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East Tennessee Children's Hospital Lean

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Scope

Our project is to look into the process of moving a patient through outpatient surgery from registration, up to the outpatient floor, to the holding room, operating room, and then finally to the PACU (post-anesthesia care unit) by looking at communication and information flows in the process. Our goal is to help streamline this process by generating a tool to improve the flow and availability of pertinent patient information through each step of the process in order to improve patient safety. The first semester we spent observing in order to fully understand the outpatient surgery process. Then we second divided up the areas in the process and assigned one person to each area. After each person was assigned an area, we were able to fully identify and analyze the process for that area. The second semester we focused on engaging the hospital staff and working on a tool to solve the problems discovered in the first semester.

Problem Statement

By incorporating the project scope above we have developed this problem statement to address these concerns:

To develop a paper tool in order to align the outpatient surgery process with the Joint Commission's National Patient Safety Goals.

Team Management

The primary contact for this project is the Lean Coordinator at East Tennessee Children's Hospital, Isaac Mitchell. Our team has been divided into subgroups; Jack-Registration, Catherine and Kelsey-Outpatient Floor, Lanier-Holding Room, Eddie-PACU. While we each have divided ourselves up into areas we thought would be the most interesting to us, we did each get to follow one patient through the whole process to see how everything is related in the end. This has helped us to be able to relate to each other in our respective areas.

Background

Our project will strive to uphold the mission statement of East Tennessee Children's Hospital (insert mission statement) East Tennessee Children's Hospital desires to provide their patient's with the highest level of safety and care. There wasn't

an immediate problem, however safety is always a number one goal so the hospital staff

is always seeking to continuously improve it.

In-depth Process Observations

<u>Registration</u>

Registration at the core is a pretty simple process. The patient's family comes in, sees one of the receptionists, verifies their information, gets an information bracelet for the patient, signs the Consent Form, and then off they go to the outpatient room. They have an E Number assigned that is used by the hospital to track the patient through the procedure. In the down time, the receptionists will "pre-register" their patients for the day based off the schedules. This allows the actual registration to go much smoother. During "pre-registration," they are able to fill out certain information about the patient, such as what procedure they are coming in for, what doctor they will be seeing, as well as some basic information about the patient. This allows the receptionist to ask the patient's parents or guardian to simply verify a lot of the information rather than put in new information. Another aspect of registration is to correct any false information. This is a crucial element to making sure the patient gets the best care possible. The registration is pretty much done on the computer and the receptionist fills out eight or so different forms. They are as follows, Patient, Contact, Guarantor, Second Guarantor, Insurance, Provider, Visit, and Add Info. The Patient tab has general information about the patient, including name, birthday, age, sex, address, and phone numbers. The contact tab has information about who next of kin is and whom they should contact.

The Guarantor form has information about who the guarantor is and their employer. The Second Guarantor form lists contact info for another guarantor. The Insurance form has all the insurance information including policy number, the subscriber and their information, and then the Insurance Company's information. The Provider section shows which doctors are the primary doctors and who will be providing care. The Visit page gives the date, time, location, and the reason for visit. Lastly, the Add Info form covers HIPAA Documentation and the Patient Rights; in addition, it covers information pertaining to police custody and security.

There are some issues with registration, however. First off, legal guardianship papers are quite problematic. Sometimes the father's info is hard to track or the info is not wished to be listed. The doctor's office doesn't require it, even though the hospital needs it. They often have to do research on it and call the DCS or Department of Children's Services. Without proper documentation, the hospital can do nothing. Also, duplicate account numbers or E numbers are an issue. Since the entire system doesn't talk, duplicate numbers lead to redoing the information. Another problem is that there are multiple schedules and that they are independent of each other. It can be especially difficult if a patient has procedures on both schedules. There is a surgery schedule for all the surgeries and procedures, and a radiology schedule for tests and things like that. Moreover, there is a sedation schedule that doesn't show up on the first two schedules. Thus, it is possible to be on three completely different schedules. Another concern is the

lack of sound proofing in the registration area where information might leak over. An additional concern is that most information is transmitted via fax. When searching through faxes on the computer, hyphenated names complicate the process, and the same person listed under two different names is confusing as well.

Outpatient Floor

The patient moves from registration to the outpatient floor. When they arrive on the outpatient floor they check in with the secretary. The secretary has a premade folder with all of their information. The secretary's job is one of assembler basically. They are responsible for having the patient's chart ready to go as soon as they arrive.

From the secretary desk the patient is goes to get his/her vitals taken. This process only takes a couple minutes at the most. There can be delays if the child is uncooperative or if the family is using an interpreter, but for the most part this process moves pretty quickly.

Then the patient is taken to their room. Once they are in the room the nurse comes in to ask them some basic questions. There are anywhere from five to eight nurses with this job every morning and each nurse is responsible for around five rooms. The nurse has a hand cart with a computer on it that houses all the information and

necessary forms on it. The nurse gets her list right away when she comes in. When one of her designated patient's arrives the patient's name changes color. The system works in real time and is easy to use. The questions and briefing the patient and the parents on the next steps take between 11 and 13 minutes.

The pre-op nurse comes in next. There is normally one who gives the medicine and one who does this charting. This is a big job for two people and sometimes can cause a hold up in the process. The pre-op medicine, "the happy juice", is used to calm the patients so they won't feel anxiety when they are taken away from their parents. The patients are often very apprehensive and this can be a major delay. The medicine also tastes horrible so it can be hard to get them to finish all of it.

The certified nurse anesthetist comes in next and asks many of the same questions. This is done so that more than one person hears the information and one person are not held completely responsible. They brief the patient and his/her parents on what the anesthesia will be like so they won't be nervous.

The nurses were so helpful and loved talking with us. They were willing to let us follow them around and tell us about the process as a whole and the atmosphere. Getting to observe the process from start to finish was helpful. The nurses are all a family on the fourth floor. Many of them have been working their 10 or plus years and know their job inside and out. They know how to handle obstinate children and distraught parents. Nothing we saw fazed them at all. There is a lot of non-verbal

communication that goes on and lot of things that are just "understood." How this person works and the predictability of this doctor are some examples. As a new nurse this would be a very stressful floor to join. There is a lot to remember and not a lot written down. The nurses have all of the steps memorized, so they don't need any help but as a new staff it would be very overwhelming.

Holding Room

  The holding room is a large empty room that can hold up to 5 patients at a time before they go into surgery. These patients are brought up from outpatient on the 4th floor when the surgery's signal that they will be ready soon, the goal is to not have children waiting in the holding room for more than 15-30 minutes. This is because right before they are sent up they are given "happy juice", it is a liquid medicine that helps the child to relax, the effects do not last very long so the hospital does not want them waiting for too long. While the child is in the holding room with the parent(s) or legal guardian(s) they wait to be seen by the anesthesiologist and depending on which doctor they are seeing, they will come talk with the parents as well. First one of the nurses in the holding room will check them in, by introducing themselves, looking through the file that was sent up with the child, confirming what surgery is going to be done, and confirming the correct child by the bracelet (they check name, date of birth, and the code). After this is the patient and family just wait until the anesthesiologist and

possibly doctor come in. Once they have the okay from anesthesia nurses come and take the child back to surgery.

Accomplishments in the area this semester have been winning over the nurses in the area and building some trust and a relationship with them. It might sound little, but it has helped me get some big insight into what is working and what is a waste of time in that area. During one of my visits to the area it was a very busy day, so the time study done gave a lot of varying times.

Issues that can be seen in the holding room are that doctors seem to run on their own time. Two doctors were late during a busy day in holding, one 45 minutes late and another nearly an hour and a half. Not only is this unpleasant for the families and children but for the nurses and other staff as well. It does not take very much for it to get backed up in holding. Nurses have stated sometimes it is so busy that they have three to four patients in the hallway since they have no more room for beds in the holding room. Also, and slight delay gets amplified over time making patients wait longer and longer. This causes a huge issue since you cannot eat or drink before surgery, the hospital can quickly be filled with cranky hungry children.

PACU

The PACU (post-anesthesia care unit) is a large room that can hold 12+ patients at one time. This is the final stage of the outpatient surgery process. The patients come from the post-ops and are still under anesthesia. The process is the PACU is very quick and very busy area. When the nurses arrive for their shift they write their name on what they call the "big board." With all the names of the nurses on the big board a star, which they move down the list, represents the nurse who will take the next patient. This board allows the nurses a quick way to see when it is their turn to take a patient or if they can help out anther nurse with their patient. When a patient is ready for the PACU, they will get a call from the surgery room that the patient is coming. The nurse next in line will get their station ready and wait for the patient to arrive. The patient arrives with a CRNA (Certified Registered Nurse Anesthetists) who will start calling out information for the nurse. The information that the CRNA gives is vital signs, what surgery was performed, meds, allergies, etc… The nurse will then make sure the patient is stable and then verify the enumber on the bracelet and the name of the patient. After the patient is verified and stable the nurse will pull up the patient's chart. They will fill out the initial vital signs given from the CRNA and information they have gathered from getting the patient stable. One key thing to chart is in start of care of the patient. One thing that is different about the PACU then any other step in the process is that they are required to update vital information every 15 min. After everything is put into the chart, the nurse

just waits for the patient to wake up or to wait 15 min and update chart. Once the patient wakes up the nurses quickly try to calm the patient and send the patient back to their families. The nurse informed me that the "happy juice" that is given to calm the child has lost their effect, so usually the patient is very unhappy and wants their parents. Therefore making it very important to get the child awake and out of the PACU quickly.

There are issues that are specific to the PACU. First, I would say there is an issue with timing and delivering of the patients. Due to previous delays wither it be from doctors showing up late or problems with the registration process, there can be times with the nurses doing nothing or they have a burst of patients arriving. Another issue that is present is the lack of being able to time and track this stage of the process. Because the patients are sedated it is impossible to time the process because it all relates to when the child wakes up. That is why they have set time window of 15 min to update vital signs. Also another issue with the PACU is the information sheet we are trying to generate for our project, I feel would not be useful in this stage of the process. They are not really gathering information that all of the process are obtaining. There only job is to check vital signs and send the patient back to their rooms.

Initial Analysis

After the team understood the process we started developing a potential

solution. We shared our initial thoughts and observations with the nursing director

Barb. She was curious to see what a new take on the existing process would reveal. She

encouraged us to come up with ideas on improvements we could make and she

suggested we look deeper into the idea of using a paper tool to follow patient thereby

addressing the problem statement.

After this meeting we brainstormed other ideas and decided to move forward

with her suggestion and started developing a paper tool. We researched and developed

a paper prototype based on communications from all the department. We designed the

tool to be as user friendly putting an emphasis on less handwriting and more simple

pen strokes. Based on our information at this point we determined the PACU was the

only area that needed a paper tool. The information they needed was all in the

computer system, but hard to access and utilize. We believed this paper tool would

mitigate these stresses. See Appendix.

We gave our prototype to our coordinator Isaac who proceeded to share with us

what the hospital had been working on to solve this problem. They had come up with a

separate the included more steps and was more comprehensive. See Appendix. In our

initial attempt to create a sheet we were not informed the hospital was making their

own tool. Upon discovery we set out to combine the two in the best, most effective manner possible.

Next we met with the nursing chief of the outpatient floor Deb. We knew the nurses on the outpatient floor were going to be the ones who were responsible for filling our new form out and we wanted to see what their opinion was. Deb informed us that her nurses were not excited or going to benefit from an extra tool. They already were inputting all the information in the system and were resistant to adding another step. Deb then showed us how easy it was to access the information in the computer system and we were taken aback. We were forced to reconsider our solution because it did not seem like it was going to increase patient safety but instead hinder patient care. An extra step seemed counter intuitive as we began to explore additional options.

IE Tools Used

In an effort to verify this assumption we attempted to simulate the process with and without the paper sheet. In this simulation using Arena, we mapped the process from patient arrival through the holding room, as shown in the figure below.
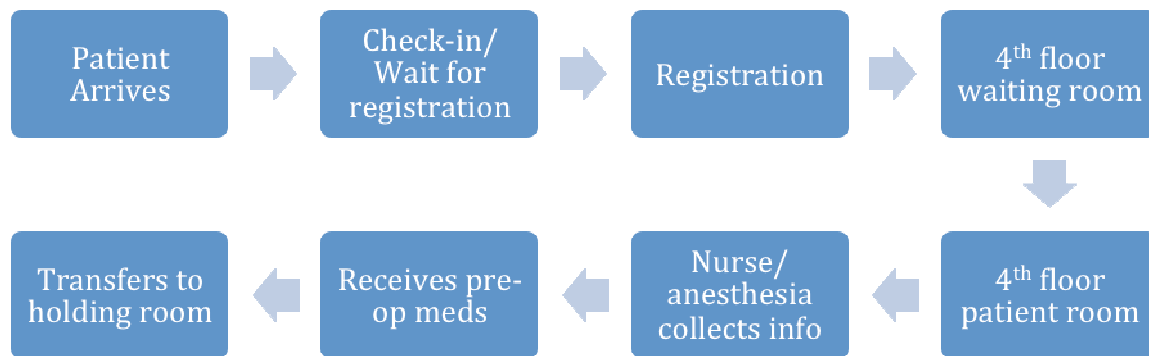
Figure 1

We used data given us by Isaac to create this simulation. One set of data was a survey that parents of children going through surgery filled out with times at each step of the process. We were able to use this to create a distribution for process times. The figure below shows one example of using input analyzer to create a best fit distribution using the data.

```
         Distribution Summary

Distribution:   Erlang
Expression:     -0.001 + ERLA(9.43, 2)
Square Error:   0.010740

Chi Square Test
  Number of intervals   = 4
  Degrees of freedom    = 1
  Test Statistic        = 53.7
  Corresponding p-value < 0.005

Kolmogorov-Smirnov Test
  Test Statistic        = 0.154
  Corresponding p-value < 0.01
```

Figure 2

We also used data on patient arrival times in order to simulate the arrival/registration

process. We used patient arrival times for three weeks to determine a schedule for

patient arrival. Below shows an example of one of the schedules we created.
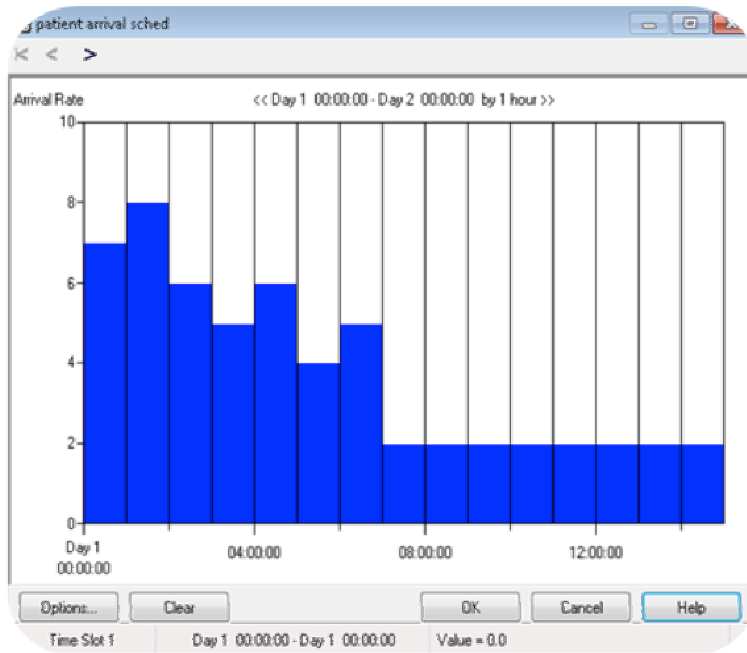
Figure 3

These are just a couple examples of the processes we went through to create the simulation. See Appendix 2 for the screenshot of the full Arena model.

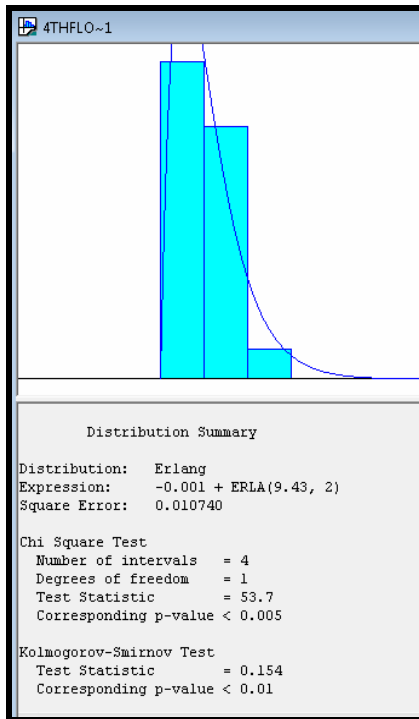We ran the simulation once with the process as is. Then we calculated a distribution for the time it would take the 4th floor nurses to fill out the form and added it into the process of the nurse collecting info from the patient. The following are the results for the two different simulations. The first without the form and the second with the form.

Total Time	Average	Half Width	Minimum Average	Maximum Average	Minimum Value	Maximum Value
NonOutpatient	50.3293	4.44	22.9374	76.4289	1.4947	372.77
Outpatient	89.8164	4.19	64.6002	118.67	23.3504	389.38

Figure 4

Total Time	Average	Half Width	Minimum Average	Maximum Average	Minimum Value	Maximum Value
NonOutpatient	48.2766	4.47	28.2478	79.0262	1.2949	381.39
Outpatient	90.1447	4.23	68.2919	113.74	23.4633	428.92

Figure 5

From the simulation, we realized that the tool really would not add much time to the overall process. We used output analyzer to analyze the total time in system data. It failed to reject the null hypothesis that the means are equal at 5% significance, shown below.


```
Compare Means - TISbasic.dat

Paired-t Comparison of Means                                    Diff
                                                      95% CL    Test Value

                                        -0.328
TIS file          -6.09                   0                      5.43


     Paired-T Means Comparison :

     IDENTIFIER       ESTD. MEAN   STANDARD  0.950 C.I.   MINIMUM   MAXIMUM  NUMBER
                      DIFFERENCE  DEVIATION  HALF-WIDTH     VALUE     VALUE  OF OBS
------------------------------------------------------------------------------
TIS file                -0.328       16.2        5.76       64.6       119      33
                                                            68.3       114      33
          FAIL TO REJECT  H0 => MEANS ARE EQUAL  AT  0.05 LEVEL
```
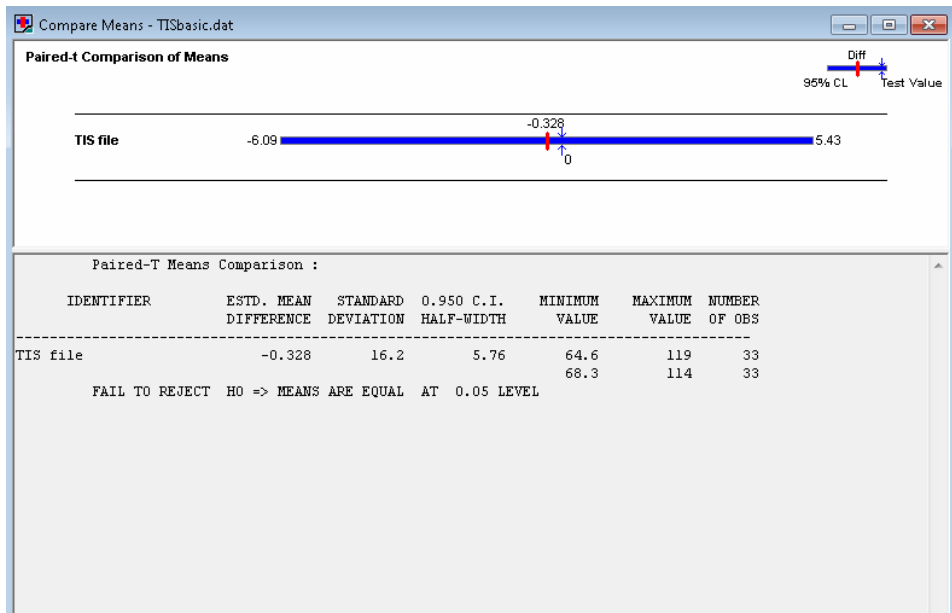
Figure 6

Thus, the results were inconclusive. This was acceptable because the process we simulated was based on the paper tool, which at this point we were reconsidering anyway. Additionally, the simulation did not perfectly simulate the process, as it was hard to incorporate everything and everyone involved. Because of this, we did not

expect to gain tons of insight from the simulation, but we still thought it would be a useful tool to use. The development of the simulation did cause us to dig deeper into the process and more fully understand the system triggers.

Next we set about trying to brainstormed the value-added aspects of the paper form solution as well as the non-value added aspects. We determined that the value is added to the process from the tool in the following ways. First, it will increase patient safety, because it contains quick, pertinent information about the patient. Also, the tool allows for quick information for the OR and PACU nurses—they do not have to spend valuable time searching in the computer or calling various departments to gather information about the patient. Finally, it will foster better communication between processes of outpatient surgery.

However, the paper tool also increases muda in the system. When a nurse fills out a form, they are double documenting information that they collected, which is a time waster. Secondly, it requires lots of "clicks" in the computer system to find all the information to go into the form, which again wastes the nurses' time. Additionally, the cost of paper and printing must be considered.

When we considered all of the waste that the paper form adds to the system, we brainstormed other options. Why not just build a tool in the software that queries all of the pertinent information into an easily accessible report? A queried report built into the software would still add all of the same value as the paper tool, while getting rid of

most of the waste. There is no longer double documentation, the form would be accessed without many "clicks," and the form would not need to be printed (and eventually shredded).

Prototype Development Part 2

We met with our coordinator to discuss the notion that a paper tool would be superfluous to the process. He insisted we needed to do more observation and brought up that OR might be a point of concern. We had no concerned OR previously because no one had brought it to our attention before. In preliminary talks it had not been brought up as an area of concern, so a meeting was then scheduled with Jenny, a member of the OR staff. During the meeting with Jenny, we discovered that she had been working on improving the hospital prototype also. She had been interviewing OR nurses and taking polls of the information that they deemed critical. She had narrowed the information down to a concise clinical panel in the existing computer program. See Appendix. She had used her stature and knowledge of the hospital quickly and efficiently. She had already brought the prototype of the clinical panel to IT and they are implementing it in the next month.

Ultimately the hospital will be implementing the idea we had brainstormed and thought to be the best route. Throughout our time at the hospital in the last year we increased the awareness of this tool and helped spur positive morale towards it. We learned about the importance of including all participating parties in the planning process.

Appendix

Patient Quick Chart

Patient's Preferred Name:

Guardian(s) Present: Mother / Father / G-parent / Foster parent / Other

Language: Verbal / Non-verbal   English / Spanish / Other
Airway Issues: Y / N

NOTES:

Time	Medication	Dosage

PERIOPERATIVE SAFETY PASSPORT

EVERY PATIENT- EVERY TIME- EVERYONE PARTICIPATES

Patient Sticker

Preferred Name:

OPS TO OR

SITUATION:
Procedure: Surgery notified of any differences between the
schedule and surgeons orders **Y   N   N/A**

Orders: CPOE: **Y   N**   Written: **Y   N**

BACKGROUND:
Family member/guardian present: Who is with the patient?

_____

Language barriers/communication/special needs (religious or
cultural): _____

ASSESSMENT:
Oxygen: _____   Labs to be drawn in OR: _____
IV Fluids: _____
Intraop Meds: _____
Antibiotics to be given in OR: _____
Trach/Foley/G-tube: _____
Blood Available: _____   Autologous **Y   N   N/A**
Significant History: _____

Isolation Precautions: _____
RECOMMENDATIONS: Any information OPS/Holding Room
would like to add: _____

OR TO PACU

MEDICATIONS:
Intraop meds other than sedation: **Y   N**
_____

ASSESSMENT:
Airway Issues: **Y   N**
_____

PACU TO POSTOP

MEDICATIONS:
Fentanyl - Dilaudid - Morphine

Other: _____

Meds Needed: _____

Assessment:
Equipment Needed: _____

Airway Issues: **Y   N**
_____

Test,Vicki
5 F   E000008599   M000000669
REG CLI CL.CF   25kg   T00000671
                                        Allergy/Adv: No Known Allergies

Perioperative Safety Passport
REG CLI Acct E000008599
Registered 03/22/2013 12:25

	03/22/13 07:00 06:59 :00	04/04/13 07:00 06:59 :00
Perioperative Safety Passport		
Situation		
→ Planned Procedure (in Caregivers Own Words)		Fix Hernia
Isolation	Contact	
Background		
Preferred Name		Vixter
Preferred Language		Spanish
Religious/Cultural Considerations to Include in Childs Care		none
History of Anesthesia		Yes
History of Anesthesia Complications		Yes
List Anesthesia Complications If Applicable		Takes a lon...
Patient/Family History of Malignant Hyperthermia		Yes: Mother
Patient/Family History of Pseudocholinesterase Deficiency		Yes: Father
Refusal of blood or blood products ??		No
Assessment *Past Medical History*		
SBE Ordered		No
Pre-Incision Antibiotic Ordered		Yes
Pre-Incision Antibiotic Given		In surgery
Surgical Staff Notified		Yes
Pre-Op Skin Prep Site		Right groin
Pre-Op Skin Prep Time		11:49
Pre-Op Site Marking		On unit
Pre-Op Site Marked By		David J Rid...
Pre-Op Med Dose		Versed 2mg
Pre-Op Med Route		PO
Pre-Op Med Time		11:50
Labs to be Drawn in OR		Yes

Status Board
Select Visits
Summary
Review Visit
Notices
New Results
Clinical Panels
Vital Signs
I & O
Medications
Laboratory
Microbiology
Blood Bank
Reports
Patient Care
Notes
Refresh EMR
Orders
Amb Orders
Clinical Data
Plan Of Care
Worklist
Mar
Write Note
TAR