, Inventory State and Distribution Type

The EDI data will be reviewed and the status of the inventory can be determined against time by comparing calculated EDI values and the chart in Figure 3.1. The EDI will approach zero as an inventory of equipment becomes less diverse; and as the inventory becomes less standardised, the EDI number will grow, but in most cases in this application, the EDI is expected to remain under a value of three, with this value representing a diverse but evenly distributed inventory.

- IV. Review and comparison of the EDI values against the user problems and adverse events, compiled annually as a whole, and by department, by fiscal year, was conducted. Both the EDI values for the total inventory for each of the devices by year and the EDI by department annually were calculated, documented and compared against the annual number of user problems and adverse events. The total inventory approach was selected as the method of choice for presentation of the data against the user problems and the adverse events by fiscal year. There simply was not enough data provided by this study to enable clear results to be drawn at the smaller department level on the effects of equipment standardisation. The data was collected and presented both by department and as the total inventory, from the onset of this study, to give a better choice of the selection of time, and to prevent having to backup and take a second look at the same data again if the results are unclear.
- V. Finally, research was carried out to determine the best way to present this data in order to have clear results for testing the hypothesis.

Chapter 4: Results and Discussion

The first step in the data collection process was the documentation of the equipment inventory for both devices under study on a spreadsheet of identical structure and format for both of these devices. The service status of each device studied within the project was documented in the spreadsheet by noting the start of service date and the date of decommissioning of the device. The attributed clinical user problems for each device was documented within each of the time intervals during the period of study. One must remain cognisant of the fact that the clinical user problems documented within the Biomedical Engineering work order system were only included within this study if they had been documented as a confirmed user problem on a work order and no corrective repair action had been necessary to resolve any functional or safety issues with the device. The documented data will allow for the calculation of the EDI values for each time period within the study period for both the physiological monitors and the syringe pumps. The clinical user problems documented on the same inventory spreadsheets will allow linking these problems to specific devices at defined time periods. Compiling both of these spreadsheets allows the EDI calculations to be determined for each of the device populations and the comparison of this data to the clinical user problems tied to these specific devices. From these data sets, a determination can be made whether there is a link to the EDI values and clinical user problems.

It is important to clarify that the documented clinical user problems and the Adverse Event (AE) reports are two different data sets. An AE report is a document completed by clinical staff detailing an incident that either did or nearly caused harm to a patient. This report is the corporate record document detailing the event and related

outcomes. AE reports will be reviewed and analysed over the study period to identify whether they involved physiological monitors or syringe pumps. Although there may be an adverse event report and a user error documenting the same incident, the similarities stop at this point. In many cases, the identity of the equipment involved in an adverse event is not documented on an adverse event report by the clinical staff completing the document. Therefore, these events cannot be documented on the spreadsheets that the equipment inventory and user error data are stored. The adverse event data must be tabulated separately and then compared to the other datasets against time. The documented events, from both systems are compared against the applicable EDI values in order to identify trends in the data that would establish links between the different data sets.

For reference, the clinical equipment inventories were extracted from the ServicePlus information system in Microsoft Excel format through a Crystal Reports utility. Separate spreadsheets were then built to collect the physiological monitor and syringe pump data. These data tables were designed identical in structure and in a manner to allow for straightforward data manipulation during the analysis phase of this study.

Both spreadsheets contain the following nineteen data fields for each device record as outlined in Table 4-1. The first six columns detail the equipment with control number, assigned department, manufacturer name, model and serial numbers and device description fields. The next two columns provide the dates on which the device was placed into service and or was removed from active service, if applicable.

Following the equipment information, the next five columns detail whether the device was in active service or not during each of the specific time slots of the five years

of the study. If a device was actively in service in a specific year, the cell will hold a value of “1” but if the device was not in service, the cell will hold a value of “0”. These columns were created for analysis purposes to simplify the summing the total inventory numbers of the specific model of device under evaluation. Finally, the last six columns document the number of user problems documented each fiscal year on Biomedical Engineering work orders in each specific device. Each of the blue columns are summed at the bottom of the spreadsheet to total number of user problems documented on work orders by fiscal year for the specific device type.

Column	Column Label	Content
1	Asset ID	CHEO Biomedical Engineering Control Number
2	Location	Assigned Department
3	Make ID	Manufacturer Code
4	Model ID	Device Model Number
5	Serial Number	Device Serial Number
6	Description	Device Description
7	Date INS	The date of first use of the device.
8	Date RET	The date of retirement of the device.
9	2005-6 (orange header)	This cell notes whether the device was in active service during fiscal 2005-6. The cell contains either a “1” denoting active use or a “0” if the device was no longer in service.
10	2006-7 (orange header)	This cell notes whether the device was in active service during fiscal 2006-7. The cell contains either a “1” denoting active use or a “0” if the device was no longer in service.
11	2007-8 (orange header)	This cell notes whether the device was in active service during fiscal 2007-8. The cell contains either a “1” denoting active use or a “0” if the device was no longer in service.
12	2008-9 (orange header)	This cell notes whether the device was in active service during fiscal 2008-9. The cell contains either a “1” denoting active use or a “0” if the

		device was no longer in service.
13	2009-10 (orange header)	This cell notes whether the device was in active service during fiscal 2009-10. The cell contains either a “1” denoting active use or a “0” if the device was no longer in service.
14	2005-6 (blue header)	The number of identified user device problems found in the ServicePlus System during the identified fiscal year.
15	2006-7 (blue header)	The number of identified user device problems found in the ServicePlus System during the identified fiscal year.
16	2007-8 (blue header)	The number of identified user device problems found in the ServicePlus System during the identified fiscal year.
17	2008-9 (blue header)	The number of identified user device problems found in the ServicePlus System during the identified fiscal year.
18	2009-10 (blue header)	The number of identified user device problems found in the ServicePlus System during the identified fiscal year.
19	2010-11 (blue header)	The number of identified user device problems found in the ServicePlus System during the identified fiscal year. Data for this fiscal year will be only collected for the period of April 1 to August 31, 2010. This factor must be considered when conducting the analysis of the data.

Table 4.1 – Inventory Spreadsheet Structure

4.1 Monitoring Devices Data Collection and Analysis

Complete versions of both the syringe pump and physiological inventory spreadsheets are located in Appendices of this report for reference purposes. The physiological monitor spreadsheet contains the summarized data from the service histories of 400 monitoring devices. Each time there was a report of an equipment problem identified, it was documented on a CHEO Biomedical Engineering work order and if the problem could be definitely attributed to user- error, the event was documented on the spreadsheet within the cell labelled for the specific fiscal year. Within the

spreadsheet, physiological parameter module histories were assessed and documented to accurately reflect all user problems documented by clinical staff and communicated to Biomedical Engineering. Physiological parameter modules are an accessory that connects to a port on the bedside physiological monitor and adds multiple parameters such as invasive or non-invasive blood pressure, transcutaneous or end tidal CO₂ or temperature measurement to a specific bedside monitor.

When an annual count of each specific type and make of physiological monitor as conducted during the development of Entropy Diversity Index (EDI) estimations, the physiological modules were not included the census counts to allow for a concise reflection of the population groups of specific monitors and thus not inaccurately skew EDI calculations. For the initial inventory exercise only, the temperature and the trend strip chart recorder were excluded from the inventory, they are not heavily used modules and do not provide any value to this study. Essentially the two specific modules do not impact the routine monitoring capabilities and operational number of the monitors available.

Once each of the inventory spreadsheets was complete, the data was sorted and summarised by fiscal year with the user problems added. User problem totals may be derived by department, make and model type, if these approaches seem beneficial when the data is evaluated. To remain consistent in the data collection methodology, if a device was removed from active service during a fiscal year, the user problems were not logged for that specific fiscal year as inclusion of these events would impact the accuracy of the results.

The physiological monitoring inventory is summarized in Table 4.2. The data shows an increase in the amount of monitors from 134 in fiscal year 2005-6 to 232 in fiscal year 2010-11. The monitoring equipment standardisation has improved at CHEO with a drop from seven different varieties in fiscal year 2006-7 to four different varieties in fiscal 2010-11.

	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11
MDE Escorts	6	3	3	3	0	0
Critikon NIBP	29	24	26	20	20	20
HP 78834C series	7	1	1	0	0	0
HP Merlin-Vivid	35	35	37	37	0	0
GE 1000 series	10	10	10	10	9	9
Nellcor Sat Monitors	47	44	78	75	75	75
Dräger Infinity Monitors	0	53	53	65	121	128
Total Active	134	170	208	210	225	232
Different Types	6	7	7	6	4	4

Table 4.2 – Physiological Monitor Inventory Summary by Year

The identified user problems are summarised on the physiological monitor spreadsheet and the data, which were extracted from the Service Plus system are documented in Table 4.3. The number of documented user problems related to bedside monitors illustrates a steady increase of 32.7 percent per year in the number of user problems identified over initial the five year period of the study. Even though the number of user problems were on the rise in the five year period of study it does not mean that users were finding one device more difficult to use over another since the total inventory of monitors has increased substantially from 134 at the beginning of the start of the study to 232 at the end of the study, as illustrated in Table 4.2. The ratio of the total number of user problems to total numbers of devices in active use per specific time period would take into account the variability in the inventory of monitors or syringe pumps to more

accurately gauge whether user issues with equipment are really becoming more problematic or not.

Data collected for fiscal year 2010-11 only encompasses the first five months of the fiscal year. The operator problem data values were extrapolated to twelve divided by five, and rounded to the nearest whole number, to obtain meaningful results for both the syringe pump and monitors.

Fiscal Year	Number of Documented User Problems
2005-6	22
2006-7	24
2007-8	40
2008-9	50
2009-10	58
2010-11	36

Table 4.3 – Summary of the Identified Monitor User Problems by Fiscal Year.

With the inventory data now available along with the user problems documented on work orders, the EDI calculations by year and the ratio of user problems to total number of devices were calculated and these findings are available in Table A3.1 in Appendix 3 on page 100. The ratio of user problems to total inventory were added to the table to provide an indication of the user problems in proportion to the changing size of the inventory, as this factor can skew the results when large variations in overall sample size occur.

The calculated EDI values for monitors show a drop over time from 1.58 at the beginning of the study to 1.03 as of fiscal year 2010-11, which correlates with the decrease in the number of different physiological monitors in use at CHEO. The EDI value is not impacted by fluctuations in the inventory but by the number of different

manufacturers and models present within the specified inventory group and the relative size of each subgroup against the total inventory. Referring back to Figure 2.1, it shows that CHEO, with a current EDI value for its inventory of monitors of 1.03, is approaching a peak level of standardisation, while the ratio of user problems, compared to the total inventory, rose every fiscal year until 2009-10 and then dropped off during the last year of the study based on the adjusted data available for the first five months of the year.

In an effort to better interpret the user problem data and the adverse event data, the data sampling was increased to four quarterly points, from one point per fiscal year. There are twenty-one points of data for each of the three measured parameters. Table A3.1 on page 101 illustrates the data set for the physiological monitors. In Table A3.1, the seven rows noted as P1 to P7 give the calculated fractional value for each different type of monitor against to total number of monitors in use during the specific period of time. Since there were seven different types of physiological monitor used at CHEO within the period of study, there were seven fractional values for each time period. These fractional values are then employed to calculate diversity index for each of the devices as shown in formula 2.1 on page 23 of Chapter 2. Finally, the negative sum values of these individual index numbers were derived to calculate the EDI value for the specific time period as shown in Table A3.1

The graphs in Figures 4.1 show the EDI values against time for the monitors while Figures 4.2 and 4.3 illustrate the plots of the user problems and the ratio of user problems over the total number of devices in service, both against time. The graph of the EDI value against time in Figure 4.1 illustrates a drop in EDI against time for the physiological monitors. Both the number of user problems and the ratio of user problems graphs in Figures 4.2 and 4.3 respectively document an increase in user problems against time until nearly the end of the study. User problems rose during fiscal year 2007-8 and began to drop in fiscal year 2009-10 and continued this trend in fiscal year 2010-11 based on the available data.

Figure 4.1 - Physiological Monitor EDI by Quarter

Figure 4.2- EDI Value for Physiological Monitors against Time.

Figure 4.3 – Ratio of User Problems over Total Monitor Inventory versus Time for Physiological Monitors

The graph in Figure 4.1 portrays the EDI value starting with a value of 1.6, which shows an inventory that with a moderate level of disorganisation when compared to its entire population. By the end of the period of study, the inventory exhibits a more

organised distribution trend with an EDI value of 1.03. The EDI values shown in Figure 4.1 can be confirmed by the number of different makes of physiological monitors exhibited in Table A3.1 on page 101. The actual different makes of physiological monitors dropped from the peak of seven in fiscal year 2006-7 to the present four different types.

When one looks at the Adverse Event data provided at the bottom of Table A3.1, one can see that there was very little Adverse Event data to work with in this case, with only six adverse events occurring over the period of study. This translates of an average of approximately one adverse event per year for physiological monitors based on the current data. Therefore, a similar plot as in Figure 4.2 or 4.3 on pages 41 and 42 respectively, was not attempted as it would not provide useful results.

It is important to note at this juncture that, as the newer standardised Drager monitors were placed into service, an additional group of Nellcor standalone pulse oximeters were placed into service at the same time. These monitors were not planned purchases, but they were provided at no cost as part of the disposable sensor contract. If one looks at the number of annual user problems that were associated with the Nellcor and GE standalone units, as opposed to the standardised Hewlett Packard and Drager physiological monitors, one can see the impact of standalone monitors in creating clinical user problems. As shown in Table 4.4 on the next page, nearly half of the user problems documented during the fiscal years 2008-9 and 2009-10 involved the standalone Nellcor and GE Dinamap devices.

Year	Standalone Monitor User Problems (Nellcor & GE)	Total Monitor User Problems	% Standalone/ Total
2008-9	21	50	42
2009-10	25	58	43

Table 4.4 – Impact of Standalone Monitors on Clinical User Problems

If the multiparameter physiological monitors are only considered for study, results change dramatically. Figure 4.4 shows this changing trend. The EDI curve although similar to the ones presented before for monitoring equipment, seems to have its baseline shifted downward with the value remaining at close to 1.0 until the major replacement program started and the value dropped to an impressive value of around 0.2. In the case of the revised plot of user problems over total devices versus time in Table 4.5, one can notice an increase in user problem events during the time of transition from the Philips to Dräger multiparameter monitoring equipment. This trend tapered off early in year 2009-10, as staff confidence improved.

Figure 4.4 – Plot of EDI Values against time for the Multiparameter Physiological Monitor

Figure 4.5 – Plot of the Ratio of Clinical User Problems against Time for Multiparameter Physiological Monitors and All Monitors

Figure 4.5 clearly shows the comparison of the multiparameter monitors separately and when included with the entire monitor population. Both plots trend each other closely but the data of the multiparameter monitor plot illustrates a consistently lower ratio of clinical user problems incidents in relationship to the inventory.

4.2 Syringe Pump Data Collection and Analysis

The inventory of syringe pumps increased from 97 in 2005-6 to 224 devices in 2010-11, an increase of 131% in the size of the syringe pump inventory at CHEO over the period of the six fiscal years. The hospital's inventory of syringe pumps remained constant at three different types over four years, peaking to four types in fiscal year 2009-10, during the fleet replacement of syringe pumps, and was finally reduced to two different types during fiscal year 2010-11.

The EDI values for the syringe pumps as illustrated in Table 4.5 over the six fiscal years remained relatively flat between 0.49 and 0.45 except during the inventory transition year of 2009-10 when the EDI peaked at 0.81. All of these EDI values sit in the acceptable range for an inventory of like devices of between 0 and about 2.0. The EDI value for 2009-2010, with its peak value of 0.81, needs some further examination as it is probably not an accurate way to calculate an EDI value during an inventory changeover. Practically, the Asena and the Medfusion 3500 were not operational simultaneously as the main syringe pump at CHEO, except during the transition periods from one system to another during the fall of 2009 and winter of 2010.

	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11
Alaris Asena	84	84	84	96	87	37
Graesby 3400	7	7	7	7	7	0
Alaris TIVA	6	6	6	6	6	0
Medfusion 3500	0	0	0	0	187	187
Total Active	97	97	97	109	287	224
Different Types	3	3	3	3	4	2
EDI	0.49	0.49	0.49	0.49	0.81	0.45
User problems (W.O.)	37	23	21	19	18	14
Ratio Problem/Inventory	0.381	0.237	0.216	0.174	0.063	0.063

Table 4.6 - Summary of Syringe Pump EDI Calculations and Problem/Inventory Ratios by Year

The summarized work order user problems illustrate a gradual decrease in the number of documented user problems, from thirty-seven to fourteen, over the six year period. This translates into a 62% drop over the six year period. The ratio of the user problems to total inventory also shows a gradual drop from 0.381 to 0.063 in the study period.

Undertaking the same approach as with the physiological monitors, that is, and increasing the number of sample points to four from one per year, and utilising the first full quarter of data from the fiscal year 2010-11, illustrates the point that the user problems have dropped over time, but in the case of the syringe pumps, there was only a marginal decrease in the EDI value. The graphs in Figures 4.6, 4.7 and Table A3.2 in Appendix A3.2 on page 102 display the expanded data set of twenty versus six data points over the period of study.

Figure 4.6 – Expanded Graph of EDI against Time

Figure 4.7 – Ratio of User Problems versus the Total Number of Syringe Pumps

Taking a second look at the syringe pump data set, brings an important environmental factor to light that needs to be considered as it impacts the results. During fiscal year 2009-10, when the syringe pumps were replaced with the Medfusion 3500, both inventories were not both operational simultaneously, even though the data in Table 4.6 suggests this fact. If the two outlying EDI points from 2009-10 Q3 and Q4 are recalculated taking into consideration that both type of pumps were not operational simultaneously, the revised EDI values for these points would be 0.45, resulting in an essentially flat line response when EDI is plotted against time.

Returning to the data in Table A3.2 on page 102, the level of standardization of the syringe pumps at CHEO has increased slightly with a drop in the EDI by 8.2 percent within this sample of syringe pumps against time. Also, the number of active syringe pumps jumped by 129 percent, to 222 devices. At the same time, the number of clinical user errors dropped.

Since there was very little Adverse Event (AE) data to work with, in this case as in the last case, a plot of the data was not carried out. A detailed review of the manual Adverse Event reports for fiscal years 2005/6, 2006/7 and 2007/8 was completed. Next, the electronic AE for fiscal years 2007/8, 2008/9, 2009/10 and 2010/11 was conducted with the total number of AE reports reviewed, the number of equipment related AE reports, and the percentage of the AE reports that involved equipment was documented in

Table 4.6. Both the manual and the electronic systems were in use simultaneously in 2007, until the electronic system was fully implemented.

By the time of the implementation of the electronic system in 2007, the manual reporting system had become unworkable. During the years 2005 and 2006, there were 1,355 AE reports filed at the hospital. This deluge of paperwork pushed the AE review process nearly to a complete halt, as there were only four event reviews conducted on these 1,355 paper reports.

	Fiscal Years	Total Reports	Equipment Related Reports	% of Equip/Total AEs
<i>Manual Reporting</i>				
	2005/6			
	2006/7			
	2007/8	1946	187	9.6%
<i>Electronic Reporting</i>				
	2007/8			
	2008/9			
	2009/10			
	2010/11	4441	49	1.1 %

Table 4.6 – Overall CHEO AE Report Statistics

Table 4.6 has provided some interesting data trends on AE reports. First, the overall average reporting rate of adverse events increased considerably with the electronic AE reporting System. The number of equipment related AE reports decreased, when compared to the total number of average reports per year, from 9.6 to 1.1 percent. The potential reasons for these sudden changes in reporting rates needs further research to identify the root causes of these trends. Insight provided on this matter from the hospital Risk Management staff suggests that the changes in statistics noted in Table 4.6

may be due to the increased reporting of AE incidents by clinical staff since the introduction of the electronic system. When a comparison was made of the two full paper AE reporting years of 2005/6 and 2006/7, against two full years of electronic AE reporting such as 2008/9 and 2009/10, the results show an increase in AE reporting from 1,797 to 3,152 AE reports, or 132.8 percent using the electronic reporting system. It is important to keep in mind that the data for fiscal year 2010/11 provided in this report only covers the period of April 1st to August 31st.

Table 4.7 summarizes the suspected and actual AE reports involving physiological monitors and syringe pumps over each fiscal year. The Suspected AE report numbers were tallied during the first high level data assessment while the Actual AE report numbers were the confirmed numbers collected after the detailed report reviews were conducted later in the study. Even with reporting increases as a result of the electronic reporting system, reported AE incidents have not increased proportionately. The most recent results show only about one percent of AE reports involves equipment, and of this amount, less than half of one percent involves infusion devices and physiological monitors.

<i>Suspected</i>			<i>Actual</i>		
Fiscal Year	Syringe Pump	Monitor	Fiscal Year	Syringe Pump	Monitor
05/06	6	1	05/06	0	1
06/07	4	5	06/07	0	4
07/08	6	1	07/08	3	0
08/09	3	2	08/09	4	1
09/10	4	4	09/10	4	1
10/11	4	3	10/11	1	1

Table 4.7 – Suspected and Actual AE Reports for Syringe Pumps and Monitors

It will be difficult to explain why the number of AE reports is actually so low when compared to the user problems identified in either Tables A3.1 or A3.2. The number of actual serious incidents per year for both syringe pumps and monitors never exceeded five events annually per device during the entire period of study, while on average clinical user problems per year for physiological monitors and syringe pumps were approximately forty and twenty-four respectively, based on the data supplied by Tables A3.1 and A3.2 from the Service Plus system.

5.0 Conclusions

The *first objective of this thesis* was to confirm that EDI is able to benchmark equipment standardisation over different clinical equipment types. This study has shown that the Entropy Diversity Index (EDI) can be used as a measuring tool for gauging the level of equipment standardisation amongst a grouping of like medical devices. The EDI can be used to benchmark the level of standardisation against other groups of medical devices within a facility or at other facilities. Therefore, it could be used to gauge the effectiveness of a facility's equipment replacement plan, or of their fleet equipment management program, in achieving optimum standardisation.

Within the confines of this work, the EDI trends illustrated different but discernable trends with both the physiological monitor and the syringe pump EDI calculations against time. If we return to Figure 2.1, then reflect on the resulting EDI data for both devices, the EDI values against time are predictable based on the changes that occurred to the equipment inventory over the period of study. Any standardisation statistic for infusion devices should have clearly produced results illustrating that infusion devices at CHEO are an example of peak organisation since the infusion devices at CHEO have been standardised since the late 1990s. This was in fact the case, as the EDI syringe pump calculations showed a consistent trend with a range of values from 0.45 to 0.49, except for one year where the value jumped to 0.81 in 2009-10. These values illustrate a population of like devices that exhibit a narrow distribution and a high degree of organisation or standardisation, except during the one period where it peaked. This

peak of 0.81 is still within the range considered as organised within the range of EDI values when referenced against the diagram in Figure 2.1 on page 23. Upon further investigation of this elevated peak, it was identified as the point of transition from one type to another type of syringe pump. It is important to note that, except during the identified transition period, when the Alaris Asena was removed from service and Smiths Medical Medfusion 3500 syringe pump was commissioned, neither of the fleets of these devices were operational simultaneously. Therefore, it is suggested that these periodic peaks be identified as transition points and discounted when one is monitoring EDI values against time.

In the case of the EDI values against time for the physiological monitors, the EDI value clearly shows a trend towards improved standardisation against time with a flat line in EDI value of about 1.5 until the end of fiscal year 2008-9, when the EDI began to drop to its current value of 1.03. This drop illustrates an inventory that starts with a narrow to uniform distribution that moves to improved physiological monitor standardisation during year fiscal 2009-10. This trend shows the gradual replacement of the older monitoring equipment in the inpatient clinical units and the whole replacement in the Critical Care department of physiological monitoring equipment to the fleet standard of Drager Infinity Delta XL monitor during fiscal year 2009-10. As the fleet management program continues at CHEO, with the physiological monitors, the older non-standard equipment is being retired, and thus the EDI will continue to drop over time below a fractional value of less than one.

The *second objective of this study* was to use the identified standardisation tool to investigate if a link can be found between clinical user problems and the level of

standardisation in commonly used clinical devices such as, in this case, physiological monitors and syringe pumps. This objective was only partially successful in this study. In the case of the syringe pumps, even with wider sampling of data within the period of study, a reliable trend could not be established with the rate of user problems against the total inventory, unless the peak point in the EDI versus time graph for the syringe pumps occurring during fiscal year 2009-10 Q3 and Q4 are reconsidered. As the data stands, the existing results show a sudden EDI peak which does not truly reflect the actual situation. After taking a second look at the syringe pump dataset, then looking into the background causes of the resulting data, an important factor comes to light that needs to be considered. During fiscal year 2009-10, when the syringe pumps were replaced with the Medfusion 3500, both inventories were not both operational simultaneously, even though the data in Table 4.6 suggests this. If the two outlying EDI points from 2009-10 Q3 and Q4 are recalculated, taking this factor into consideration, then the revised EDI values for these points would be 0.45, resulting in an essentially flat line response when EDI is plotted against time. This recalculation can be accomplished by moving the breakpoint for 2009-10 Q3 and Q4 to the transition point of the replacement fleet to Medfusion 3500 syringe pumps. The level of standardization of the syringe pumps at CHEO has increased slightly within this sample population against time, registering about an eight percent improvement and since the size of sample has more than doubled in size and the clinical user errors has dropped over time to about one third of the original total as shown in Figure 4.6. Therefore, it can be concluded the under controlled conditions, where no major fleet changes are being undertaken, the hypothesis stating that improved equipment standardisation improves patient safety can be considered valid. The syringe pumps saw a

drop in the ratio of clinical user problems to the total inventory drop from an average in year 2005/6 of 0.096 rising to a peak value in the third quarter of year 2005/6 of 0.155 and reaching a minimum value of 0.018 in year 2010/11 while the EDI value only exhibited a drop of 8.1 percent for the same five year period. The variance in the results of change of ratio of clinical user problems to the total inventory and the EDI value in the case of the syringe pumps can be explained by the influence of environmental factors such as increased nursing staff training on the Medfusion 3500 syringe pump and the more intuitive user interface on this same device.

The same dilemma was faced with the physiological monitor population and their related documented user problems. There were again in this case as well as with the syringe pumps, a number of extenuating circumstances that affected the results from this portion of the study. In fact the graph in Figure 4.7 illustrates a situation where the value of the EDI decreases, or conversely the equipment standardisation increases, and the clinical user problems decrease. There were a number of factors that impacted the results of this observational study. First, the hospital inpatient units leaped from very limited standalone monitoring capabilities, to an advanced system that is interfaced to a central station, the Hospital Information System (HIS), a nurse call system and wireless communication systems over the course of a few short years. It was and it continues to be an immense learning process for all staff involved. A similar parallel impact was felt as the entire hospital moved to electronic patient charting during the calendar year 2010, finally forcing all clinical staff to embrace computer technology, whether they wanted to or not.

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As the remaining older monitors are decommissioned and standardisation efforts are continued, further positive results may be demonstrated if the study was repeated.

As the newer standardised physiological monitors were placed into service, an additional group of Nellcor standalone pulse oximeters were placed into service at the same time. Seventy-five of these devices were given to CHEO at no cost as part of the single use sensor contract. These standalone oxygen saturation monitors, although reliable, are not as user-friendly as the Drager or Philips physiological monitors. The Nellcor monitors provide the user with an alpha numeric code, for a number of the user or device problems, such as a low battery. As a result the Nellcor monitors are removed from service on many occasions, and sent for servicing, for what ends up being a trivial problem that should have been corrected by clinical staff on the unit. If one looks at the number of annual user problems that were associated with the Nellcor and GE standalone units as illustrated in Table 4.13, it is clear why the clinical user problem data trend did not decrease as the EDI value for physiological monitors decreased. On average, the standalone oxygen saturation and non invasive blood pressure monitors contributed to 42.5 percent of the clinical user problems during the fiscal years 2008-9 and 2009-10.

This error factor skewed the results for the EDI values versus the results of the ratio of clinical user problems to total number of devices illustrated in Figure 4.5. If the boundaries of this study were modified to include only the multiparameter monitoring equipment, and have the standalone single parameter physiological monitors either minimised, or totally removed from the study, the results would provide the desired trends and thus support research goals of this study, supporting the hypothesis that

equipment standardisation supports patient safety when the study sample size is narrowed to include only multiparameter physiological monitors.

In the case of the physiological monitors, the overall ratio of clinical user problems to the total inventory over the five year period of study started at 0.0375 in year 2005/6 went to a peak of 0.075 in the third quarter of year 2007/8 and then dropped to a low in year 2010/11 of 0.0259. When comparing the ratio values of clinical user problems to total inventory from the start and the end of the study showed a decline of 33.1 percent while the EDI for the same period showed a nearly proportional drop of 29.4 percent which supports the second objective of this study.

This study has made it clear that when considering the relationship of EDI to clinical user errors, the study sample should be carefully evaluated before data collection commences and the results must be watched closely to identify potential environmental factors, such as large scale device replacements during the course of the study, that may impact the results in a negative way. This study has also shown why a health care facility should have a comprehensive long range clinical capital plan that receives full endorsement of the facility's executive team and clinical staff. To be effective, such a long range plan must encourage fleet management concepts that encourage standardisation of common key clinical equipment.

The *final objective of this thesis* was to use an identified standardisation tool to investigate if a link can be found between adverse event reports and the level of standardisation in commonly used clinical devices such as physiological monitors and syringe pumps. This study was unable to find a link between equipment standardisation and the adverse event reports generated by the hospital specifically involving

physiological monitors and syringe pumps due to the lack of reported events involving these types of equipment from the AE reporting system. Since there has been a conscious effort to standardise key fleets of commonly used clinical equipment at CHEO for a number of years, and the number of adverse events are very low, it is unlikely that further improvements in this area will be achieved in the future. But efforts to standardise clinical equipment should be continued to try to maintain a low number of equipment-related adverse events.

5.1 Contribution to Knowledge

This study has contributed to knowledge on the following points:

- (a) The Entropy Diversity Index (EDI) was successfully applied as a method of benchmarking the level of equipment standardisation for other types of equipment than just infusion devices. This research confirms the earlier work conducted by Brindle and Gibson [56] that shows EDI to be a useful tool in summarizing the frequency distribution of devices. This work has gone one step further than Brindle and Gibson [57] to test this Index on more than one type of device and thereby further prove its value in measuring equipment standardisation. In using this Index, one must keep in mind that different frequency distributions may in fact have the same index value. Therefore, it is recommended that caution be used when drawing conclusions on the state of an inventory from a single parameter. This Index remains an accurate method of predicting when changes in population diversity occur as long as measurements are consistently made over a period of time.

- (b) The research established the point that: If you wish to conduct an observational study that attempts to relate issues such as equipment standardisation and patient safety, prior analysis of potential environmental factors, such as large scale replacement of equipment, should be considered before framing the scope of the research study.
- (c) The study illustrates why it is important to develop and enforce a long range clinical equipment replacement plan that discourages sudden changes, as these changes could create more problems than they actually solve, such as in the case of the no cost pulse oximeters.
- (d) This is the first time that the EDI is related to adverse events and to user-errors. The findings of this study, and of others that can follow on other types of equipment in the clinical environment, will lead to long term safety improvements.

5.2 Future Research

- (a) It would be possible to use EDI to create a benchmark that measures the standardisation of a hospital's twelve to fifteen major fleet devices such as defibrillators, ventilators and stretchers for example that comprise the majority of the clinical equipment within in most hospitals. One might be able to use the EDI calculations for these devices to create a benchmark that will allow for the comparison of standardisation efforts of multiple hospitals within a region.
- (b) The EDI for a specific device population could be factored with the median age of this specific population and the published anticipated life expectancy to create a potential comparative indicator. This benchmark could then be calculated for the

major group of fleet devices mentioned above and the top fifteen to twenty non-fleet devices to derive an indicator that would allow for comparison of any hospital against another or a defined group of facilities to gauge both the useful life expectancy and level of standardisation of a hospital's clinical equipment inventory.

- (c) Investigate nursing staff turnaround and its relationship to adverse events on specific common clinical devices.
- (d) Study the human interface on common medical devices such as infusion devices and physiological monitors and link the difficulty of use of this interface to clinical user errors.
- (e) Investigate the relationship between in-service training of clinical staff and its relationship to adverse events on specific common clinical devices.
- (f) Consider incorporating a level of severity for AEs and user errors and their relationship to equipment standardisation. No attempt was made to assess the severity of AEs or the clinical user errors nor was a concerted effort undertaken to document the types of user errors during the present research study. Table 5.1 demonstrates some of the common clinical user errors occurring during this study on both studied devices. This information could be considered as a starting point for further research.

Physiological Monitor	Syringe Pump
Heart Rate not accurate	Interstitial IV but no pump alarms
Monitor alarming constantly when patient is fine	Low battery alarm when pump is plugged in.
Not working	Inaccurate drug delivery when compared to set delivery rate
Sudden desaturation not detected	Constant occlusion pressure alarm when IV line appears to be fine
Saturation reading inaccurate	Pump shut down when in use
Monitor shut down when in use	
Monitor alarming leads off when leads attached	

Table 5.1 – Documented Clinical User Errors

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Appendix 1

Physiological Monitor Data Spreadsheet

AssetID	Location	MakeID	ModelID	Serial Number	Description	Date II	Date RI	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
4E/046	4 East	Critikon - GE	8100	8100-K5092	Monitor, Vital Signs	20-Jul-92		1	1	1	1	1	0	0	0	0	0	0
4E/060	4 East	Nellcor- Mallinckrodt	N-20	20042616	Pulse Oximeter	13-Nov-92	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4E/061	4 East	MDI	E100	13177	Monitor, Physiological	2-Nov-93	21-Aug-09	1	1	1	1	1	1	0	0	0	0	0
4E/063	4 East	Critikon - GE	8100	8100-L4649	Monitor, Vital Signs	8-Dec-94		1	1	1	1	1	0	0	0	0	0	0
4E/064	4 East	Nellcor- Mallinckrodt	N-20	20633176	Pulse Oximeter	3-Jan-95	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4E/071	4 East	Nellcor- Mallinckrodt	N200	20781454	Pulse Oximeter	3-Mar-95	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4E/077	4 East	Nellcor- Mallinckrodt	N-20	20875362	Pulse Oximeter	23-Sep-96	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4E/078	4 East	Hewlett Packard	78834A	2637G01000	Monitor, Physiological	26-Nov-86	5-Feb-04	0	0	0	0	0	0	0	0	0	0	0
4E/089	4 East	Critikon - GE	9300	9300-K5074	Monitor, Vital Signs	10-Jun-97		1	1	1	1	1	0	1	1	1	2	1
4E/098	4 East	Critikon - GE	117222	990H0015411	Monitor, Physiological	28-Oct-98	4-Feb-08	1	1	1	0	0	0	1	0	0	0	0
4E/099	4 East	Critikon - GE	117277	4E/099	Power Supply, Mps Select	28-Oct-98	4-Feb-08	1	1	1	0	0	0	0	0	0	0	0
4E/100	4 East	Critikon - GE	117322	990H0017253	Module, ECG/resp/temp	28-Oct-98	4-Feb-08	1	1	1	0	0	0	0	0	0	0	0
4E/101	4 East	Critikon - GE	117300	990H0016763	Module, N.I.B.P.	28-Oct-98	4-Feb-08	1	1	1	0	0	0	0	0	0	0	0
4E/102	4 East	Critikon - GE	117310	990H0017285	Module, Sao2/pleth	28-Oct-98	4-Feb-08	1	1	1	0	0	0	0	0	0	0	0
4E/103	4 East	Critikon - GE	117335	990H0017406	Module, Recorder	28-Oct-98	4-Feb-08	1	1	1	0	0	0	0	0	0	0	0
4E/118	4 East	GE	1000	030M2940006	Monitor, Vital Signs	1-Dec-03		1	1	1	1	1	0	0	0	1	0	0
4E/120	4 East	Nellcor- Mallinckrodt	N-595	G03844542	Monitor, Pulse Oximeter	11-Feb-04		1	1	1	1	1	0	0	0	0	0	0
4E/163	4 East	Nellcor- Mallinckrodt	NPB-40	G05859686	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	0	1	0
4E/164	4 East	Nellcor- Mallinckrodt	NPB-40	G05859720	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	0	1	0
4E/165	4 East	Nellcor- Mallinckrodt	NPB-40	G05859634	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	0	1	0
4E/166	4 East	Nellcor- Mallinckrodt	NPB-40	G05859661	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	0	0	0
4E/167	4 East	Nellcor- Mallinckrodt	NPB-40	G05859593	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	0	1	0
4E/168	4 East	Nellcor- Mallinckrodt	NPB-40	G05859587	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	0	0	0
4E/169	4 East	Nellcor- Mallinckrodt	NPB-40	G05859611	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	1	1	1	0
4E/170	4 East	Nellcor- Mallinckrodt	NPB-40	G05859767	Pulse Oximeter	27-Oct-05		1	1	1	1	1	0	0	0	1	1	0
4E/188	4 East	Drager	MS18597E539D	5397755855	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	1	0	0
4E/189	4 East	Drager	MS18597E539D	5397878945	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4E/190	4 East	Drager	MS18597E539D	5397869153	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4E/191	4 East	Drager	MS18597E539D	5397880158	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0

AssetID ▼	Location ▼	MakeID ▼	ModelID ▼	Serial Number ▼	Description ▼	Date If ▼	Date RI ▼	2005 ▼	2006 ▼	2007 ▼	2008 ▼	2009 ▼	2010 ▼	2011 ▼	2012 ▼	2013 ▼	2014 ▼	2015 ▼
4E/192	4 East	Drager	MS18597E539D	5397878847	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	1	1	0
4E/193	4 East	Drager	MS18597E539D	5397859449	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4E/194	4 East	Drager	MS18597E539D	5397875057	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4E/195	4 East	Drager	MS18597E539D	5397880256	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	1	0	1	0
4E/196	4 East	Drager	MS18597E539D	5397877349	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4E/197	4 East	Drager	MS18597E539D	5397881852	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	1	0	0	0
4E/198	4 East	Drager	MS18597E539D	5397863756	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4E/199	4 East	Drager	MS18597E539D	5397882058	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4E/200	4 East	Drager	MS18597E539D	5397874450	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4E/201	4 East	Drager	MS18597E539D	5397881950	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4E/202	4 East	Drager	MS18597E539D	5397870855	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4E/203	4 East	Drager	MS18597E539D	5397871061	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4E/204	4 East	Drager	MS18597E539D	5397870659	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	2	0
4E/205	4 East	Drager	MS18597E539D	5397876448	Monitor, Physiological	15-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4E/285	4 East	Nellcor- Mallinckrodt	NPB-290	G00807602	Pulse Oximeter	5-Jan-00		1	1	1	1	1	0	0	0	0	0	0
4E/328	4 East	Drager	MS18597	6000933869	Monitor, Physiological	1-Jun-09		0	0	0	0	1	0	0	0	0	0	0
4E/329	4 East	Drager	MS18597	6000923176	Monitor, Physiological	1-Jun-09		0	0	0	0	1	0	0	0	0	0	0
4E/330	4 East	Drager	MS18597	600015274	Monitor, Physiological	1-Jun-09		0	0	0	0	1	0	0	0	0	0	0
4E/331	4 East	Drager	MS18597	600092865	Monitor, Physiological	1-Jun-09		0	0	0	0	1	0	0	0	0	0	0
4N/073	4 North	Critikon - GE	8100	8100-K5516	Monitor, Vital Signs	2-Jun-92		1	1	1	1	1	0	0	0	1	0	0
4N/074	4 North	Critikon - GE	8100	8100-K5521	Monitor, Vital Signs	20-Jul-92		1	1	1	1	1	1	0	0	0	0	1
4N/091	4 North	J&J Critikon GE	COMPACT T	98Q0013218Y0	Monitor, Vital Signs	23-Apr-98	20-Jul-09	1	1	1	1	0	0	0	0	0	0	0
4N/105	4 North	Nellcor- Mallinckrodt	N-20	CHECK	Pulse Oximeter	23-Apr-98	21-May-05	1	0	0	0	0	1	0	0	0	0	0
4N/114	4 North	Critikon - GE	9300	J6346	Monitor, Vital Signs	20-Nov-96		1	1	1	1	1	1	0	1	1	0	0
4N/124	4 North	Nellcor- Mallinckrodt	N-20	21678453	Pulse Oximeter	4-Dec-01	21-May-05	1	0	0	0	0	0	0	0	0	0	0
4N/141	4 North	Nellcor- Mallinckrodt	NPB-290	G99835611	Pulse Oximeter	5-Jan-00		1	1	1	1	1	0	0	0	0	1	0
4N/142	4 North	Hewlett Packard	78834A	2815G02410	Monitor, Physiological	9-Dec-88	21-May-05	1	0	0	0	0	1	0	0	0	0	0
4N/145	4 North	Hewlett Packard	78351A	2332A01045	Monitor, Physiological	27-Oct-83	21-May-05	1	0	0	0	0	1	0	0	0	0	0
4N/152	4 North	GE	1000	030M070001	Monitor, Vital Signs	23-Aug-05		1	1	1	1	1	0	1	1	0	0	0
4N/153	4 North	GE	1000	030M0490005	Monitor, Vital Signs	23-Aug-05	25-Sep-08	1	1	1	1	0	0	0	1	0	0	0

AssetID	Location	MakeID	ModelID	Serial Number	Description	Date II	Date RI	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
4N/154	4 North	GE	1000	030M0480018	Monitor, Vital Signs	23-Aug-05		1	1	1	1	1	0	0	1	1	0	0
4N/155	4 North	Nellcor- Mallinckrodt	N-20E	G03802519	Pulse Oximeter	7-Sep-03		1	1	1	1	1	0	0	0	0	0	0
4N/156	4 North	Nellcor- Mallinckrodt	N-20E	G03802523	Pulse Oximeter	7-Sep-03		1	1	1	1	1	0	0	0	0	0	0
4N/159	4 North	Nellcor- Mallinckrodt	N-65	G06803289	Pulse Oximeter	7-Sep-03		1	1	1	1	1	0	0	1	0	0	0
4N/165	4 North	GE	400	AAW06160039SA	Monitor, Vital Signs	5-Sep-06		1	1	1	1	1	0	0	4	1	0	2
4N/172	4 North	Drager	MS18597E539D	5397844055	Monitor, Physiological	30-Nov-06		0	1	1	1	1	0	0	0	1	0	1
4N/173	4 North	Drager	MS18597E539D	5397860563	Monitor, Physiological	30-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4N/174	4 North	Drager	MS18597E539D	5397815354	Monitor, Physiological	30-Nov-06		0	1	1	1	1	0	0	0	1	0	0
4N/175	4 North	Drager	MS18597E539D	5397604261	Monitor, Physiological	30-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4N/176	4 North	Drager	MS18597E539D	5397864853	Monitor, Physiological	30-Nov-06		0	1	1	1	1	0	0	0	1	0	0
4N/177	4 North	Drager	MS18597E539D	5397833655	Monitor, Physiological	30-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4N/222	4 North	Nellcor- Mallinckrodt	N-65 Oximax	G06834132	Pulse Oximeter	23-Jan-07		0	0	1	1	1	0	0	0	1	0	0
4N/223	4 North	Nellcor- Mallinckrodt	N-65 Oximax	G06834070	Pulse Oximeter	23-Jan-07		0	0	1	1	1	0	0	0	0	2	0
4N/224	4 North	Nellcor- Mallinckrodt	N-65 Oximax	G06834135	Pulse Oximeter	23-Jan-07		0	0	1	1	1	0	0	0	0	0	0
4N/225	4 North	Nellcor- Mallinckrodt	N-65 Oximax	G06834117	Pulse Oximeter	23-Jan-07		0	0	1	1	1	0	0	0	1	1	0
4N/311	4 North	GE	v100	SDT08300023	Monitor, Vital Signs	28-Aug-08		0	0	1	1	1	0	0	0	0	3	1
4N/312	4 North	GE	v100	SDT08300025SP	Monitor, Vital Signs	28-Aug-08		0	0	1	1	1	0	0	0	1	1	0
4N/313	4 North	Drager	MS18597	53990395555	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0
4N/314	4 North	Drager	MS18597	5398814754	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	2	0	0
4W/136	4 West	Nellcor- Mallinckrodt	N-20	20042682	Pulse Oximeter	13-Nov-92	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/149	4 West	Critikon - GE	8100	8100-K9065	Monitor, Vital Signs	27-May-93	24-May-05	1	1	1	1	1	1	0	0	0	0	1
4W/150	4 West	Nellcor- Mallinckrodt	N200	20784403	Pulse Oximeter	14-Oct-94	23-May-06	1	1	0	0	0	0	0	0	0	0	0
4W/158	4 West	MDI	ESCORT II	3509	Monitor, Physiological	15-Apr-96	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/159	4 West	Nellcor- Mallinckrodt	N-20	20872610	Pulse Oximeter	24-Jul-96	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/161	4 West	Hewlett Packard	78834C	2943G00696	Monitor, Physiological	26-Nov-90	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/162	4 West	Hewlett Packard	78834C	3107G01605	Monitor, Physiological	1-May-91	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/163	4 West	Hewlett Packard	78834C	3113G02699	Monitor, Physiological	24-Jan-92	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/164	4 West	Hewlett Packard	78834C	3252A00826	Monitor, Physiological	10-Mar-93	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/177	4 West	Critikon - GE	117222	990H0015410	Monitor, Physiological	10-Jun-97	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/178	4 West	Critikon - GE	117277	4W/178	Power Supply, Mps Select	10-Jun-97	24-May-05	1	0	0	0	0	0	0	0	0	0	0

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4W/179	4 West	Critikon - GE	117322	990H0017256	Module, ECG/resp/temp	10-Jun-97	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/180	4 West	Critikon - GE	117300	990H0017692	Module, N.I.B.P.	10-Jun-97	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/181	4 West	Critikon - GE	117310	990H0017328	Module, Sao2/pleth	10-Jun-97	24-May-05	1	0	0	0	0	0	0	0	0	0	0
4W/182	4 West	Nellcor- Mallinckrodt	N-20	G00838339	Pulse Oximeter	18-Dec-00	10-Feb-07	1	1	1	0	0	0	0	0	0	0	0
4W/189	4 West	GE	1000	030M0420003	Monitor, Vital Signs	4-Feb-03		1	1	1	1	1	0	0	0	0	0	0
4W/190	4 West	GE	1000	030M0700024	Monitor, Vital Signs	4-Feb-03		1	1	1	1	1	0	0	0	0	0	0
4W/195	4 West	GE	1000	030M1980020	Monitor, Vital Signs	4-Feb-03		1	1	1	1	1	0	0	0	0	0	0
4W/196	4 West	GE	1000	030M1980016	Monitor, Vital Signs	4-Feb-03		1	1	1	1	1	0	0	0	0	0	0
4W/200	4 West	Nellcor- Mallinckrodt	N-595	go3850322	Pulse Oximeter	4-Mar-03		1	1	1	1	1	0	0	0	0	0	0
4W/228	4 West	Drager	MS18597E539D	5397721758	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	1	0	0
4W/229	4 West	Drager	MS18597E539D	5397706258	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/230	4 West	Drager	MS18597E539D	5397703457	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/231	4 West	Drager	MS18597E539D	5397719253	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	1	1	0
4W/232	4 West	Drager	MS18597E539D	5397702565	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/233	4 West	Drager	MS18597E539D	5397703956	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	1	0	1
4W/234	4 West	Drager	MS18597E539D	5397703564	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/235	4 West	Drager	MS18597E539D	5397785056	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/236	4 West	Drager	MS18597E539D	5397725353	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/237	4 West	Drager	MS18597E539D	5397706356	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/238	4 West	Drager	MS18597E539D	5397702761	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	1	0
4W/239	4 West	Drager	MS18597E539D	5397705856	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/240	4 West	Drager	MS18597E539D	5397716599	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/241	4 West	Drager	MS18597E539D	5397703760	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	1	0	0	0
4W/242	4 West	Drager	MS18597E539D	5397706561	Monitor, Physiological	23-Nov-06		0	1	1	1	1	0	0	0	0	0	0
4W/298	4 West	Nellcor- Mallinckrodt	N-65 Oximax	G06834037	Pulse Oximeter	23-Jan-07		0	0	0	1	1	0	0	0	0	0	0
4W/309	4 West	GE	1000	030M2940003	Monitor, Physiological	12-Jan-03		0	0	0	1	1	0	0	0	0	0	0
4W/313	4 West	Nellcor- Mallinckrodt	N-65 Oximax	G08818930	Pulse Oximeter	10-Mar-08		0	0	1	1	1	0	0	0	0	0	0
4W/314	4 West	Nellcor- Mallinckrodt	N-65 Oximax	G08818922	Pulse Oximeter	10-Mar-08		0	0	1	1	1	0	0	0	0	0	0
4W/324	4 West	Drager	MS18597	6000927867	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0
4W/325	4 West	Drager	MS18597	6000913579	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0

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5E/073	5 East	Nellcor- Mallincrodt	N-20P	20272098	Pulse Oximeter	4-Oct-94		1	1	1	1	1	1	0	1	0	0	0
5E/076	5 East	Critikon - GE	8100	8100-K9984	Monitor, Vital Signs	6-Oct-95		1	1	1	1	1	1	1	0	0	0	0
5E/085	5 East	Critikon - GE	9300	9300-H1192	Monitor, Vital Signs	15-Nov-97		1	1	1	1	1	0	1	0	4	2	2
5E/088	5 East	MDI	ESCORT II	3508	Monitor, Physiological	15-Apr-97	20-Apr-06	1	1	0	0	0	0	1	0	0	0	0
5E/095	5 East	MDI	ESCORT II	4618	Monitor, Physiological	16-Apr-98	23-May-06	1	1	0	0	0	0	1	0	0	0	0
5E/105	5 East	Nellcor- Mallincrodt	NPB-290	G00807108	Pulse Oximeter	5-Jan-00		1	1	1	1	1	0	0	0	0	0	0
5E/106	5 East	Nellcor- Mallincrodt	NPB-290	G00809736	Pulse Oximeter	5-Jan-00		1	1	1	1	1	1	0	0	0	0	0
5E/107	5 East	Nellcor- Mallincrodt	NPB-290	G00817480	Pulse Oximeter	5-Jan-00		1	1	1	1	1	0	2	0	0	0	0
5E/137	5 East	Critikon - GE	PRO 100	020M0159050	Monitor, Vital Signs	6-May-02		1	1	1	1	1	0	0	0	0	2	0
5E/152	5 East	Drager	MS18597E539D	5397645849	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	1	0	0
5E/153	5 East	Drager	MS18597E539D	5397660957	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	0	0
5E/154	5 East	Drager	MS18597E539D	5397866352	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	0	0
5E/155	5 East	Drager	MS18597E539D	5397830453	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	0	0
5E/156	5 East	Drager	MS18597E539D	5397856951	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	0	0
5E/157	5 East	Drager	MS18597E539D	5397768850	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	1	0	0	0
5E/158	5 East	Drager	MS18597E539D	5397845152	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	0	1
5E/159	5 East	Drager	MS18597E539D	5397669351	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	1	1	2	0
5E/160	5 East	Drager	MS18597E539D	5397825450	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	1	0	0
5E/161	5 East	Drager	MS18597E539D	5397648944	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	2	1	2	0
5E/162	5 East	Drager	MS18597E539D	5397646447	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	2	0
5E/163	5 East	Drager	MS18597E539D	5397861063	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	0	0
5E/164	5 East	Drager	MS18597E539D	5397646153	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	1	0	0
5E/165	5 East	Drager	MS18597E539D	5397836554	Monitor, Physiological	12-Jul-06		0	1	1	1	1	0	0	0	0	1	0
5E/235	5 East	Nellcor- Mallincrodt	N-65 Oximax	G06834105	Pulse Oximeter	23-Jan-07		0	1	1	1	1	0	0	0	0	0	0
5E/236	5 East	Nellcor- Mallincrodt	N-65 Oximax	G06834021	Pulse Oximeter	23-Jan-07		0	1	1	1	1	0	0	1	0	0	0
5E/237	5 East	Nellcor- Mallincrodt	N-65 Oximax	G06834067	Pulse Oximeter	23-Jan-07		0	1	1	1	1	0	0	0	0	1	0
5E/255	5 East	Nellcor- Mallincrodt	N-65 Oximax	G08809168	Pulse Oximeter	20-Jun-08		0	0	1	1	1	0	0	0	0	0	0
5E/256	5 East	Nellcor- Mallincrodt	N-65 Oximax	G08809189	Pulse Oximeter	20-Jun-08		0	0	1	1	1	0	0	0	0	0	0
5E/257	5 East	Nellcor- Mallincrodt	N-65 Oximax	G08809198	Pulse Oximeter	20-Jun-08		0	0	1	1	1	0	0	0	0	0	0
5E/258	5 East	Nellcor- Mallincrodt	N-65 Oximax	G08809221	Pulse Oximeter	20-Jun-08		0	0	1	1	1	0	0	0	0	0	0

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5E/269	5 East	Drager	MS18597	5399764057	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0
5E/270	5 East	Drager	MS18597	60001313775	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0
5E/271	5 East	Drager	MS18597	5399037557	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0
5E/272	5 East	Drager	MS18597	5399001168	Monitor, Physiological	6-Jan-09		0	0	0	1	1	0	0	0	0	0	0
EM/108	Emergency	Critikon - GE	8100	K3295	Monitor, Vital Signs	30-Oct-92		1	1	1	1	1	0	0	1	1	0	0
EM/111	Emergency	Hewlett Packard	78834C	3204A00160	Monitor, Physiological	16-Mar-93	4-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/116	Emergency	Critikon - GE	8100	8100-K7537	Monitor, Vital Signs	18-Jan-94		1	1	1	1	1	0	0	0	1	0	1
EM/117	Emergency	Critikon - GE	8100	8100-K7538	Monitor, Vital Signs	18-Jan-94		1	1	1	1	1	0	0	2	0	0	0
EM/131	Emergency	Nellcor- Mallinicrodt	N-20	20086466	Pulse Oximeter	8-Mar-96		1	1	1	1	1	0	0	0	0	0	0
EM/132	Emergency	Nellcor- Mallinicrodt	N-20	20086465	Pulse Oximeter	24-Mar-96		1	1	1	1	1	0	0	0	0	0	0
EM/152	Emergency	Nellcor- Mallinicrodt	N-20	20772842	Pulse Oximeter	30-Mar-98		1	1	1	1	1	0	1	0	0	0	0
EM/153	Emergency	Nellcor- Mallinicrodt	N-20	20772854	Pulse Oximeter	30-Mar-98		1	0	0	0	0	1	0	0	0	0	0
EM/160	Emergency	MDI	ESCORT II	3226	Monitor, Physiological	2-Jan-97	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/203	Emergency	Hewlett Packard	M1094B	3806187683	Monitor, Video, Colour	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/204	Emergency	Hewlett Packard	M1166A	3826A80349	Computer Mainframe	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/206	Emergency	Hewlett Packard	M1020A	3805A97251	Module, Sae2/pleth	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/207	Emergency	Hewlett Packard	M1016A	3805G12156	Module, Co2 End Tidal	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/208	Emergency	Hewlett Packard	M1006B	3805G53268	Module, Invasive Pressure	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/212	Emergency	Hewlett Packard	M1106C	3504A50197	Monitor, Keypad	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/213	Emergency	Hewlett Packard	M1116B	3809A72963	Module, Recorder	1-Apr-99	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/222	Emergency	Nellcor- Mallinicrodt	NPB-290	G99826039	Pulse Oximeter	1-Apr-99	15-Aug-07	1	1	1	0	0	0	0	0	0	0	0
EM/271	Emergency	Hewlett Packard	M1205A	4006A83694	Monitor, Physiological	15-Feb-01	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/273	Emergency	Hewlett Packard	M1002B	DE01765547	Module, ECG/respiration	15-Feb-01	31-Mar-08	1	1	1	0	0	0	0	0	0	0	0
EM/289	Emergency	GE	400	030M1128038	Monitor, Vital Signs	24-Jun-03		1	1	1	1	1	0	0	1	0	0	0
EM/292	Emergency	GE	400	030M3018007	Monitor, Vital Signs	24-Jun-03		1	1	1	1	1	0	0	1	0	0	0
EM/293	Emergency	GE	400	030M3018048	Monitor, Vital Signs	24-Jun-03		1	1	1	1	1	1	1	0	1	1	0
EM/295	Emergency	Nellcor- Mallinicrodt	N-595	G03839501	Pulse Oximeter	26-Nov-03	7-Nov-07	1	1	0	0	0	0	0	0	0	0	0
EM/296	Emergency	Nellcor- Mallinicrodt	N-595	G03844804	Pulse Oximeter	26-Nov-03	7-Nov-07	1	1	0	0	0	0	0	0	0	0	0
EM/297	Emergency	Nellcor- Mallinicrodt	N-595	G03844593	Pulse Oximeter	26-Nov-03	7-Nov-07	1	1	0	0	0	0	0	0	0	0	0
EM/349	Emergency	Nellcor- Mallinicrodt	N-65	G06836643	Pulse Oximeter	26-Nov-03	7-Nov-07	1	1	0	0	0	0	0	0	0	0	0

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EM/350	Emergency	Nellcor- Mallincrodt	N-65	G06836674	Pulse Oximeter	26-Nov-03		1	1	1	1	1	0	0	0	0	0	0
EM/351	Emergency	Nellcor- Mallincrodt	N-65	G06836629	Pulse Oximeter	26-Nov-03		1	1	1	1	1	0	0	0	0	0	0
EM/352	Emergency	Nellcor- Mallincrodt	N-65	G06836640	Pulse Oximeter	26-Nov-03		1	1	1	1	1	0	0	0	0	0	0
EM/353	Emergency	Nellcor- Mallincrodt	N-65	G06836638	Pulse Oximeter	26-Nov-03		1	1	1	1	1	0	0	0	0	0	0
EM/365	Emergency	Nellcor- Mallincrodt	N-600	G06835182	Pulse Oximeter	26-Nov-03		1	1	1	1	1	0	0	0	0	0	0
EM/368	Emergency	Nellcor- Mallincrodt	N-600	G06831535	Pulse Oximeter	26-Nov-03		1	1	1	1	1	0	0	0	0	0	0
EM/373	Emergency	Nellcor- Mallincrodt	N-85	97514760	Monitor, Capnograph/Pulse Oximeter	27-Nov-08		0	0	0	1	1	0	0	0	0	2	0
EM/814	Emergency	Hewlett Packard	M1008B	DE91106314	Module, NIBP	10-Mar-05	26/02/08	1	1	1	1	1	0	0	0	0	0	0
EM/816	Emergency	Hewlett Packard	M1116B	4011A00148	Module, Recorder	10-Mar-05	26/02/08	1	1	1	1	1	0	0	0	0	0	0
EM/825	Emergency	Nellcor- Mallincrodt	NPB-40	G05887064	Pulse Oximeter	12-Sep-05		0	1	1	1	1	0	0	0	0	0	0
EM/826	Emergency	Nellcor- Mallincrodt	NPB-40	G05887063	Pulse Oximeter	12-Sep-05		0	1	1	1	1	0	0	0	0	0	0
EM/832	Emergency	GE	1000	030M1980018	Monitor, Vital Signs	14-Aug-03		1	1	1	1	1	0	0	1	0	0	0
EM/833	Emergency	Drager	MS18597	5399017659	Monitor, Physiological	30-Apr-08		0	0	0	1	1	0	0	0	3	0	0
EM/837	Emergency	Drager	MS18597	5399009356	Monitor, Physiological	30-Mar-08		0	0	0	1	1	0	0	0	0	0	0
EM/839	Emergency	Drager	MS18597	5399038057	Monitor, Physiological	30-Mar-08		0	0	0	1	1	0	0	0	0	0	0
EM/841	Emergency	Drager	MS18597	5399044451	Monitor, Physiological	30-Mar-08		0	0	0	1	1	0	0	0	1	0	0
EM/843	Emergency	Drager	7862696E559U	SI0727001893	Module, End-tidal CO2 pod, microstream	30-Mar-08		0	0	0	1	1	0	0	0	0	0	0
EM/844	Emergency	Drager	7862696E559U	SI0727001870	Module, End-tidal CO2 pod, microstream	30-Mar-08		0	0	0	1	1	0	0	0	0	0	0
EM/846	Emergency	Drager	7862696E559U	SI0723001808	Module, End-tidal CO2 pod, microstream	30-Mar-08		0	0	0	1	1	0	0	0	0	0	0
EM/849	Emergency	Drager	7862696E559U	SI0723001828	Module, End-tidal CO2 pod, microstream	30-Mar-08		0	0	0	1	1	0	0	0	0	0	0
EM/864	Emergency	Drager	MS18623	5750094571	Monitor, Physiological	15-Jul-08		0	0	0	0	1	0	0	0	0	0	0
EM/865	Emergency	Drager	MS18623	5750094767	Monitor, Physiological	15-Jul-08		0	0	0	0	1	0	0	0	0	0	0
EM/866	Emergency	Drager	MS18623	5750094669	Monitor, Physiological	15-Jul-08		0	0	0	0	1	0	0	0	0	0	0
EM/867	Emergency	Drager	MS18623	5750090967	Monitor, Physiological	15-Jul-08		0	0	0	0	1	0	0	0	0	0	0
EM/868	Emergency	Drager	MS18623	5750091868	Monitor, Physiological	15-Jul-08		0	0	0	0	1	0	0	0	0	0	0
EM/869	Emergency	Drager	MS18623	5750092965	Monitor, Physiological	15-Jul-08		0	0	0	0	1	0	0	0	0	0	0
EM/871	Emergency	GE	v100	SDT08300026SP	Monitor, Vital Signs	28-Aug-08		0	0	0	0	1	0	0	0	0	0	0
EM/872	Emergency	GE	v100	SDT08300030SP	Monitor, Vital Signs	28-Aug-08		0	0	0	0	1	0	0	0	0	0	0
EM/873	Emergency	GE	v100	SDT08300032SP	Monitor, Vital Signs	28-Aug-08		0	0	0	0	1	0	0	0	0	1	0
EM/874	Emergency	GE	v100	SDT08300015SP	Monitor, Vital Signs	28-Aug-08		0	0	0	0	1	0	0	0	0	2	0

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IC/143	PICU	Hewlett Packard	M1002A	2926A02774	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/144	PICU	Hewlett Packard	M1006A	2922A09930	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/148	PICU	Hewlett Packard	M1046A	2924A04478	MONITOR,CPU SECTION	25-Oct-89	14-May-07	1	1	1	1	0	0	0	0	0	0	0	0
IC/149	PICU	Hewlett Packard	M1002A	2926A02768	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0	0
IC/150	PICU	Hewlett Packard	M1006A	2922A09937	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/154	PICU	Hewlett Packard	M1046A	2924A04475	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0	0
IC/155	PICU	Hewlett Packard	M1002A	2926A02772	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	1	0	0	0	0
IC/157	PICU	Hewlett Packard	M1006A	2922A09929	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0	0
IC/160	PICU	Hewlett Packard	M1046A	2924A04479	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/161	PICU	Hewlett Packard	M1002A	2926A02647	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/162	PICU	Hewlett Packard	M1006A	2922A09003	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/166	PICU	Hewlett Packard	M1046A	2924A04477	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/167	PICU	Hewlett Packard	M1002A	2926A02648	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/169	PICU	Hewlett Packard	M1006A	2922A09932	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0	0
IC/172	PICU	Hewlett Packard	M1046A	2924A04476	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/173	PICU	Hewlett Packard	M1002A	2926A02649	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/175	PICU	Hewlett Packard	M1006A	2922A09005	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/177	PICU	Hewlett Packard	M1006A	2922A00370	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/178	PICU	Hewlett Packard	M1006A	2922A09938	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0	0
IC/179	PICU	Hewlett Packard	M1006A	2922A09002	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/180	PICU	Hewlett Packard	M1006A	2922A09004	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/181	PICU	Hewlett Packard	M1006A	2922A09006	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/195	PICU	Hewlett Packard	M1008A	3805A70503	MODULE,N.I.B.P.	30-Aug-90	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0	0
IC/196	PICU	Hewlett Packard	M1008A	3029A06783	MODULE,N.I.B.P.	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/204	PICU	Hewlett Packard	M1020A	3039A07667	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0	0
IC/205	PICU	Hewlett Packard	M1020A	3039A07677	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/206	PICU	Hewlett Packard	M1020A	303907678	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/207	PICU	Hewlett Packard	M1020A	3039A07679	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/208	PICU	Hewlett Packard	M1020A	3039A07683	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0
IC/209	PICU	Hewlett Packard	M1020A	3039A07682	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0	0

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EM/875	Emergency	GE	v100	SDT08300067SP	Monitor, Vital Signs	28-Aug-08		0	0	0	0	1	0	0	0	0	2	0
EM/892	Emergency	Drager	MS18597	5398995549	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/902	Emergency	Drager	MS18597	5398998644	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	1	0
EM/905	Emergency	Drager	MS18597	5398996646	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	1	0
EM/908	Emergency	Drager	MS18597	5399018453	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	1
EM/909	Emergency	Drager	MS18597	6000919965	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/912	Emergency	Drager	MS18597	6000925370	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/915	Emergency	Drager	7862696E559U	SI0909002699	Module, End-tidal CO2 pod, microstream	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/916	Emergency	Drager	MS18597	6000936964	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/923	Emergency	Drager	MS18597	5398878649	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/926	Emergency	Drager	MS18597	5398958946	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
EM/929	Emergency	Drager	MS18597	5398888647	Monitor, Physiological	18-Sep-09		0	0	0	0	1	0	0	0	0	0	0
IC/025	PICU	Hewlett Packard	M1012A	2924A00474	MODULE,CARDIAC OUTPUT	11-Jan-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/026	PICU	Hewlett Packard	M1020A	2928A04161	MODULE,SAO2/PLETH	14-Mar-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/027	PICU	Hewlett Packard	M1020A	2928A04162	MODULE,SAO2/PLETH	14-Mar-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/028	PICU	Hewlett Packard	M1020A	2928A03862	MODULE,SAO2/PLETH	14-Mar-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/032	PICU	MDI	E100-1	4299	Monitor, Physiological	31-Jul-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/116	PICU	Hewlett Packard	M1046A	2924A04472	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	2	0	0	0	0
IC/117	PICU	Hewlett Packard	M1020A	2922A01923	MODULE,SAO2/PLETH	25-Oct-89	24-Aug-09	1	1	1	1	0	1	1	0	0	0	0
IC/119	PICU	Hewlett Packard	M1006A	3731A45332	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/120	PICU	Hewlett Packard	M1002A	2926A02770	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/123	PICU	Hewlett Packard	M1002A	2926A02771	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/124	PICU	Hewlett Packard	M1008A	3226A07383	MODULE,N.I.B.P.	24-Jun-93	24-Aug-09	1	1	1	1	0	0	0	3	2	0	0
IC/126	PICU	Hewlett Packard	M1006A	2922A09931	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/128	PICU	Hewlett Packard	M1046A	2924A04473	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/129	PICU	Hewlett Packard	M1002A	2926A02776	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/130	PICU	Hewlett Packard	M1006A	2922A09935	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/136	PICU	Hewlett Packard	M1046A	2924A04481	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/137	PICU	Hewlett Packard	M1002A	2926A02775	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/139	PICU	Hewlett Packard	M1006A	2922A09936	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0

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IC/143	PICU	Hewlett Packard	M1002A	2926A02774	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/144	PICU	Hewlett Packard	M1006A	2922A09930	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/148	PICU	Hewlett Packard	M1046A	2924A04478	MONITOR,CPU SECTION	25-Oct-89	14-May-07	1	1	1	1	0	0	0	0	0	0	0
IC/149	PICU	Hewlett Packard	M1002A	2926A02768	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/150	PICU	Hewlett Packard	M1006A	2922A09937	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/154	PICU	Hewlett Packard	M1046A	2924A04475	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/155	PICU	Hewlett Packard	M1002A	2926A02772	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	1	0	0	0
IC/157	PICU	Hewlett Packard	M1006A	2922A09929	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/160	PICU	Hewlett Packard	M1046A	2924A04479	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/161	PICU	Hewlett Packard	M1002A	2926A02647	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/162	PICU	Hewlett Packard	M1006A	2922A09003	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/166	PICU	Hewlett Packard	M1046A	2924A04477	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/167	PICU	Hewlett Packard	M1002A	2926A02648	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/169	PICU	Hewlett Packard	M1006A	2922A09932	MODULE,INVASIVE PRESSURE	25-Oct-89	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/172	PICU	Hewlett Packard	M1046A	2924A04476	MONITOR,CPU SECTION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/173	PICU	Hewlett Packard	M1002A	2926A02649	MODULE,ECG/RESPIRATION	25-Oct-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/175	PICU	Hewlett Packard	M1006A	2922A09005	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/177	PICU	Hewlett Packard	M1006A	2922A00370	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/178	PICU	Hewlett Packard	M1006A	2922A09938	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/179	PICU	Hewlett Packard	M1006A	2922A09002	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/180	PICU	Hewlett Packard	M1006A	2922A09004	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/181	PICU	Hewlett Packard	M1006A	2922A09006	MODULE,INVASIVE PRESSURE	6-Sep-89	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/195	PICU	Hewlett Packard	M1008A	3805A70503	MODULE,N.I.B.P.	30-Aug-90	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/196	PICU	Hewlett Packard	M1008A	3029A06783	MODULE,N.I.B.P.	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/204	PICU	Hewlett Packard	M1020A	3039A07667	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/205	PICU	Hewlett Packard	M1020A	3039A07677	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/206	PICU	Hewlett Packard	M1020A	3039A07678	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/207	PICU	Hewlett Packard	M1020A	3039A07679	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/208	PICU	Hewlett Packard	M1020A	3039A07683	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/209	PICU	Hewlett Packard	M1020A	3039A07682	MODULE,SAO2/PLETH	30-Aug-90	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0

AssetID	Location	MakeID	ModelID	Serial Number	Description	Date II	Date RI	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
IC/233	PICU	Hewlett Packard	M1006A	3126A4225	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/234	PICU	Hewlett Packard	M1006A	3126A42212	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/235	PICU	Hewlett Packard	M1006A	3126A42213	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/236	PICU	Hewlett Packard	M1006A	3126A42224	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/237	PICU	Hewlett Packard	M1006A	3126A42222	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	1	0	0	0
IC/238	PICU	Hewlett Packard	M1006A	3126A42216	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	1	0	0	0
IC/239	PICU	Hewlett Packard	M1006A	3126A42211	MODULE,INVASIVE PRESSURE	18-Dec-91	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/250	PICU	Hewlett Packard	M1008B	3209A01837	MODULE,N.I.B.P.	15-Apr-92	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/251	PICU	Hewlett Packard	M1008B	3516A31016	MODULE,N.I.B.P.	5-Jan-96	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/261	PICU	Hewlett Packard	M1006A	3218A29259	MODULE,INVASIVE PRESSURE	21-May-92	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/262	PICU	Hewlett Packard	M1006A	3218A47290	MODULE,INVASIVE PRESSURE	21-May-92	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/270	PICU	Hewlett Packard	M1046A	3110A17723	MONITOR,CPU SECTION	5-Jun-92	24-Aug-09	1	1	1	1	0	0	0	1	0	0	0
IC/272	PICU	Hewlett Packard	M1046A	3130A23436	MONITOR,CPU SECTION	5-Jun-92	24-Aug-09	1	1	1	1	0	0	0	0	0	0	0
IC/333	PICU	Hewlett Packard	M1008B	3413A19039	MODULE,N.I.B.P.	29-Aug-96	24-Aug-09	1	1	1	1	0	1	0	0	0	0	0
IC/334	PICU	Hewlett Packard	M1008B	3523A47505	MODULE,N.I.B.P.	29-Aug-96	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/335	PICU	Hewlett Packard	M1008A	3251A06776	MODULE,N.I.B.P.	29-Aug-96	24-Aug-09	1	1	1	1	0	0	1	0	0	0	0
IC/460	PICU	Nellcor- Mallinckrodt	N-65	G06803389	Pulse Oximeter	5-Jan-06		1	1	1	1	1	1	0	0	0	0	1
IC/475	PICU	Nellcor- Mallinckrodt	N-65 Oximax	G06834097	Pulse Oximeter	23-Jan-07		0	0	1	1	1	0	0	0	0	0	0
IC/476	PICU	Nellcor- Mallinckrodt	N-600	G06831499	Pulse Oximeter	23-Jan-07		0	0	1	1	1	0	0	0	0	0	0
IC/495	PICU	Nellcor- Mallinckrodt	N-20	G00853602	Pulse Oximeter	27-Jan-01		0	0	1	1	1	0	0	0	1	0	0
IC/768	PICU	Drager	MS18596	6001025475	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/769	PICU	Drager	MS18596	6001026777	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/770	PICU	Drager	MS18596	6001011285	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/771	PICU	Drager	MS18596	6000961473	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/772	PICU	Drager	MS18596	6000961776	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	1	0
IC/773	PICU	Drager	MS18596	6000963872	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/774	PICU	Drager	MS18596	6001047077	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/775	PICU	Drager	MS18596	6001025083	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/776	PICU	Drager	MS18596	6000956773	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/777	PICU	Drager	MS18596	6000959770	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0

AssetID	Location	MakeID	ModelID	Serial Number	Description	Date II	Date RI	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
IC/778	PICU	Drager	MS18596	6001041974	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/793	PICU	Drager	7862696E559U	S10909002697	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/794	PICU	Drager	7862696E559U	S10909002702	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/795	PICU	Drager	7862696E559U	S10909002691	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/796	PICU	Drager	7862696E559U	S10909002725	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/797	PICU	Drager	7862696E559U	S10909002701	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/798	PICU	Drager	7862696E559U	S10909002689	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/799	PICU	Drager	7862696E559U	S10909002714	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/800	PICU	Drager	7862696E559U	S10909002676	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/801	PICU	Drager	7862696E559U	S10909002708	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/804	PICU	Drager	558822	5293818753	Infinity HemoMed	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/805	PICU	Drager	558822	5293820064	Infinity HemoMed	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/806	PICU	Drager	558822	5293818450	Infinity HemoMed	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/807	PICU	Drager	558822	5293818949	Infinity HemoMed	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/808	PICU	Drager	MS17441	5700135078	HemoMed-Picco	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/853	PICU	Drager	7862696E559U	SI0919002999	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/854	PICU	Drager	7862696E559U	SI0919003000	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
IC/860	PICU	Drager	7862696E559U	SI0927003037	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	1	0
IC/861	PICU	Drager	7862696E559U	SI0914002944	Module, End-tidal CO2 pod, microstream	28-Aug-09		0	0	0	0	1	0	0	0	0	0	0
NN/551	NICU	Hewlett Packard	M1002A	3523A44901	Module, ECG/respiration	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/552	NICU	Hewlett Packard	M1020A	3616A58606	Module, Sao2/pleth	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/553	NICU	Hewlett Packard	M1008B	3523A47544	Module, N.I.B.P.	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/554	NICU	Hewlett Packard	M1204A	3628A09901	Monitor, Video, Colour	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/556	NICU	Hewlett Packard	M1002A	3727a26120	Module, ECG/respiration	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/557	NICU	Hewlett Packard	M1020A	3616A58759	Module, Sao2/pleth	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/558	NICU	Hewlett Packard	M1008B	3523A47595	Module, N.I.B.P.	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/559	NICU	Hewlett Packard	M1204A	3628A09905	Monitor, Video, Colour	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/561	NICU	Hewlett Packard	M1002A	3523A44961	Module, ECG/respiration	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/562	NICU	Hewlett Packard	M1020A	3616A58612	Module, Sao2/pleth	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0
NN/563	NICU	Hewlett Packard	M1008B	3523A47547	Module, N.I.B.P.	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0

AssetID	Location	MakeID	ModelID	Serial Number	Description	Date II	Date RI	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NN/564	NICU	Hewlett Packard	M1204A	3628A09903	Monitor, Video, Colour	29-Aug-96		1	1	1	1	1	0	0	0	2	0	0	
NN/566	NICU	Hewlett Packard	M1002A	3523A44879	Module, ECG/respiration	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0	
NN/567	NICU	Hewlett Packard	M1020A	3616A58608	Module, Sao2/pleth	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0	
NN/568	NICU	Hewlett Packard	M1008B	3523A47537	Module, N.I.B.P.	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0	
NN/571	NICU	Hewlett Packard	M1018A	3604G01931	Module, O2 / Co2	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0	
NN/572	NICU	Hewlett Packard	M1018A	3604G01831	Module, O2 / Co2	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0	
NN/573	NICU	Hewlett Packard	M1018A	3604G01973	Module, O2 / Co2	29-Aug-96		1	1	1	1	1	0	0	0	1	0	0	
NN/579	NICU	Hewlett Packard	M1008B	3523A48531	Module, N.I.B.P.	29-Aug-96		1	1	1	1	1	0	0	0	1	0	0	
NN/580	NICU	Hewlett Packard	M1018A	3604G01969	Module, O2 / Co2	29-Aug-96		1	1	1	1	1	0	0	0	0	0	0	
NN/581	NICU	Hewlett Packard	M1018A	3604G01960	Module, O2 / Co2	29-Aug-96	17-Oct-08	1	1	1	1	1	0	0	0	0	0	0	
NN/593	NICU	Nellcor- Mallincrodt	N-180	20217603	Pulse Oximeter	19-Jan-93		1	1	1	1	1	0	0	0	0	0	0	
NN/594	NICU	Nellcor- Mallincrodt	N-180	20217049	Pulse Oximeter	19-Jan-93		1	1	1	1	1	0	0	0	0	0	0	
NN/699	NICU	Nellcor- Mallincrodt	N-20E	G02800034	Pulse Oximeter	28-Feb-02		1	1	1	1	1	0	0	1	1	1	0	
NN/719	NICU	Hewlett Packard	M1002A	3523A44914	Module, ECG/respiration	20-Apr-04		1	1	1	1	1	1	0	0	0	0	0	
NN/737	NICU	Hewlett Packard	M1008B	3226A04016	Module, N.I.B.P.	20-Apr-04		1	1	1	1	1	0	1	1	0	0	0	
NN/738	NICU	Hewlett Packard	M1008B	3226A04015	Module, N.I.B.P.	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/739	NICU	Hewlett Packard	M1008B	DE911E1668	Module, N.I.B.P.	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/740	NICU	Hewlett Packard	M1204A	3713A17826	Monitor, Video, Colour, patient	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/742	NICU	Hewlett Packard	M1002A	3410A30664	Module, ECG/respiration	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/743	NICU	Hewlett Packard	M1020A	2927A02895	Module, Sao2/pleth	20-Apr-04		1	1	1	1	1	0	1	0	0	0	0	
NN/744	NICU	Hewlett Packard	M1204A	3713A17825	Monitor, Video, Colour, patient	20-Apr-04		1	1	1	1	1	0	0	0	1	0	0	
NN/746	NICU	Hewlett Packard	M1002A	3523A51919	Module, ECG/respiration	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/747	NICU	Hewlett Packard	M1020A	2927A02896	Module, Sao2/pleth	20-Apr-04		1	1	1	1	1	0	0	1	0	0	0	
NN/748	NICU	Hewlett Packard	M1008B	3727A38421	Module, N.I.B.P.	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/749	NICU	Hewlett Packard	M1008B	372G55176	Module, N.I.B.P.	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/750	NICU	Hewlett Packard	M1204A	3642A15423	Monitor, Video, Colour, patient	20-Apr-04		1	1	1	1	1	0	0	0	0	0	0	
NN/752	NICU	Hewlett Packard	M1002A	3523A51976	Module, ECG/respiration	20-Apr-04		1	1	1	1	1	0	0	1	0	0	0	
NN/753	NICU	Hewlett Packard	M1020A	2927A02894	Module, Sao2/pleth	20-Apr-04		1	1	1	1	1	0	0	1	0	0	0	
NN/766	NICU	Nellcor- Mallincrodt	N-600	G06831482	Pulse Oximeter	18-Jan-07		0	0	1	1	1	0	0	0	0	0	0	
NN/767	NICU	Nellcor- Mallincrodt	N-600	G06831494	Pulse Oximeter	18-Jan-07		0	0	1	1	1	0	0	0	0	0	0	

NN/768	NICU	Nellcor- Mallinicrodt	N-600	G06831498	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	1	0
NN/769	NICU	Nellcor- Mallinicrodt	N-600	G06831479	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/770	NICU	Nellcor- Mallinicrodt	N-600	G06831460	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	1	0	0
NN/771	NICU	Nellcor- Mallinicrodt	N-600	G06835181	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/772	NICU	Nellcor- Mallinicrodt	N-600	G06831447	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/773	NICU	Nellcor- Mallinicrodt	N-600	G06831474	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	1	0
NN/774	NICU	Nellcor- Mallinicrodt	N-600	G06831458	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	1	0
NN/775	NICU	Nellcor- Mallinicrodt	N-600	G06831473	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/776	NICU	Nellcor- Mallinicrodt	N-65 Oximax	G06834015	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/777	NICU	Nellcor- Mallinicrodt	N-65 Oximax	G06834044	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/779	NICU	Nellcor- Mallinicrodt	N-600	G06834179	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	1	0
NN/780	NICU	Nellcor- Mallinicrodt	N-600	G06835256	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	1	0	0	0
NN/781	NICU	Nellcor- Mallinicrodt	N-600	G06835259	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/782	NICU	Nellcor- Mallinicrodt	N-600	G06831451	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/783	NICU	Nellcor- Mallinicrodt	N-600	G06835158	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/784	NICU	Nellcor- Mallinicrodt	N-600	G06831500	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	1	0	0
NN/785	NICU	Nellcor- Mallinicrodt	N-600	G06831532	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	1	0	0	0
NN/786	NICU	Nellcor- Mallinicrodt	N-600	G06831483	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	1	0	0
NN/787	NICU	Nellcor- Mallinicrodt	N-600	G06831478	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/819	NICU	Nellcor- Mallinicrodt	N-600	G07812306	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	0	0	0
NN/820	NICU	Nellcor- Mallinicrodt	N-600	G0781224	Pulse Oximeter	18-Jan-07	0	0	1	1	1	0	0	0	1	0	0
NN/888	NICU	Drager	MS18596	6000985465	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/889	NICU	Drager	MS18596	6000961277	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/890	NICU	Drager	MS18596	6000961580	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/891	NICU	Drager	MS18596	6001038470	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/892	NICU	Drager	MS18596	6000982967	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/893	NICU	Drager	MS18596	6000960875	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/894	NICU	Drager	MS18596	6001041778	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/895	NICU	Drager	MS18596	6000957772	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0
NN/896	NICU	Drager	MS18596	6000957175	Monitor, Physiological	28-Aug-09	0	0	0	0	1	0	0	0	0	0	0

AssetID	Location	MakeID	ModelID	Serial Number	Description	Date It	Date R	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
NN/897	NICU	Drager	MS18596	6000985768	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/898	NICU	Drager	MS18596	6000962472	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/899	NICU	Drager	MS18596	6001046773	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/900	NICU	Drager	MS18596	6001038577	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/901	NICU	Drager	MS18596	6000960973	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	1
NN/902	NICU	Drager	MS18596	6000960679	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/903	NICU	Drager	MS18596	6000963079	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/904	NICU	Drager	MS18596	6000962971	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/905	NICU	Drager	MS18596	6000985269	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/906	NICU	Drager	MS18596	6001048869	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
NN/907	NICU	Drager	MS18596	6000960376	Monitor, Physiological	28-Aug-09		0	0	0	0	1	0	0	0	0	0
TOTALS								22	24	40	50	58	15				

Appendix 2

Syringe Pump Data Spreadsheet

AssetID	SerialNumber	Description	Date INS	Date RET	2005-1	2005-2	2005-3	2005-4	2005-5	2005-6	2005-7	2005-8	2005-9	2005-10	2005-11	2005-12
4F/057	8002-07934	Pump, Syringe	29-May-01		1	1	1	1	1	1	0	0	0	0	0	0
4F/058	8002-05892	Pump, Syringe	29-May-01		1	1	1	1	1	0	0	1	3	0	0	0
4F/059	8002-05675	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	0	0	0	0	1	0
4F/060	8002-08011	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	1	0	0	0	0	0
4F/061	8002-08306	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	0	0	0	1	0	0
BM/1047	M70302	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0
IP/088	M70036	Pump, Syringe, Infusion (Medfusion)	17-Sep-09		0	0	0	0	1	0	0	0	0	0	0	0
IP/089	M70279	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	1	0	0
DS/041	8002-05681	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	0	0	0	0	0	0
DS/042	8002-08031	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	0	0	0	0	0	0
EM/276	8002-08028	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	0	0	0	0	0	0
EM/277	8002-05493	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	0	0	0	1	0	0
EM/278	8002-05725	Pump, Syringe	4-Jun-01		1	1	1	1	1	0	1	0	1	0	0	0
IP/001	M70251	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/002	M70322	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/003	M70330	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/004	M70041	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/005	M69994	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/006	M70328	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/007	M70333	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/008	M70350	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	1	0	0
IP/009	M70313	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/010	M70277	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/011	M70011	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/012	M70013	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	1	0	0
IP/013	M70017	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/014	M70329	Pump, Syringe, Infusion (Medfusion)	28-Jan-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/015	M70260	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0
IP/016	M70341	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2006-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-1	2012-2	2012-3	2012-4	2012-5	2012-6	2012-7	2012-8	2012-9	2012-10	2012-11	2012-12
IP/017	M70042	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/018	M70284	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/019	M70320	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/020	M70342	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/021	M70037	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/022	M70323	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/023	M69999	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/024	M70263	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/025	M69995	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/026	M69990	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/027	M70355	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/028	M70315	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/029	M70265	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/030	M70314	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/031	M70319	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/032	M70351	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/033	M70291	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/034	M70269	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/035	M70282	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/036	M70025	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/037	M71072	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/038	M69937	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/039	M70347	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/040	M70326	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/041	M70276	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/042	M70262	Pump, Syringe, Infusion (Medfusion)	15-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/043	M70297	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/044	M70348	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/045	M70332	Pump, Syringe, Infusion (Medfusion)	2-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IP/046	M70325	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
IP/047	M70043	Pump, Syringe, Infusion (Medfusion)	17-Sep-09		0	0	0	0	1	0	0	0	0	0
IP/048	M70258	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/049	M70275	Pump, Syringe, Infusion (Medfusion)	3-Feb-10		0	0	0	0	1	0	0	0	0	0
IP/050	M70289	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/051	M70318	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/052	M70022	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/053	M70340	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/054	M70334	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/055	M70317	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/056	M70327	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/057	M70278	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/058	M70312	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/059	M70274	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/060	70353	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	1
IP/061	M70000	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/062	M70021	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/063	M69988	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/064	M70038	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/065	M70343	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/066	M70299	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/067	M70310	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/068	M70030	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/069	70007	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/070	M70337	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/071	M70354	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/072	M70035	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/073	M69998	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
IP/074	M69987	Pump, Syringe, Infusion (Medfusion)	17-Sep-09		0	0	0	0	1	0	0	0	0	0
IP/075	M70001	Pump, Syringe, Infusion (Medfusion)	17-Sep-09		0	0	0	0	1	0	0	0	0	0
IP/076	M70280	Pump, Syringe, Infusion (Medfusion)	28-Oct-09		0	0	0	0	1	0	0	0	0	0
IP/077	M70356	Pump, Syringe, Infusion (Medfusion)	28-Oct-09		0	0	0	0	1	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
IP/078	M70307	Pump, Syringe, Infusion (Medfusion)	28-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/079	M70039	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/080	M70008	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/081	M70034	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/082	M70285	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/083	M70045	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/084	M70311	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/085	M70270	Pump, Syringe, Infusion (Medfusion)	27-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/086	M70298	Pump, Syringe, Infusion (Medfusion)	28-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/087	M70295	Pump, Syringe, Infusion (Medfusion)	28-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/088	M70036		17-Sep-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/089	M70279		26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/090	M70281	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/091	M70331	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/092	M70256	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/093	M70309	Pump, Syringe, Infusion (Medfusion)	26-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/094	M69996	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/095	M70012	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/096	M70335	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/097	M70024	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/098	M70002	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/099	M70018	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/100	M71064	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/101	M70032	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/102	M69991	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/103	M70019	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/104	M70261	Pump, Syringe, Infusion (Medfusion)	15-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/105	M70046	Pump, Syringe, Infusion (Medfusion)	15-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/106	M70267	Pump, Syringe, Infusion (Medfusion)	15-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/107	M70292	Pump, Syringe, Infusion (Medfusion)	15-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/108	M70336	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/109	M70316	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/110	M70288	Pump, Syringe, Infusion (Medfusion)	15-Oct-09		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/111	M71059	Pump, Syringe, Infusion (Medfusion)	4-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/112	M70028	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/113	M71060	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/114	M71079	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/115	M70389	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/116	M70708	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/117	M71077	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
IP/118	M70321	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2005-1	2005-2	2005-3	2005-4	2005-5	2005-6	2005-7	2005-8	2005-9	2005-10	2005-11	2005-12
IP/119	M71063	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/120	M71061	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/121	M71070	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/122	M70264	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/123	M70705	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/124	M70397	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/125	M70706	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/126	M70702	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/127	M71058	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/128	M70014	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	1
IP/129	M70003	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/130	M70044	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/131	M71062	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/132	M70400	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/133	M70701	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/134	M70388	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/135	M70707	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/136	M70015	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/137	M69984	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/138	M70399	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/139	M70704	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/140	M71074	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/141	M70703	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/142	M70710	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/143	M71066	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/144	M70398	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/145	M70709	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/146	M71069	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/147	M71076	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/148	M71078	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/149	M71080	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0
IP/150	M71075	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
IP/151	M71042	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0
IP/152	M70026	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0
IP/153	M70006	Pump, Syringe, Infusion (Medfusion)	5-Feb-10		0	0	0	0	1	0	0	0	0	0
IC/409	8002-08336	Pump, Syringe	5-Apr-01		1	1	1	1	1	1	0	0	0	1
IC/410	8002-08305	Pump, Syringe	5-Apr-01		1	1	1	1	1	1	0	0	0	0
IC/411	8002-08323	Pump, Syringe	5-Apr-01		1	1	1	1	1	0	0	0	0	1
IC/412	8002-08296	Pump, Syringe	5-Apr-01		1	1	1	1	1	1	0	0	1	0
IC/413	8002-08304	Pump, Syringe	5-Apr-01		1	1	1	1	1	0	1	0	1	0
IC/414	8002-08324	Pump, Syringe	5-Apr-01		1	1	1	1	1	1	0	0	0	0
IC/415	8002-08311	Pump, Syringe	5-Apr-01		1	1	1	1	1	1	0	2	0	0
IC/416	8002-08295	Pump, Syringe	15-Jun-01		1	1	1	1	1	0	0	1	0	0
IC/417	8002-08313	Pump, Syringe	5-Apr-01		1	1	1	1	1	2	0	1	0	0
IC/418	8002-08330	Pump, Syringe	15-Jun-01		1	1	1	1	1	1	0	1	0	0
IC/419	8002-08328	Pump, Syringe	5-Apr-01		1	1	1	1	1	1	0	0	1	0
IC/420	8002-05741	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	1	0	0
IC/421	8002-08029	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0
IC/422	8002-05694	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0
IC/423	8002-05745	Pump, Syringe	6-Apr-01		1	1	1	1	1	2	0	0	0	0
IC/424	8002-05682	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	2	1	0	1
IC/426	8002-05723	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0
IC/427	8002-05450	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	2	0	0	0
IC/428	8002-06018	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	0	0	1	0
IC/429	8002-05679	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	2	0	0	0
IC/430	8002-08030	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	2	0
IC/431	8002-05684	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0
IC/432	8002-05749	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	0	0	0	0
IC/433	8002-08025	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	0	0	0	1
IC/434	8002-05771	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	0	0	0	0
IC/435	8002-05673	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0
IC/436	8002-05742	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	1	1	0
IC/437	8002-05731	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
IC/438	8002-08024	Pump, Syringe	6-Apr-01		1	1	1	1	1	1	1	0	0	0	0
IC/439	8002-08021	Pump, Syringe	6-Apr-01		1	1	1	1	1	2	1	0	0	0	0
IC/440	8002-05685	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0	0
IC/456	800235203	Pump, Syringe	15-Mar-05		1	1	1	1	1	1	1	0	0	0	1
IC/457	800235195	Pump, Syringe	15-Mar-05		1	1	1	1	1	2	1	0	1	0	0
IC/425	8002-05773	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0	0
NN/667	8002-08376	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	1	1	0	1	0
NN/676	8002-08329	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	1	0	0	0	0
NN/678	8002-08326	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	1	1	0	0	0
NN/797	800329475	Pump, Syringe	4-Jun-07	30-May-08	0	0	0	1	0	0	0	0	0	0	0
NN/807	800329473	Pump, Syringe	4-Jun-07	30-May-08	0	0	0	1	0	0	0	0	0	0	0
OR/0619	030049	Pump, Infusion, Syringe	8/16/1996	16-Dec-09	1	1	1	1	0	1	0	0	1	0	0
NN/663	8002-07941	Pump, Syringe	22-Mar-01		1	1	1	1	1	1	0	0	0	0	0
NN/664	8002-07936	Pump, Syringe	22-Mar-01		1	1	1	1	1	0	1	0	0	0	0
NN/665	8002-07940	Pump, Syringe	22-Mar-01		1	1	1	1	1	0	0	0	1	0	0
NN/666	8002-08010	Pump, Syringe	22-Mar-01	27-May-09	1	1	1	1	0	0	0	0	0	0	0
NN/667	8002-08010	Pump, Syringe	22-Mar-01	27-May-09	1	1	1	1	0	0	2	1	1	0	0
NN/668	8002-08546	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	1	2	0	0	0
NN/669	8002-08317	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	1	0	1	0
NN/670	8002-08300	Pump, Syringe	31-Mar-01		1	1	1	1	1	2	0	2	0	0	0
NN/671	8002-08310	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	0	0	0	0
NN/672	8002-08299	Pump, Syringe	31-Mar-01		1	1	1	1	1	1	0	0	0	0	0
NN/673	8002-08314	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	0	0	0	0
NN/674	8002-08547	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	1	0	0	0
NN/675	8002-08298	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	1	0	0	0
NN/677	8002-08303	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	1	0	0	0
NN/679	8002-08327	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	0	1	0	0
NN/680	8002-08309	Pump, Syringe	31-Mar-01		1	1	1	1	1	1	0	0	1	0	0
NN/681	8002-08318	Pump, Syringe	31-Mar-01	16-Jan-10	1	1	1	1	0	0	0	1	0	0	0
NN/682	8002-08325	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	1	0	1	0	0
NN/683	8002-08307	PUMP, SYRINGE	31-Mar-01		1	1	1	1	1	0	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
NN/684	8002-08384	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	0	0	0	0
NN/685	8002-08383	Pump, Syringe	31-Mar-01		1	1	1	1	1	0	0	0	0	1	0
NN/686	8002-08373	Pump, Syringe	31-Mar-01		1	1	1	1	1	1	1	0	0	1	0
NN/687	8002-08492	Pump, Syringe	31-Mar-01		1	1	1	1	1	1	0	0	0	0	0
NN/688	8002-08386	Pump, Syringe	31-Mar-01	21-Jan-10	1	1	1	1	0	0	1	0	0	1	0
NN/689	8002-08301	Pump, Syringe	31-Mar-01	19-Feb-10	1	1	1	1	0	0	0	0	0	0	0
NN/690	8002-08368	Pump, Syringe	31-Mar-01	18-Jan-10	1	1	1	1	0	0	0	0	0	0	0
NN/691	8002-08380	Pump, Syringe	31-Mar-01	15-Jan-09	1	1	1	1	0	0	0	0	1	0	0
NN/796	800329486	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/798	800329482	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/799	800329423	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/800	800329452	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/801	800329465	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/802	800329476	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	1
NN/803	800329470	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/804	800329471	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/805	800329477	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/806	800329487	Pump, Syringe	4-Jun-07		0	0	0	1	1	0	0	0	0	0	0
NN/696	80855	Pump, Syringe	24-Jan-02	1-Jan-10	1	1	1	1	1	0	0	0	0	0	0
NN/697	80888	Pump, Syringe	24-Jan-02	1-Jan-10	1	1	1	1	1	0	0	0	0	0	0
NN/698	79207	Pump, Syringe	24-Jan-02	1-Jan-10	1	1	1	1	1	0	0	0	0	0	0
OR/0544	005918	Pump, Infusion, Syringe	1-Nov-94		1	1	1	1	1	0	0	0	0	0	0
OR/0545	012452	Pump, Infusion, Syringe	1-Nov-94		1	1	1	1	1	0	0	0	0	0	0
OR/0567	015206	Pump, Infusion, Syringe, anaesthesia	1-Apr-96		1	1	1	1	1	0	0	0	0	2	0
OR/0568	015143	Pump, Infusion, Syringe	1-Apr-96		1	1	1	1	1	0	0	0	0	1	0
OR/0618	030048	Pump, Infusion, Syringe	2-Jun-97		1	1	1	1	1	1	0	0	0	1	0
OR/0676	487061998	Pump, Infusion, Syringe	2-Jun-97		1	1	1	1	1	0	0	0	0	0	0
OR/0818	8002-08502	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0	0
OR/0819	8002-08371	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0	0
OR/0820	8002-08370	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0	0
OR/0821	8002-08302	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
OR/0822	8002-08312	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0
OR/0823	8002-08297	Pump, Syringe	9-Feb-01		1	1	1	1	1	3	0	0	0	0
OR/0824	8002-08548	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0
OR/0825	8002-08504	Pump, Syringe	9-Feb-01		1	1	1	1	1	0	0	0	0	0
OR/0871	6002-17641	Pump, syringe, dose rate	4-Jan-02		1	1	1	1	1	0	0	0	0	0
OR/0872	6002-17647	Pump, syringe, dose rate	4-Jan-02		1	1	1	1	1	0	0	0	0	0
OR/0873	6002-17559	Pump, syringe, dose rate	4-Jan-02		1	1	1	1	1	0	0	0	0	0
OR/0874	6002-17644	Pump, syringe, dose rate	4-Jan-02		1	1	1	1	1	0	0	0	0	0
OR/0875	6002-17566	Pump, syringe, dose rate	4-Jan-02		1	1	1	1	1	0	0	0	0	0
OR/0876	6002-17553	Pump, syringe, dose rate	4-Jan-02		1	1	1	1	1	0	0	0	0	0
OR/1445	M70273	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1446	M70294	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1447	M70346	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1448	M70308	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1449	M70290	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1450	M70283	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1451	M70272	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1452	M70266	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1453	M70005	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1454	M70031	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0
OR/1455	M70029	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1456	M70300	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1457	M69993	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1458	M70286	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1459	M70301	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1460	M69989	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1461	M70338	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1462	M70020	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1463	M70009	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0
OR/1464	M70004	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0

AssetID	SerialNumber	Description	Date INS	Date RET	2005-6	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
OR/1465	M70010	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0	0
OR/1466	M69997	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0	0
OR/1467	M70027	Pump, Syringe, Infusion (Medfusion)	16-Sep-09		0	0	0	0	1	0	0	0	0	0	0
OR/1468	M70287	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1469	M70040	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1470	M70344	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1471	M70339	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1472	M70345	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1473	M70293	Pump, Syringe, Infusion (Medfusion)	22-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1474	M70296	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0
OR/1475	M70306	Pump, Syringe, Infusion (Medfusion)	20-Oct-09		0	0	0	0	1	0	0	0	0	0	0
UY/026	8002-07932	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0	0
UY/027	8002-08337	Pump, Syringe	6-Apr-01		1	1	1	1	1	0	0	0	0	0	0
TOTALS										37	23	21	19	18	6

Appendix 3

Detailed Summary Tables for the Monitor and Infusion Pump Data

	2005-6 Q1	2005-6 Q2	2005-6 Q3	2005-6 Q4	2005-7 Q1	2005-7 Q2	2005-7 Q3	2005-7 Q4	2005-8 Q1	2005-8 Q2	2005-8 Q3	2005-8 Q4	2005-9 Q1	2005-9 Q2	2005-9 Q3	2005-9 Q4	2005-10 Q1	2005-10 Q2	2005-10 Q3	2005-10 Q4	2005-11 Q1
NBE-Escorts	6	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	0	0	0	0
Critikon-NBE	29	27	26	26	24	25	25	25	26	29	29	29	29	29	29	29	20	20	20	20	20
HP-78834-series	7	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
HP-Merlin-Vidia	35	35	35	35	35	35	35	35	37	34	34	34	34	34	34	34	0	0	0	0	0
GE 1000-series	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9
Nellcor-SaO ₂ Monitors	47	39	47	48	44	47	47	76	78	74	74	74	74	74	74	74	75	75	75	75	75
Dräger-Infrared Monitors	0	0	0	0	0	14	53	53	53	53	53	53	57	57	57	65	65	128	128	128	128
Total Active	134	118	123	124	117	135	174	203	208	202	202	202	206	206	205	213	171	232	232	232	232
Different Types	6	6	6	6	6	7	7	7	7	6	6	6	6	6	6	6	4	4	4	4	4
P1	0.0448	0.0424	0.0325	0.0323	0.0256	0.0222	0.0172	0.0148	0.0144	0.0099	0.0099	0.0099	0.0097	0.0097	0.0098	0.0094	0.0117	0.0000	0.0000	0.0000	0.0000
P2	0.2164	0.2288	0.2114	0.2097	0.2051	0.1852	0.1437	0.1232	0.1250	0.1436	0.1436	0.1436	0.1408	0.1408	0.1415	0.1362	0.1170	0.0862	0.0862	0.0862	0.0862
P3	0.0522	0.0169	0.0081	0.0081	0.0085	0.0074	0.0057	0.0049	0.0048	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P4	0.2612	0.2966	0.2846	0.2823	0.2991	0.2593	0.2011	0.1724	0.1779	0.1683	0.1683	0.1683	0.1650	0.1650	0.1659	0.1596	0.0000	0.0000	0.0000	0.0000	0.0000
P5	0.0746	0.0847	0.0813	0.0806	0.0855	0.0741	0.0575	0.0493	0.0481	0.0495	0.0495	0.0495	0.0485	0.0485	0.0439	0.0423	0.0526	0.0388	0.0388	0.0388	0.0388
P6	0.3507	0.3305	0.3821	0.3871	0.3761	0.3481	0.2701	0.3744	0.3750	0.3663	0.3663	0.3663	0.3592	0.3592	0.3610	0.3474	0.4386	0.3233	0.3233	0.3233	0.3233
P7	0.0000	0.0000	0.0000	0.0000	0.0000	0.1037	0.3046	0.2611	0.2548	0.2624	0.2624	0.2624	0.2767	0.2767	0.2780	0.3052	0.3801	0.5517	0.5517	0.5517	0.5517
P1 ln(P1)	-0.1391	-0.1340	-0.1114	-0.1108	-0.0939	-0.0846	-0.0700	-0.0623	-0.0611	-0.0457	-0.0457	-0.0457	-0.0450	-0.0450	-0.0452	-0.0438	-0.0520	0.0000	0.0000	0.0000	0.0000
P2 ln(P2)	-0.3312	-0.3375	-0.3285	-0.3276	-0.3249	-0.3123	-0.2788	-0.2579	-0.2599	-0.2787	-0.2787	-0.2787	-0.2760	-0.2760	-0.2767	-0.2715	-0.2510	-0.2113	-0.2113	-0.2113	-0.2113
P3 ln(P3)	-0.1542	-0.0691	-0.0391	-0.0389	-0.0407	-0.0363	-0.0296	-0.0262	-0.0257	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P4 ln(P4)	-0.3507	-0.3605	-0.3576	-0.3570	-0.3610	-0.3500	-0.3226	-0.3031	-0.3071	-0.2999	-0.2999	-0.2999	-0.2973	-0.2973	-0.2980	-0.2929	0.0000	0.0000	0.0000	0.0000	0.0000
P5 ln(P5)	-0.1937	-0.2092	-0.2040	-0.2030	-0.2102	-0.1928	-0.1642	-0.1483	-0.1459	-0.1488	-0.1488	-0.1488	-0.1469	-0.1469	-0.1372	-0.1337	-0.1550	-0.1261	-0.1261	-0.1261	-0.1261
P6 ln(P6)	-0.3675	-0.3659	-0.3676	-0.3674	-0.3678	-0.3673	-0.3536	-0.3678	-0.3678	-0.3679	-0.3679	-0.3679	-0.3678	-0.3678	-0.3678	-0.3673	-0.3615	-0.3651	-0.3651	-0.3651	-0.3651
P7 ln(P7)	0.0000	0.0000	0.0000	0.0000	0.0000	-0.2350	-0.3621	-0.3506	-0.3484	-0.3511	-0.3511	-0.3511	-0.3555	-0.3555	-0.3559	-0.3622	-0.3677	-0.3281	-0.3281	-0.3281	-0.3281
Sum(P1-P7)	-1.5363	-1.4761	-1.4083	-1.4047	-1.3986	-1.5784	-1.5808	-1.5162	-1.5160	-1.4920	-1.4920	-1.4920	-1.4885	-1.4885	-1.4807	-1.4714	-1.1871	-1.0305	-1.0305	-1.0305	-1.0305
Users/problems (w/o)	7	3	7	2	5	6	7	6	8	8	17	7	15	10	14	16	13	14	19	12	6
Ratio Problem/Inventory	0.052	0.025	0.057	0.016	0.043	0.044	0.040	0.030	0.038	0.040	0.034	0.033	0.073	0.049	0.068	0.073	0.076	0.060	0.082	0.052	0.026
AE Suspected	0	0	0	1	1	2	0	2	0	0	0	1	1	0	1	0	1	0	3	0	1

Figure A3.1 – Expanded Physiological Monitor Data Table

	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2015:Q1	2015:Q2	2015:Q3	2015:Q4	2015:Q1
Aris Asena	84	84	84	84	84	84	84	84	84	96	96	96	96	96	96	92	87	87	87	87	37
Caesby3400	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	0	0
Aris TIVA	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0
Melusion3500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	15	15
Total Active	97	97	97	97	97	97	97	97	97	109	109	109	109	109	109	105	99	99	106	272	222
Different Types	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	4	4	2
P1	0.8880	0.8880	0.8880	0.8880	0.8880	0.8880	0.8880	0.8880	0.8880	0.8807	0.8807	0.8807	0.8807	0.8807	0.8807	0.8762	0.8788	0.8788	0.4439	0.3999	0.1657
P2	0.0722	0.0722	0.0722	0.0722	0.0722	0.0722	0.0722	0.0722	0.0722	0.0642	0.0642	0.0642	0.0642	0.0642	0.0642	0.0657	0.0606	0.0606	0.0306	0.0000	0.0000
P3	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.069	0.0550	0.0550	0.0550	0.0550	0.0550	0.0550	0.0571	0.0606	0.0606	0.0306	0.0000	0.0000
P4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4949	0.6601	0.8333
P1In(P1)	-0.1246	-0.1246	-0.1246	-0.1246	-0.1246	-0.1246	-0.1246	-0.1246	-0.1246	-0.1119	-0.1119	-0.1119	-0.1119	-0.1119	-0.1119	-0.1168	-0.1165	-0.1165	-0.3305	-0.3646	-0.2936
P2In(P2)	-0.1897	-0.1897	-0.1897	-0.1897	-0.1897	-0.1897	-0.1897	-0.1897	-0.1897	-0.1763	-0.1763	-0.1763	-0.1763	-0.1763	-0.1763	-0.1805	-0.1699	-0.1699	-0.1057	0.0000	0.0000
P3In(P3)	-0.1721	-0.1721	-0.1721	-0.1721	-0.1721	-0.1721	-0.1721	-0.1721	-0.1721	-0.1596	-0.1596	-0.1596	-0.1596	-0.1596	-0.1596	-0.1636	-0.1699	-0.1699	-0.1057	0.0000	0.0000
P4In(P4)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.3481	-0.2822	-0.159
Sum(P1-P4)	-0.4665	-0.4665	-0.4665	-0.4665	-0.4665	-0.4665	-0.4665	-0.4665	-0.4665	-0.4478	-0.4478	-0.4478	-0.4478	-0.4478	-0.4478	-0.4599	-0.4534	-0.4534	-0.9221	-0.8268	-0.4506
(P1)	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
User problems (No)	7	5	2	3	6	6	7	4	3	9	6	3	4	4	6	5	5	4	6	3	4
Ratio Padded Inventory	0.072	0.155	0.124	0.051	0.032	0.032	0.072	0.041	0.031	0.033	0.065	0.023	0.017	0.017	0.055	0.043	0.051	0.040	0.051	0.011	0.033
AE Suspected	1	2	1	2	1	2	0	1	2	1	1	2	1	1	1	1	1	2	0	1	2
AE / User	0.143	0.400	0.500	0.667	0.167	0.333	0.000	0.250	0.667	0.111	0.167	0.667	0.250	0.250	0.167	0.200	0.200	0.500	0.000	0.333	0.500

Table A3.2 – Summary of Inventory, EDI Calculations, User problems and Adverse Event Data for the Syringe Pumps

Appendix 4

Research Ethics and Corporate Approval Documentation

Children's Hospital of Eastern Ontario
Centre hospitalier pour enfants de l'est de l'Ontario

October 1, 2010

Kim Greenwood

Re: Use of CHEO Biomedical Engineering Equipment Data in your Masters Thesis

Dear Kim:

This is to acknowledge your request and to authorize the use of equipment inventory information and related service history data from the CHEO Biomedical Engineering ServicePlus information system in your Masters Thesis work being completed through Carleton University's Biomedical Engineering program. It is understood that this information contains no patient information and thereby is not impacted by current privacy legislation. It is also understood that this offer of permission is only extended for use in this specific project and cannot be used for other purposes without permission.

Yours truly

Gerald Hissom
Senior Vice-President & CEO

Il y a une différence entre les mots et les actions, mais les actions sont les plus importantes.

Il y a une différence entre les mots et les actions, mais les actions sont les plus importantes.

PROBATION TITLE: Review of Equipment Related CHCO Advisor Event Reports

☐ ~~None~~ ~~unusable~~☐ Chemical Database

NO ₂ (ppm)	0.015-0.017	11-12	0.015-0.017
CO (ppm)	0.015-0.017	11-12	0.015-0.017

[illegible]
$$N_{\text{eff}} = 4 - 0.05 \text{ THU} \text{ DRSR} + 0.155 \text{ THU} \text{ DRSR}^2 - 0.0005 \text{ THU} \text{ DRSR}^3 - 0.0000005 \text{ THU} \text{ DRSR}^4$$

My signature confirms that, as Primary CHED site investigator:

- I assume full responsibility for the research as outlined in this application.
- I will comply with the conditions outlined in the CHED policies on "Privacy and Confidentiality of Patient Personal Health Information" and "Access to and Disclosure of Patient Health Information".
http://checanet.com/Files_docs/2329_Access%20to%20Confidentiality.doc
http://checanet.com/Files_docs/2343_HRDC%20%20Access%20to%20Data%20Access%20to%20Data%20Access%20to%20Data.doc
- The personal health information collected in this study will:
 - Be used only as necessary, to fulfill the specific research objectives and related research questions described in this application and approved by the REB.
 - Be encoded in a way that would not be identifying of the individual. Codes based on date of birth, ethnicity, and residency will be avoided. Variables that can be identifying of the person either alone or in combination will similarly be avoided.
 - Be stored in locked areas and access will be restricted to the names listed above. Any personal health information that leaves the site for any reason will be re-identified, password protected and encrypted. Data will be destroyed at the conclusion of the study.
 - Not be used to contact or attempt to contact the patient whose personal health information is being researched unless CHED first obtains the patient's express written consent.
 - Not be published in a way that could reasonably allow others to identify the patient whose personal health information is being researched.
 - Immediately notify the REB in writing if the investigator becomes aware of any breach of confidentiality or security.
 - Be disclosed except as required or permitted by law.

Signed: _____
 Primary CHED site investigator Print Name: _____ Date: 11/12/12

 Research Assistant Print Name: _____ Date: _____

Please forward to: Mrs. Nadine Anderson, Administrative Assistant Research Ethics Board Children's Hospital of Eastern Ontario Room 2129, 401 Smyth Road, Ottawa, Ontario, K1H 8L1 Telephone: (613) 737-7680, ext. 3350	CHED Research Ethics Board - APPROVAL Chair's Signature: _____ Date: 11/12/12
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Please note that the REB approval is valid for one year from the date of approval.
 An annual renewal must be submitted to maintain the approval.

Ethics Clearance Form

This is to certify that the Carleton University Research Ethics Board has examined the application for ethical clearance. The REB found the research project to meet appropriate ethical standards as outlined in the Tri-Council Policy Statement: *Ethical Conduct for Research Involving Humans* and, the *Carleton University Policies and Procedures for the Ethical Conduct of Research*.

☒ **New clearance**

☐ **Renewal of original clearance**

Original date of clearance:

Date of clearance	12 November 2010
Student Researcher	Kim Greenwood
Status	M.A. student
Faculty supervisor	Professor Monique Frize, Systems and Computer Engineering
Department	Biomedical Engineering
Funding status	Not funded
Title of project	Clinical equipment standardisation and its impact on patient safety

Clearance expires: 31 May 2011

All researchers are governed by the following conditions:

Annual Status Report: You are required to submit an Annual Status Report to either renew clearance or close the file. Failure to submit the Annual Status Report will result in the immediate suspension of the project. Funded projects will have accounts suspended until the report is submitted and approved.

Changes to the project: Any changes to the project must be submitted to the Carleton University Research Ethics Board for approval. All changes must be approved prior to the continuance of the research.

Adverse events: Should any participant suffer adversely from their participation in the project you are required to report the matter to the Carleton University Research Ethics Board. You must submit a written record of the event and indicate what steps you have taken to resolve the situation.

Suspension or termination of clearances: Failure to conduct the research in accordance with the principles of the Tri-Council Policy Statement: *Ethical Conduct for Research Involving Humans* and the *Carleton University Policies and Procedures for the Ethical Conduct of Research* may result in the suspension or termination of the research project.

Leslie J. MacDonald-Hicks ✓
Research Ethics Board Coordinator
For the Chair of the Carleton University Research Ethics Board
Prof. Antonio Guatteri