University of Michigan Health Systems Alaris Infusion Pump Analysis

Final Report

Materiel Services

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Executive Summary

The Materiel Services (MS) department at the University of Michigan Health Systems (UMHS) currently delivers infusion pumps to patients throughout the hospital. Because 86% of all patients admitted to hospital beds require an infusion pump, MS would like to know if it is feasible and cost effective to place a pump at each bedside.

When an infusion pump order is placed, the goal of the MS staff is to deliver a pump within 1 hour for standard patients and within ½ hour for STAT patients. There are 549 beds in the University Hospital and 184 beds in Mott Children's Hospital. MS owns 864 single channel pumps and 232 dual channel pumps. Currently, they also rent 327 single channel pumps. MS wanted to know how other hospitals' handle equipment with a decentralized system and if such a system will be feasible at UMHS.

The scope of this project included the adult inpatient care in the University Hospital and the Mott Children's Hospital. The project excluded any infusion pumps used in outpatient care areas. The project began with precise and methodical data collection regarding infusion pump utilization, processes of other hospitals using decentralized pump usage, staff shadowing, cost of infusion pumps, billing and tracking, pump cleaning, and maintenance. The collected data was then analyzed to determine cost of the current pump delivery process and develop a new process that would minimize or even cut costs.

Our recommended process consists of placing one Alaris SE Gold dual channel infusion pump at each bedside in the University Hospital (549 beds) and Mott Children's Hospital (184 beds) since 86% of the patients admitted to hospital beds use 0, 1, or 2 channels from infusion pumps. Each room would have one dual pump except for the Intensive Care Units (ICUs) which would have 2 dual pumps in each room. In order to have a dual channel pump in each room as well as account for standby pump demand, we recommend that MS purchase 632 additional dual channel pumps which will cost $1.83 million (632 x $2900).

We also recommend that MS stop renting pumps which will save $2.43 million over 5 years (the pump's depreciable period). Currently, MS is leasing 327 pumps for $135 each a month which amounts to savings of $529,740 a year or $2.65 million over 5 years.

By placing a pump in each room and eliminating the need to deliver pumps, the MS staff can be reduced by 4 employees resulting in a labor savings of $160,000 each year ($40,000 x 4) or $800,000 over 5 years (the pump's depreciable period). Pump delivery accounts for 46% of all patient equipment delivery. These four employees will not be needed due to the deceased number of pump deliveries.

There are many benefits of our proposed process:

- Labor savings of $160,000 per year
- Pump rental savings of $529,740 per year

- Better nursing satisfaction and eliminating the need to store extra pumps
- Less damage to equipment due to decrease in pump movement
- Better patient satisfaction

Our recommendation requires a capital expenditure of $1.83 million to purchase 632 additional dual channel infusion pumps. However, total cost savings over 5 years for this project is $3.2 million.

Introduction

The Materiel Services (MS) department at the University of Michigan Health Systems (UMHS) delivers infusion pumps to patients throughout the hospital. Since 86% of patients that are admitted to a hospital bed require the use of an infusion pump, MS is curious to see if placing an infusion pump at each bedside is possible. The current process works with few if any problems on a daily basis. The Patient Equipment Manager would like to know if there is a better alternative to the current process of sending the pumps from the basement (where MS and PE are stationed) up multiple floors to the patient rooms. Specifically, the Patient Equipment Manager has asked us to determine if it would be feasible to have a pump at every bedside of adult patient (University Hospital) care and the Mott Children's Hospital, waiting for patients admitted to hospital beds. Based on our conclusions from the data collected, we recommended the most cost effective and efficient process. The purpose of this report is to provide our findings and outline our proposed process.

Background

Currently, patients who are admitted to beds in the UMHS usually need an infusion pump, sometimes multiple pumps. For a patient to get an infusion pump, six steps take place:

1. A written order for the pump is placed by a physician.
2. A clerk fills out an order form via the web, or occasionally, a pump is ordered over the phone or through a pager.
3. The PE staff enters the order into the Medical Equipment Management Systems (MEMS) database for records and prints out a form with patient information.
4. The PE staff checks the pump to make sure the battery is fully charged.
5. A member of the PE staff hand delivers the pump to the patient room. (MS is located in the basement 2 (B2) of the hospital, so the PE staff must take the elevators up to the patient rooms.)
6. The PE staff checks for pumps that are not in use or have already been used in the soiled closets of the staff member's assigned zone (1-4).

According to the Patient Equipment Manager, from the time the order is placed to the time the pump is delivered usually takes about 1 hour for standard patients and ½ hour for STAT patients. The Patient Equipment Manager wants to know if putting pumps at each bedside of the University Hospital and the Mott Children's Hospital would save the hospital money by reducing the amount of time and labor needed for a patient to have an infusion pump.

UMHS has 549 beds for adult patients and 184 beds in Mott Children's Hospital. They currently own 1,096 infusion pumps and rent 327 pumps. Of the 1,096 pumps owned, 232 of the pumps are dual channel pumps. Purchasing a pump costs $2,700 for a new Alaris SE Gold single channel pump and $2,900 for a new dual channel pump. Renting a single channel pump costs $135/pump/month. We determined if it was necessary to purchase or rent more pumps if a pump is placed at each bedside for adult inpatient care.

According to the Patient Equipment Manager, daily average utilization of the pumps is approximately 86%.

The following is a list of questions that we looked to answer in order to determine our recommendations for this project:

- How feasible is it to have a pump in every room?
- Can UMHS use the current system or a similar one for billing and tracking the pumps?
- How are other hospitals organized for patient equipment delivery?
- Will it be possible to reallocate the maintenance and cleaning procedures of the pumps?
- Will nurses continue to collect reserves of pumps?
- If a patient already on a pump is transferred from outpatient to inpatient, what will happen to the pump?
- What effect will a new process have on other units in the hospital that require the use of infusion pumps, such as the OR and ER?

Goals

To find the most cost effective method of providing infusion pumps to patients, the goals of this project were as follows:

- Perform a cost analysis to determine if infusion pumps should be installed at each bedside
- Recommend a new pump management process
- Increase service to patients and nursing staff
- Utilize more efficiently the Materiel Services staff

Project Scope

The scope of this project included the process by which pumps are delivered to the adult inpatient unit in the University Hospital and in the Mott Children's Hospital. The project excluded any infusion pumps used in outpatient care areas.

Data Collection and Findings

Interviews

Because there were no existing studies regarding the placement of an infusion pump at each bedside, we gathered information from other hospitals that currently practice this proposed process. Our team consulted with five other hospitals ranging in size from 500 to 1,000 beds that had a decentralized patient equipment system. The hospitals and contacts were as follows:

Hospital	Contact
Swedish Medical Center (Seattle, WA)	VP of Supply Chain Management
Woman's Hospital (Baton Rouge, LA)	Director of Materials Management
Johns Hopkins Hospital (Baltimore, MD)	Clinical Products Specialist
Cedars Sinai Medical Center (Los Angeles, CA)	Manager of Materials Management
Stony Brook University Hospital (Stony Brook, NY)	Director of Nursing Materials Management

Of the five hospitals interviewed, only one is unhappy with a decentralized patient equipment system. They had been decentralized for 5 years and are changing to a hybrid for a few reasons. First, labor savings never materialized. Second, there was an increase in the amount of equipment purchased. The third reason is that housekeeping had to be trained to clean the pumps. They have dual channel infusion pumps in every room. In the future, their final system will be a hybrid, semi-central system where the pumps are cleaned downstairs, however there will still be a pump in every room. This particular hospital rents all of their pumps to accommodate for technology obsolescence as new pumps come out every six to seven months.

Another finding from our research is that every hospital we interviewed does not charge patients directly for pumps. They include the pump cost into the room rate or consider it an expense (room resident equipment). They don't charge because they perceive that they would not collect anything on patient equipment due to fixed fee/DRG cases which include Medicare.

As for the pump process of the decentralized hospitals, housekeeping cleans the pumps in the room in between patient stays. When transferring a patient already on a pump (for example, from the Emergency Room) to an inpatient room already having a pump, whoever moved the patient transfers the pump in the room to where the patient originated. This is the "give a pump, get a pump" policy. All of the pumps are mounted on stands. Maintenance of the pumps is carried out in central equipment.

As for owning or leasing the pumps, two of the hospitals own the infusion pumps while two of them lease them. If a patient needs multiple pumps, two of the hospitals have safety stocks of pumps in the utility rooms on each floor. The other two hospitals have central equipment bring up more pumps.

One hospital is switching to Smart Pumps (Alaris Medley), which consist of a brain component and 4 detachable modules, allowing up to 4 channels on one pump. The hospital also has a wireless tracking system to monitor each pump's location in the hospital.

While interviewing our contacts at the other hospitals, they stated their realized benefits of a decentralized system:

- Less time consuming
- Less running around delivering and searching for pumps
- Less damage to equipment
- Better nurse satisfaction
- Better patient satisfaction
- Labor costs savings
- Increased pump availability.

Alaris Infusion Pump Literature Search

The UMHS currently uses the Alaris Signature Edition Gold Pump model 7130, which cost $2,700 for a new single channel pump and $2,900 for a new dual channel pump. In August 2006, Cardinal Health issued a recall on Alaris SE pumps including model 7130. They warned that there is a potential for over infusion because of a key bounce event. Key bounce occurs when a number registers twice although the operator only pressed the key once. This may result in an infusion rate at least ten times the intended infusion rate. For example, if an infusion rate is intended to be entered as 4.8 mL/hr and the key bounce occurs when the 4 is pressed, the actual rate registered will be 44.8 mL/hr.

Of the hospitals interviewed, two are switching to a new Smart Pump called the Alaris Medley. It consists of a brain unit and modules. Up to 4 modules or channels can be connected to the brain. The brain component of the pump also has a built in tracking device, as does every detachable module, signaling the equipment's location in the hospital. A company called Pango installs this tracking system and incorporates it into the current wireless system of the hospital. The price for 1 brain and 1 module is $3500.

Billing Process

Currently, four controllers in the Materiel Services department account for equipment billing. They perform daily sweeps through each unit and scan the equipment in use. If a piece of equipment is being used by a patient who is not registered to that piece of equipment, then the controller reassigns that equipment to the patient that is currently using it. This assures that patients are not billed for equipment after they have been discharged and are no longer using the equipment. Patients are mis-charged for equipment when a nurse sees unused equipment and gives it to a patient in need of that piece of equipment. Below is a breakdown of payment methods for UMHS patients.

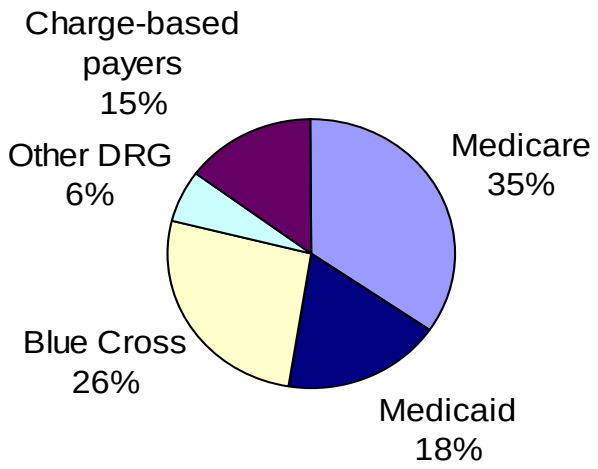


Figure 1. Payment Methods

Collection of Billing

MS bills $61,698,724 each year for all of their equipment but only collects 9.8% of what they bill for ($6,046,475). This was calculated from data given to us by the Reimbursement Manager in Billing. Of all UMHS patients, 86% pay via DRG, or on a fixed cost per case basis. Equipment charges are not relevant to the DRG patients. Of the 14% who don't pay with DRG's (charge-based payers), only 70% of those charges are collected. This means that MS is only collecting 9.8% of the charges to patients. Below is a graphical depiction of the breakdown.

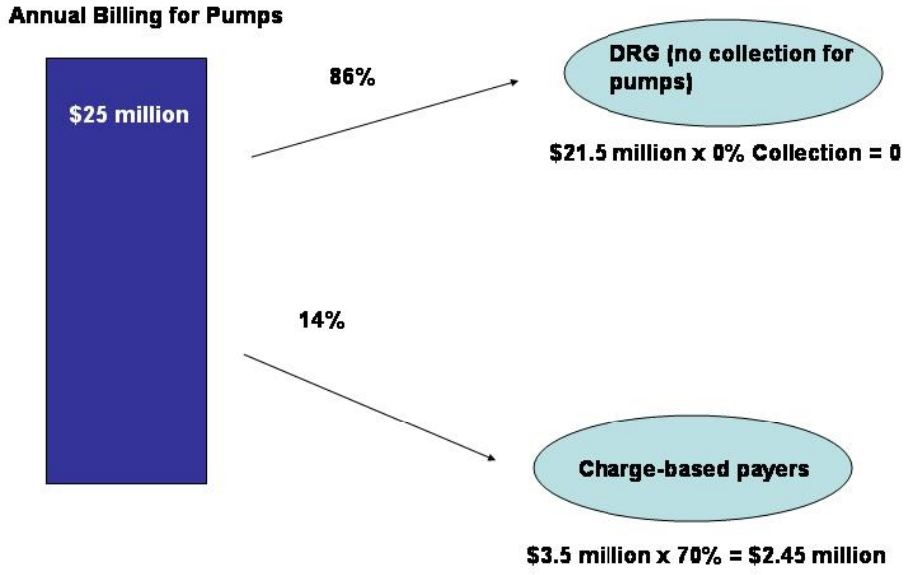


Figure 2. MS Collections from Infusion Pumps

The labor cost of the four controllers who are in charge of billing and tracking based on yearly salary is 4 x $40,000 = $160,000. The average annual controller salary is $40,000 ($30,000 base + 32% fringe benefits). Our team analyzed the feasibility of eliminating the four controllers; however it was not cost effective. The controllers collect $5,886,474 in revenue each year, and the expense (their salaries) totals $160,000.

Pump Usage Data

To determine the number of extra pumps that are needed in order to install one in each room, pump usage data was collected from February 4th through the 10th, 2007. To determine how many deliveries MS would save, we broke down how many pumps are used by each hospital and how many pumps are used by each patient. The calculations in Appendix A show how we concluded that 83% of all patients in the University Hospital use at least one Alaris pump.

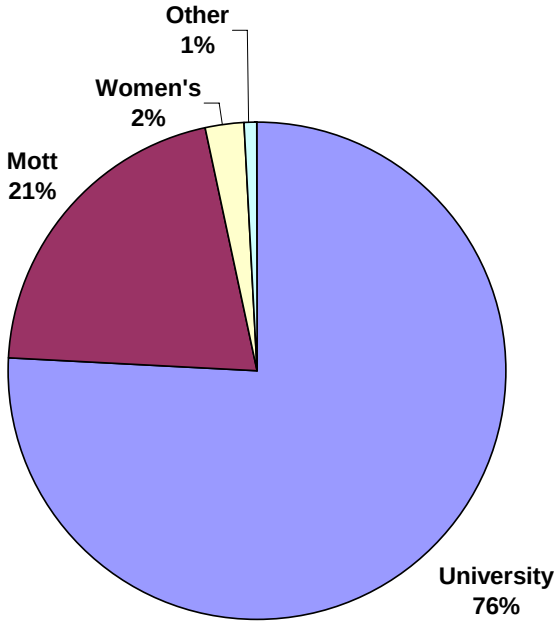


Figure 3. Pump Usage

During the week, 5,158 out of 6,808 pumps were used in the University Hospital while an additional 1,419 pumps were used in Mott. Figure 3 shows the complete breakdown usage of Alaris pumps. From the figure, 76% of all pumps were used in the University Hospital while 21% were used in the Mott Children's Hospital.

The breakdown also showed that 86% of all patients' needs would be met by having a dual channel pump in each room. The entire breakdown is shown in Figure 4 below.

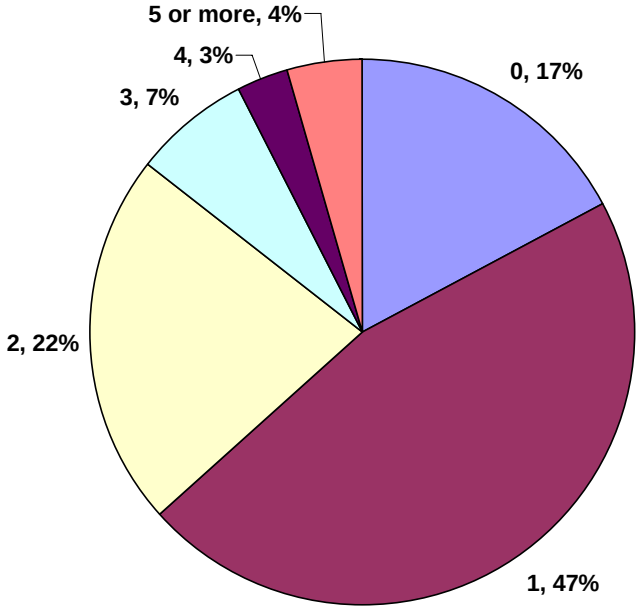


Figure 4. Pumps per patient per day

The usage data shows that Alaris pump usage greatly varies among hospital departments. By determining the usage of pumps by department, we can show how many pumps would need to be placed in each room to maximize utility. Appendix G shows that every department uses pumps and that certain departments such as the ICU units of 5D and 6D would best be served by having at least 3 or 4 pumps in each room. To minimize the amount of deliveries MS would have to make with pumps being in each room and to standardize each department, we determined that dual channel pumps should be placed in every room of the University Hospital as well as having a second dual channel pump placed in each ICU unit since its average usage is above 2.5 pumps per patient. Figure 5 shows that by implementing our recommendation, 87.2% of all patients needs would be met.

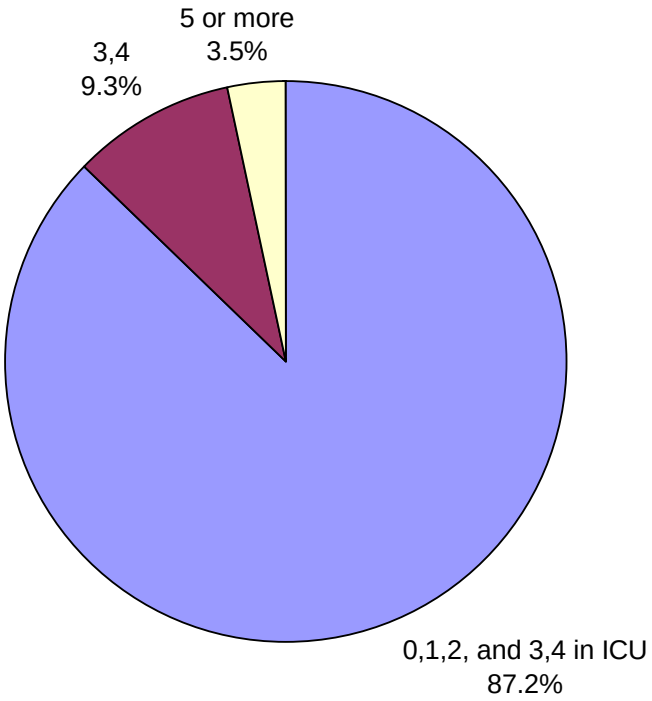


Figure 5. Patient Pump Usage for 1 day

Delivery Breakdown

To determine how much cost saving could be realized by implementing a decentralized system for Alaris pumps, a breakdown of total deliveries for Materiel services was required. This data was collected from the MS database and shows that Alaris Pumps account for 45% of all deliveries. Table 1 shows the breakdown of Materiel Services deliveries.

Delivery Breakdown (week of 2-4-07)		
Item:	Total Deliveries	% of Total Deliveries
Alaris Pumps	857	45.30%
Other	1035	54.70%
Total	1892	

Table 1. Deliveries for week of 2-4-07

Patient satisfaction in relation to infusion pumps would be most closely tied to delivery time meaning the patient would be happier by having to wait a shorter amount of time for a pump. Appendix D displays a breakdown of delivery times for infusion pumps. An average delivery time of 42 minutes was achieved for the week of February 4th.
We obtained our delivery data times from MS scanning procedures. All pumps that are delivered are currently scanned and time stamped three times. This time stamp includes order time, issue time, and delivery time. From this data, we determined that the average delivery time was 42 minutes after the order date. While shadowing MS employees, we

discovered that many workers scanned the pumps as delivered at the same time they issued the pump while still in the MS storage area. This was done because the wireless network doesn't always stay connected to the MS scanner while they are on the delivery floor. By doing this, MS staff decreases the amount of time they spend delivering the pumps but most of the delivery times do not represent the actual time they are delivered, and therefore the 42 minute average delivery time could be wrong. To show how much the data could be skewed, Figure 6 examines how much time has elapsed between the equipment being issued and delivered. Figure 6 shows that 576 deliveries took up to 5 minutes between being issued and actually delivered.

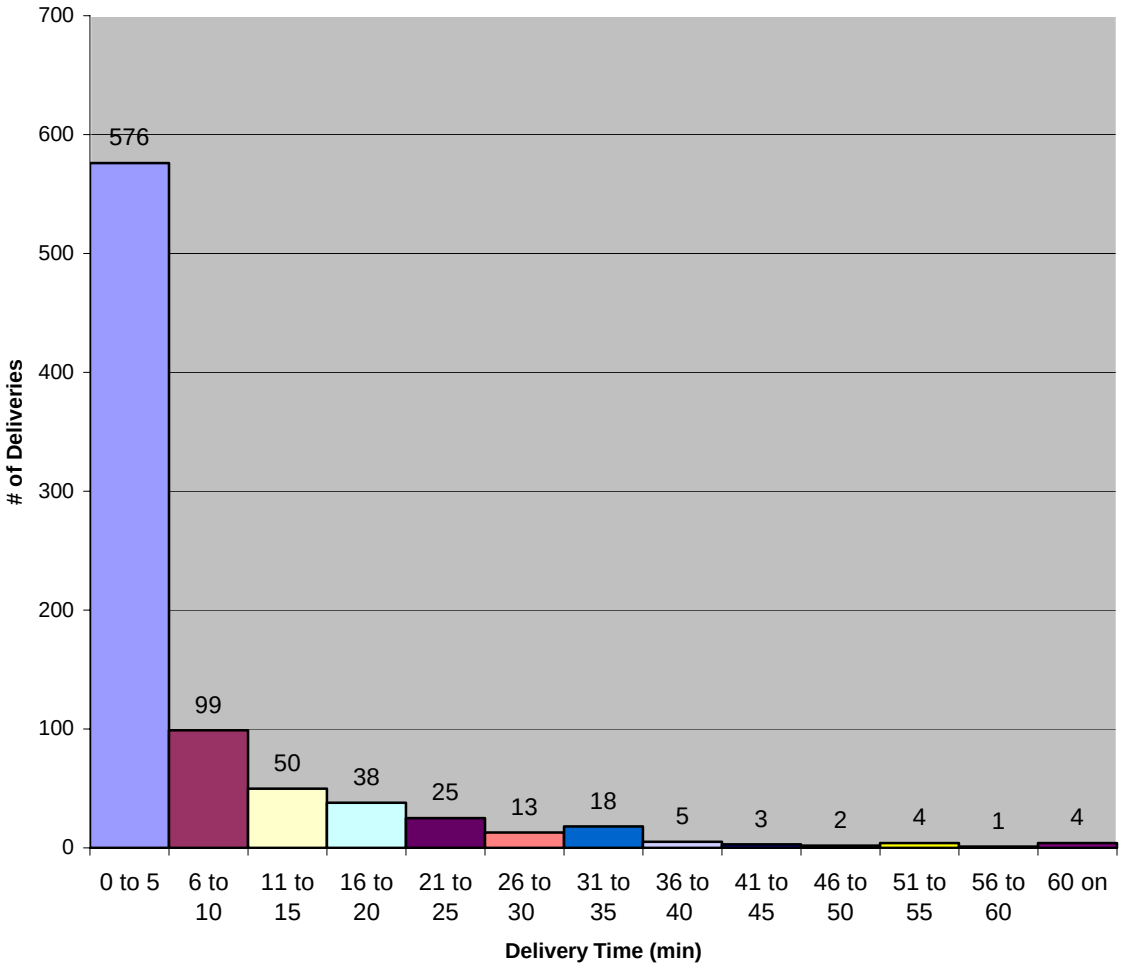


Figure 6. Difference between delivery scan time and the issue scan time

Using this data, we determined that on average delivery of pumps only took 6 minutes and 17 seconds after the pumps were issued. Knowing that this data was likely skewed, two studies were done. Taking into account the size of the hospital and the speed of the elevators, we determined that any delivery scan that was less than 3 minutes after the issue scan was likely double scanned while downstairs. These data points were then

omitted, and new averages were computed. This allowed us to show that the delivery scans were off by 14 minutes and 50 seconds. Using this average difference, a new total delivery time of 57 minutes and 42 seconds was computed. Table 2 below shows our computed values.

Total Delivery Time Breakdown (week of 2-4-07)	
Deliveries	837
Issue Time (min)	30,651
Average Issue Time (min)	36:35
Delivery Time (min)	5,270
Average Delivery Time (min)	6:17
Total Time (min)	35,922
Total Average (min)	42:52
Average Delivery Time 3 min or less	:59
Average Delivery Time 4 min or more	14:50
Total Average (min)	42:52
Total Average+ 4 min. or more	57:42

Table 2. Total Delivery Time

Amount of Pumps Necessary

Table 3 displays how we estimated the number of pumps needed to successfully implement our proposed process.

Pumps Needed				
Hospital	**Pump Location**	**Reason**	**Beds**	**Channels**
University Hospital	In Room	Place 2 channels in each room	549	1098
MOTT Children's	In Room	Place 2 channels in each room	184	368
University – ICU	In Room	Place extra 2 channels in each room	40	80
All Rooms w/o ICU	Central	Patients needing 3 or more channels		292
University – ICU	Central	Patients needing 5 or more channels		16
Women's Hospital	Central	Patients needing 1 or more channels		28
Standby	Central	Currently use 280, switch to duals		560
Inventory	Central	Need Inventory		150
			Total	2592

Table 3. Number of Pumps Needed for Proposed Process

The total number of dual channel pumps necessary for our proposed process is 1,296 pumps (2,592/2). Currently, MS owns 864 single channel pumps and 232 dual channel pumps. Once 2 single channel pumps are placed on a stand, the number of dual pumps MS owns is 664 pumps. Therefore, 632 additional dual channel pumps need to be purchased. Our findings are summarized in Table 4.

Current Pumps		
Type	#	Channels
Single	864	864
Duals	232	464
	Total	1328
	Total Needed	2592
	Additional Needed	1264
	Duals Needed	632

Table 4. Pumps Required to be Purchased

Pump Cleaning

Currently, the MS staff cleans the infusion pumps after patient use. The pumps are brought down to the cleaning station, located directly across from Patient Equipment, where they are wiped down with a rag soaked in alcohol, sterilizing the pump. Also, any substances that may be stuck to the pump due to patient use are wiped or scraped off. An MS staff member spends on average of 1 minute and 58 seconds cleaning a dual channel pump.

Our proposed process will require the Environmental Services (ES) staff to take on the task of cleaning the pumps. The ES staff currently cleans patient rooms after the patient has been discharged. If ES is willing to take on the additional responsibility of cleaning infusion pumps after patient discharge, it will allow the pumps to remain in the room waiting for the next patient to arrive. ES staff will only be required to clean the number of pumps matching the number of beds in each room with the exception of ICU patients. We recommend putting 2 dual channel pumps at each bedside in ICU. Any additional pumps in the room after patient discharge will be placed in the soiled utilities closet for the MS staff to take back to Patient Equipment where it will be cleaned and stored for later use.

However, the cleaning agent ES presently uses, Virex, reportedly damages electrical components of the Alaris infusion pumps, causing the pumps to malfunction. Therefore, we recommend that a spray bottle containing alcohol be added to the ES staffs' cleaning equipment.

Our team spoke with the Staff Development Manager of ES regarding the placement of an infusion pump at each bedside. He felt that ES would not readily take on cleaning the infusion pumps after patient discharge, unless this new process significantly improves patient service and shows a cost savings.

Pump Maintenance

Now, infusion pumps are repaired and maintained by the BioMedical Department, which is attached to the MS cleaning station. If a pump is broken or malfunctions, it is placed on shelves in the room attached to the cleaning station. BioMed staff repairs the equipment on the shelves in no particular order. There is no first-in-first-out policy. The pumps are also scheduled for annual preventative maintenance. Each pump is marked by

a sticker which is dated with the last time maintenance was performed and its future scheduled maintenance. Every Saturday, a BioMed staff member checks the stickers on the equipment in Patient Equipment to see if there is any equipment scheduled for maintenance. Maintenance of pumps usually takes between ½ hour and 1 hour.

Based on data from UMHS Program and Operations Analysis, the current maintenance process is breaking down. Therefore, we recommend that changes need to be made to the current system. The following is one idea to remedy the problem. Patient Equipment will generate a list of pumps requiring preventative maintenance in addition to BioMed performing weekly scans for pumps. The Patient Equipment Controller marks pumps signaling maintenance required. The ES staff will place marked equipment in the soiled utilities closet. Then, PE retrieves the equipment and places it on the shelves in the room attached to the cleaning station. Also, nurses will be responsible for checking the scheduled dates for preventative maintenance. When a pump is scheduled for maintenance, the nurse will place a note on the pump indicating that the pump requires maintenance.

Recommendations

Pump Cost Analysis

Our recommended process consists of placing one Alaris SE Gold dual channel infusion pump at each bedside in the University Hospital (549 beds) and Mott Children's Hospital (184 beds) since 86% of the patients admitted to hospital beds use 0, 1, or 2 channels from infusion pumps. Each room would have one dual pump except for the Intensive Care Units which would have 2 dual channel pumps in each room. In order to have a dual channel pump in each room in addition to satisfying standby pump demand, we recommend that MS purchase 632 additional dual channel pumps which will cost $1.83 million (632 x $2900).

We also recommend that MS stop renting pumps which will save $2.43 million over 5 years (the pump's depreciable period). Currently, MS is leasing 327 pumps for $135 each a month which amounts to savings of $529,740 a year or $2.65 million over 5 years. Appendix E depicts annual operating cost savings for the hospital.

Labor Cost Analysis

By placing a pump in each room and eliminating the need to deliver pumps, the MS staff can be reduced by 4 employees resulting in a labor savings of $160,000 each year ($40,000 x 4) or $800,000 over 5 years (the pump's depreciable period). Pump delivery accounts for 46% of all patient equipment delivery. These four employees will not be needed due to the deceased number of pump deliveries. Only 72% of the current pump delivery staff will be needed for the proposed process. This results in only 11 employees out of 15 being needed for pump deliveries. Our calculations can be found in Appendix F.

Proposed Process

We recommend implementing a new pump management process. A dual channel infusion pump would be placed in each room of the University Hospital as well as Mott Children's Hospital. If a patient needs more than 2 channels (one dual pump), then a nurse will place an order with MS to bring up an additional dual channel pump. As for the 864 single channel pumps that UMHS owns, they will be placed 2 to a stand to imitate a dual pump. This is to standardize the pumps across the hospital.

Cleaning of the pumps will take place in patient rooms in between patient stays. Cleaning of a pump takes approximately 1 min. 58 sec. We are allotting an additional $28,543 to Environmental Services to accommodate this change. Additionally, since more pumps will have to be maintained by BioMed, we recommend allotting them $20,527 each year to cover their costs. As for line hookup and disposal, the nurses will continue to use the current process.

Refer to Appendix B for our proposed process flowchart. Refer to Appendix C for the current process flowchart.

Annual Cash Flow for Proposed Process

	2008	2009	2010	2011	2012
Labor Savings	$160,000	$160,000	$160,000	$160,000	$160,000
Pump Rental Savings	$529,740	$529,740	$529,740	$529,740	$529,740
New Pump Cost*	$366,560	$366,560	$366,560	$366,560	$366,560
Environmental Services Cost	$28,543	$28,543	$28,543	$28,543	$28,543
BioMed Cost	$20,527	$20,527	$20,527	$20,527	$20,527
Total Cash Flow	$274,110	$274,110	$274,110	$274,110	$274,110

*depreciated over 5 years

Consequences of our Recommendations

Many benefits are derived from our proposed process:

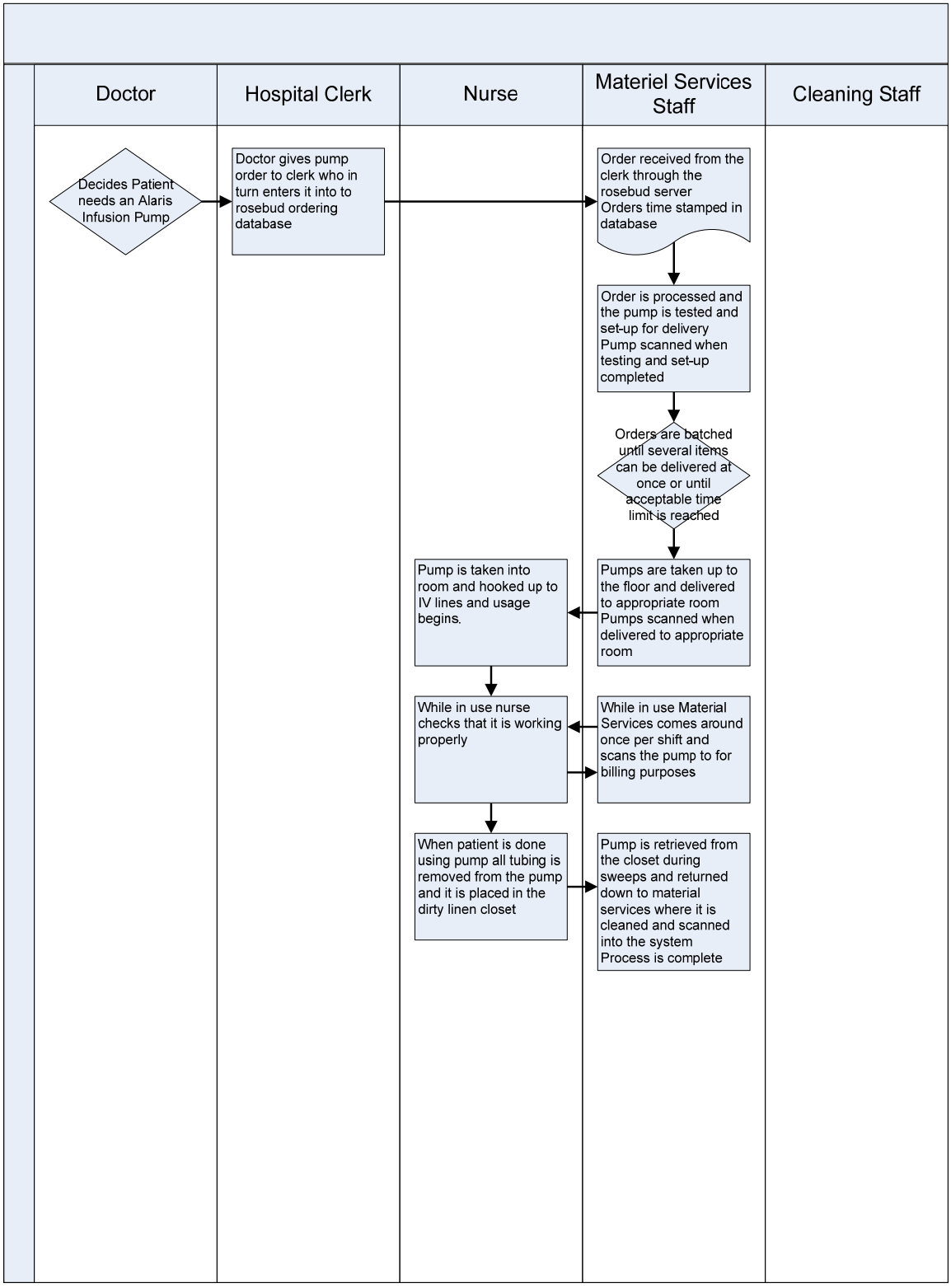
- Labor savings of $160,000 per year
- Pump rental savings of $529,740 per year
- Better nursing satisfaction and eliminating the need to store extra pumps
- Less damage to equipment due to decrease in pump movement
- Better patient satisfaction from decreased delivery time
    - For 83% of patients, delivery time will be reduced from 57 minutes to 0 minutes.

Our recommendation requires a capital expenditure of $1.83 million to purchase 632 additional dual infusion pumps. However, total cost savings over 5 years for this project is $3.2 million.

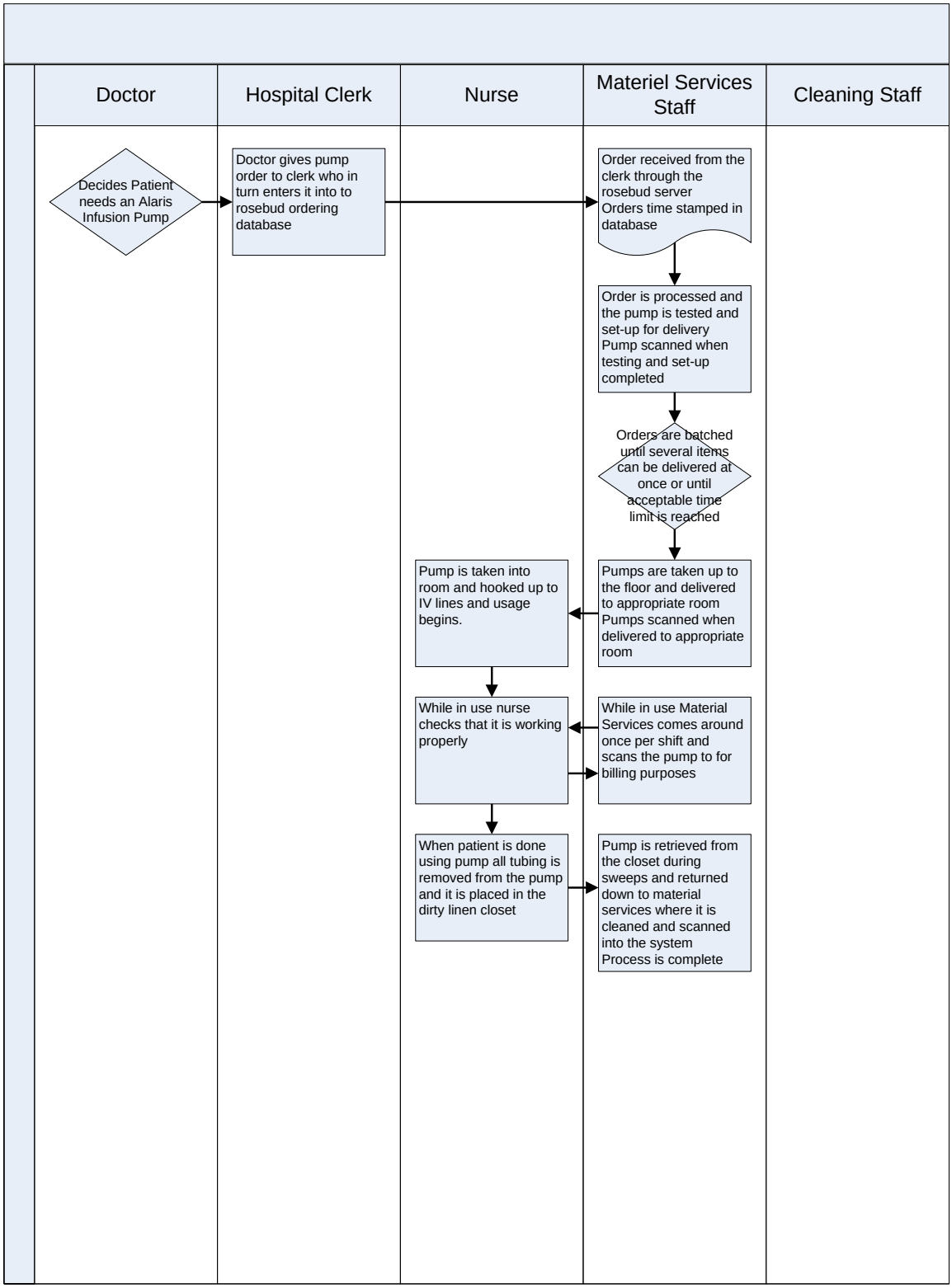
Appendix A. Number of patients not using pumps (week of 2-4-07)

Total Patients for week in beds- 4785	**Total Pumps Used- 6808**
patient/usage breakdown	
3242 people in University Hospital	
5158 Alaris pumps used	
1.92 Alaris pumps/patient according to usage breakdown	
5158/1.92=2686.45	2686
2686/3242=.828	83% of patients use pumps

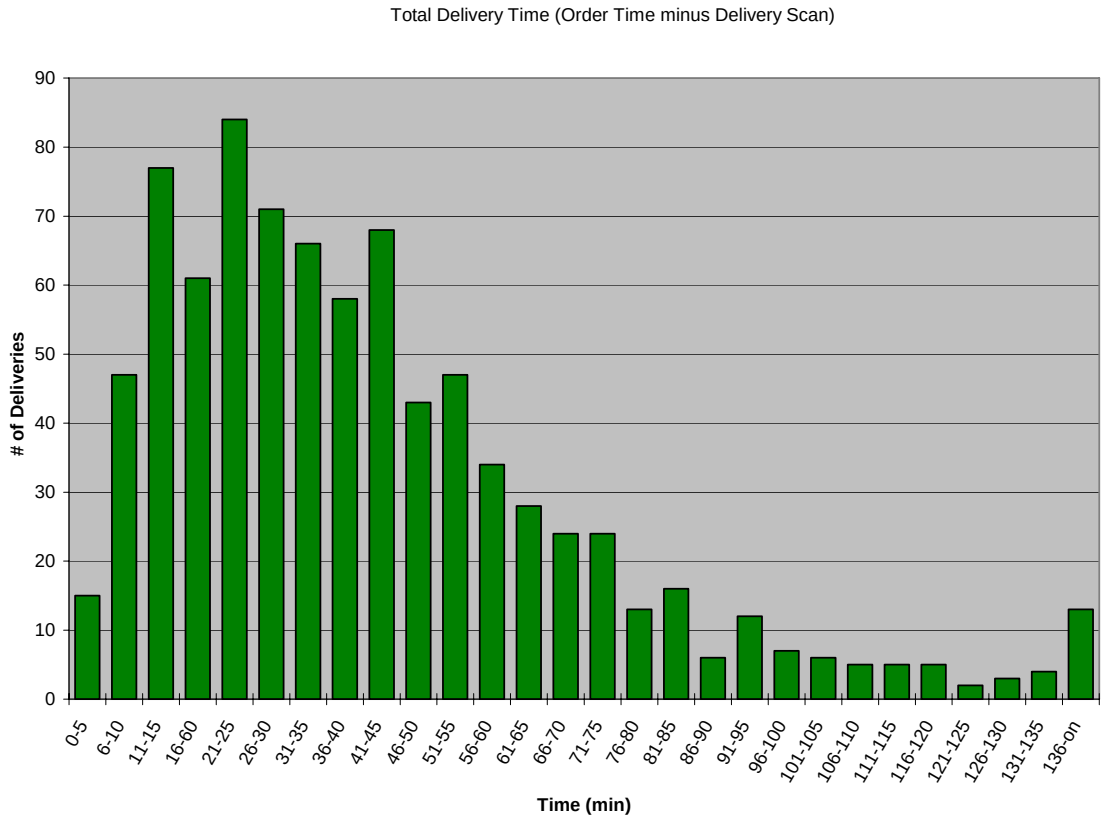
Appendix B. Proposed Process Flowchart



Appendix C. Current Process Flowchart



Appendix D. Total Delivery Time



Appendix E. Annual Operating Cost Savings

Annual Operating Cost Savings			
Item	**Cost/Savings**	**Depreciation**	**Notes**
Materiel Services	$160,000		4 less people@$30,000+32% for fringe
Environmental Services	$28,543		Every Room cleaned every 5.6 days*additional 2 minutes to clean pumps, using $13.50/hr+33% fringe
Biomedical	$20,527		Purchase Cost of additional pumps*# of Additional Pumps*1.12%
Rental Costs	$529,740		327pumps*$135 month*12 months
Depreciation		$366,560	(632 new duals*$2900)/5 years
Total Savings/year = $274,110			

Appendix F. Labor Necessary for Current and Proposed Process

Current Process			
Item	**#**	**Average Time**	**Total Time**
Alaris Pumps	839	42 min	35,238
Non- Alaris Pumps	1013	42 min	42,546
			77,784
New Process			
Item	#	Average Time	Total Time
Alaris Pumps	327	42 min	13,734
Non Alaris Pumps	1013	42 min	42,546
			56,280
72% of Labor Needed, 72%*15 workers(6,6,3) = 11 needed			

Appendix G. Number of Pumps per patient by department

University Hospital

	Alaris Pump Total for week	#Pumps/Patient
BAC	62	1.63
BICU	93	1.75
KEC	0	0.00
4A	184	1.35
4AS	60	2.61
4B	97	2.94
4BC	631	1.84
4C	0	0.00
4CI	27	1.35
4DN	93	1.55
4DS	53	0.96
5A	252	1.46
5B	260	1.25
5C	335	1.80
5D	405	3.49
6A	50	0.26
6B	274	1.36
6C	310	1.51
6D	347	2.67
7A	21	0.68
7A1	11	0.73
7B	350	1.67
7C	312	1.46
7DN	113	2.09
8A1	207	1.32
8B1	391	2.14
8C	220	1.09
Total	**5158**	**1.59**