

LESSONS LEARNED FROM MOVING TO WEB BASED SURGICAL REQUESTS

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Abstract

Due to incomplete and incorrect entries, the Jewish General Hospital's paper-based surgery request process resulted in a considerable amount of rework. Thus as part of a larger effort, the hospital decided to change the manner in which surgeons submitted these requests.

In particular, the Chief of Surgical Services decided to require surgeons to submit these requests via a web-based capability that only accepted fully and properly completed requests. Challenges included resistance from surgeons' offices, the Admissions Department, Medical Records; getting the vendor of the surgical information system to develop the functionality and interface in a timely fashion; training users; rolling out the new system and identification of unanticipated bugs or deficiencies; and most importantly, working to insure the full benefit of the automation process by eliminating all paper flow from the surgeon's office to the surgery scheduling office.

Lessons learned include the need for getting user involvement from all relevant areas as early as possible, the requirement for a concerted and persistent effort to get software vendors to deliver needed functionality, the need to revisit the system after rollout to address unexpected issues, and the need to demonstrate that the future state would be significantly better than the current one.

Introduction

The Sir Mortimer B. Davis Jewish General Hospital is a full service university affiliated medical center. It serves a large and diverse population in Montreal to which it provides a broad range of inpatient and outpatient services, including that provided by its tertiary & quaternary cardiovascular, neuroscience, oncology (including robotic surgery) and neonatology programs. It has 637 beds (154 surgical beds, and 20-22 staffed ICU beds), and its surgical services division performs approximately 15,000 operative procedures per year, a number that is expected to grow 2% per year through 2015. Approximately 40% of these require overnight patient stays after the procedure.

A driving force for process improvement in the hospital has been Dr. Lawrence Rosenberg, who took over as Chief of Surgical Services in October, 2007. One of the challenges he faced at that time was the frequent cancellation of operative procedures because of surgeon overbooking, long turnover times between procedures, and late start times; cancellations also occurred because of a lack of available beds in the ICU and the surgical wards. In addition, almost all of the surgeons complained about insufficient OR time, even though some services underutilized the time allotted to them.

Another challenge was the existing process for

submitting surgical requests; surgeons located inside the hospital directly entered their requests into the hospital's surgical information system, whereas surgeons outside the hospital submitted them on paper. Both submission mechanisms resulted in some fields, such as the technique & site fields, often being left empty, and in other fields, such as the procedure code, often being filled incorrectly. In addition, procedure dates were often set and changed without consideration of the need for preoperative screening; the resulting lack of documentation and consent forms led to procedure delays and cancellations. As might be expected, correcting instances of these problems on a regular basis consumed a significant amount of administrative effort.

Addressing The Problems

Fall 2007

One of the early decisions of the new Chief of Surgical Services was to engage an analyst, Dr. Philip Troy, to analyze peri-operative processes. One of the first actions the analyst took was to build a simple simulation model to try to understand OR utilization. While doing so the analyst realized that in some cases there was large variability in the time taken for specific procedures, even for the same surgeon. As the scheduling process relied on surgeon/procedure averages to estimate the time a specific procedure would take a specific surgeon, this variability often resulted in underestimation or overestimation of this time, with the result that surgeons often finished their surgical blocks early and thus wasted OR time, finished their blocks late, or finished their blocks without performing all of the procedures scheduled for those blocks. Thus it was hypothesized that if additional data could be collected, such as whether a surgeon felt that a particular procedure would take more or less time than usual, that this data could be used to reduce cancellation of procedures by improving their scheduling.

Spring 2008

By the spring of 2008, a consensus had been reached by Dr. Rosenberg, the Director of Nursing (Surgery), the analyst, and other personnel involved in surgical services that additional data, including estimates of procedure duration, needed to be specified for each procedure. In contrast to the past where similar changes had led to new paper based surgical request forms, the analyst pushed for electronic entry for all requests. To minimize data entry errors, he suggested that the number of fields with default values be minimized and that entry of data into all remaining fields be required; he also suggested that all fields be checked before requests were accepted to minimize the need for corrective actions by surgery scheduling office staff.

After getting approval for this concept the analyst held

discussions with relevant parties including management and staff of the surgery scheduling office, surgeons, and surgical secretaries. The purpose of these discussions was to elicit details about the fields that would need to be included in the electronic entry capability, and about how those fields should be organized to make them as convenient as possible for the capabilities expected users, surgical secretaries. Much to the analyst's surprise the discussions degenerated into discussions about why the project should not proceed, i.e. because many of the surgeons and their secretaries were computer illiterate, many surgeons didn't have computers, the belief that such a capability would lead to more errors and problems, and the belief that it would take surgeons and their secretaries more time to submit surgical requests.

Finally, to move beyond these discussions, Dr. Rosenberg told attendees of a meeting that if airplane travelers could use self serve check-in kiosks, then surgeons could submit surgery requests on a well designed electronic entry capability.

Summer 2008

Following this meeting, a limited budget for the development of a prototype of a web based surgical request capability was authorized. The intention was for this prototype to include all needed data fields, and that it be able to save surgical requests entered into it into a standalone database not hooked up to the surgical information system. A developer was engaged to build the prototype, and the analyst requested that the vendor of the hospital's surgical information system inform him and the developer as to the mechanisms that could be used to connect the prototype to the surgical information system.

At this point in time, the analyst's expectation was that the prototype would be delivered in the fall with all requested capabilities, and that the vendor would provide at least one mechanism for connecting the prototype to the surgical information system.

Fall 2008

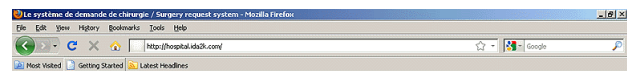
In the fall of 2008, the developer delivered a draft of the prototype that was missing much of the required functionality. To address this, the analyst worked more closely with the developer. The result was a very attractive and easy to use web based surgical request capability prototype that had all needed functionality except for the ability to connect to the hospital's surgical information and patient record systems, where the latter system could be used to automatically obtain patient demographic data.

Subsequent to the completion of the prototype, the analyst contacted the surgical information system vendor again regarding the availability of mechanisms for connecting the capability to the vendor's surgical information system. In particular, the analyst requested that the vendor make it possible for the developer to either directly access their system's database, to provide a utility for transferring batches of requests to their system, or to provide an application programming interface.

Early 2009

Early 2009, the vendor requested a meeting with Dr. Rosenberg and the hospital's Chief Information Officer to

discuss this request. At that meeting, they proposed that instead of providing a mechanism for accessing their system, that they develop a complete capability. At that same meeting, they agreed to have that capability meet all of the hospital's requirements, which had mostly already been demonstrated in the prototype. Of particular importance was a requirement that the capability list interventions with their techniques so that users would pick the intervention and technique at the same time from a single combo box, rather than have to first pick the intervention from one combo box, and then pick the technique from a second combo box. This capability was desired to preclude users from forgetting to specify techniques, which in turn would result in not having the appropriate equipment and supplies for the procedure. An equally important capability was that the list of allowable intervention/technique combinations be customizable, by the system administrator, for each surgeon.

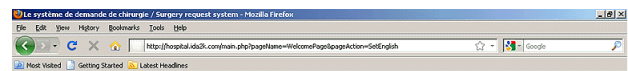


Le système de demande de chirurgie / Surgery request system

English Français



Welcome Screen



Le système de demande de chirurgie / Surgery request system

Login ID: nest
 Password: *****
 Surgeon: Aborheim, Haim

Submit Reset



Login Screen

Given that the vendor had agreed to provide all needed capabilities, the hospital agreed to have the vendor build the complete capability.

Spring 2009

After the hospital came to an agreement with the vendor, the vendor arranged for meetings between the hospital's analyst and the vendor's programmer and analyst. At these meetings the vendor's programmer and analyst

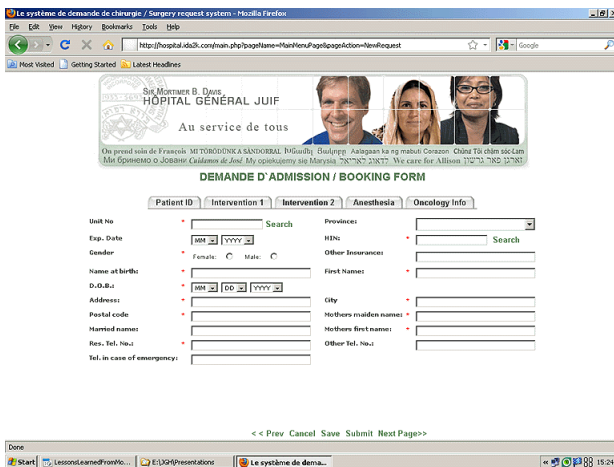
reviewed the hospital's requirements and verbally agreed that they were feasible. At around the same point in time, the hospital assigned Trixie Mairura, to manage the project.

Towards the end of this period the vendor demonstrated major progress, but did not deliver on several major capabilities. That led to a series of meetings between the hospital's project manager, the hospital's analyst and the vendor's analyst, where the analyst would tell the hospital analyst and project manager that he would look into meeting specific requirements, and would subsequently come back and tell the analyst and project manager that those requirements could not be met.

As a result, the project almost came to a standstill, and the hospital considered canceling the vendor's work.



Main Menu Screen



Patient Demographic Information Screen

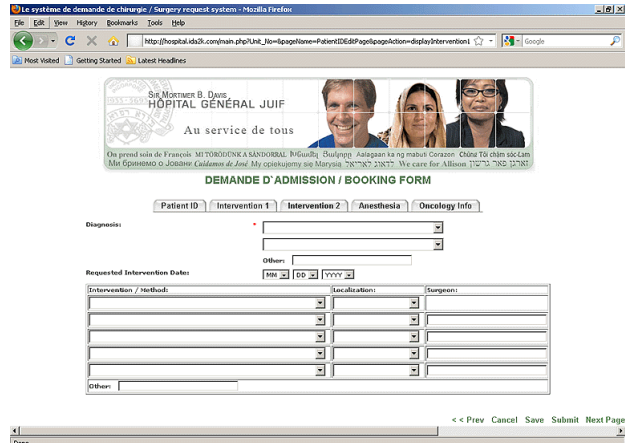
Summer 2009

This culminated with the vendor delivering a capability that was supposed to meet the hospital's requirements. The hospital's project manager scheduled a training session with herself, the hospital's analyst, a surgeon, staff from the hospital's surgery booking office, and several secretaries. During that training session, it was discovered that many of the major capabilities did not work as required.

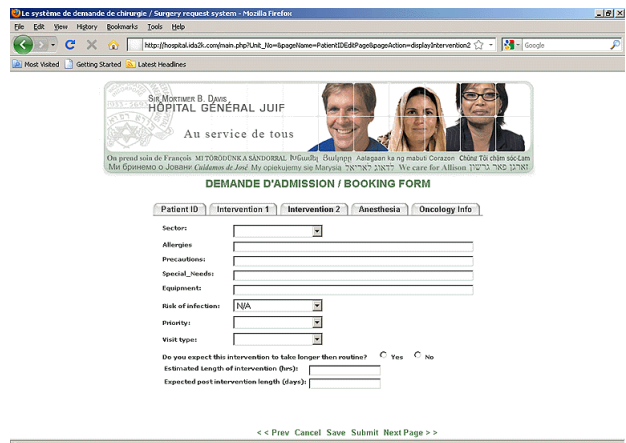
Fall 2009

To determine if the hospital should cancel the vendor's effort, a meeting was arranged between Dr. Rosenberg, his

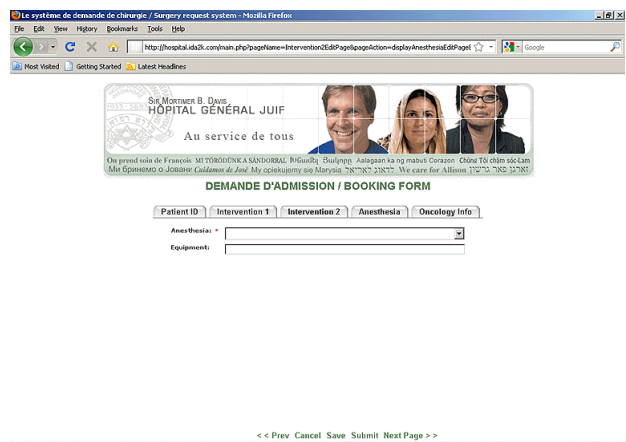
analyst, the hospital's project manager, the hospital's Chief Information Officer, and the vendor's president, vice president of sales, and top analyst. This meeting resulted in a written list of deliverables which both the vendor and the hospital signed off on.



Patient First Intervention Screen



Patient Second Intervention Screen

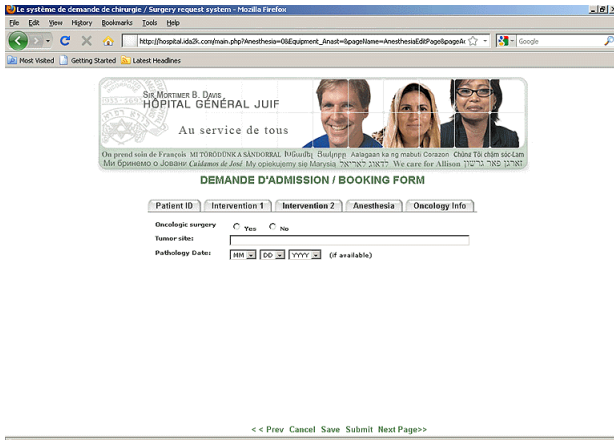


Patient Anesthesia Screen

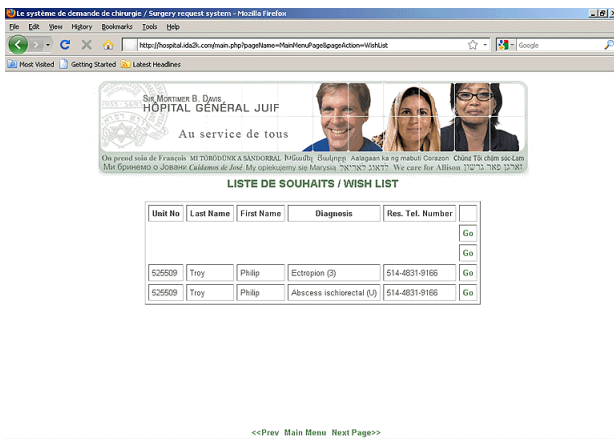
Summer 2010

During the summer of 2010, the vendor delivered a capability that was supposed to meet all of the agreed upon requirements. At this point in time, 5 users were trained,

and a pilot test with those users was run. After it was found that the vendor's capability met all but one requirement, the system was deployed.



Patient Oncology Information Screen



Patient Surgery Request List Screen (One of Many)

Results Of Implementation

Elimination Of Paper Flow

One of the goals of the project was to eliminate paper flow between surgeons, and the hospital's surgical booking office. Unfortunately, this was not initially achieved as the vendor had neglected to implement the capability of sending the surgical technique field to the surgical information system. As a result, paper copy of the requests still had to be filled in and sent to the surgery scheduling office so that the technique field could be manually entered.

Communication Time

Another goal was to decrease the time needed by surgery scheduling office staff to communicate with surgical secretaries to ensure that surgery requests were properly filled out. While communication time with surgical secretaries initially increased after the capability was deployed, that time is now very significantly reduced.

Processing Time

When the capability was initially deployed, it required more time from both the secretaries and the surgery scheduling office to process the requests. However as secretaries became more comfortable with the capability, the amount of time required by both the secretaries and surgery scheduling office staff became significantly lower.

User Satisfaction

As the secretaries became more comfortable with the capability, their satisfaction with it increased because they found the system to be easier to use and because its use reduced the need to communicate with the surgery scheduling office. In contrast, surgeons were less satisfied with the capability than with the paper request form because the capability required them to provide information for all required fields.

Next Steps

Version 1.1

The goal of version 1.1 was to refine the first version without adding major new functionality, i.e. to have the capability fully transfer all data from the request to the surgical information system, including the technique field, to make it possible for users to delete requests that had not yet been successfully submitted, to make it possible for users to add extensions to patient phone numbers, and to make it possible for users to print request lists.

Version 1.2 (In Progress)

The primary goal of version 1.2 is to make the capability tablet friendly, to the extent that it takes less time for surgeons to fill out requests themselves than to communicate to their secretaries the information needed to fill out requests. If successful, this would significantly reduce the need for secretaries for surgeons located in the hospital.

Version 2 (In Progress)

The primary goal of version 2 is to eliminate all remaining paper flow between surgical offices and the surgery scheduling office, and to also eliminate the need for matching consent forms with surgical requests and patient charts in either the surgery scheduling office or the pre-surgical screening clinic. This will entail electronic capture of consent, possibly via a digital signature capture device.

Lessons Learned

Lesson 1

Realizing that there was considerable waste in using paper surgical requests was a good first step. However, performing a value stream mapping analysis with personnel in relevant departments would have been more helpful. That's because the value stream mapping analysis would have identified other opportunities, such as providing more flexible approaches for surgeons to schedule their surgical procedures. Performing a value stream mapping would also have been helpful in that it would have provided a graphical display of non-value added steps, which would have made it

easier to sell the project. It would have also made it easier to identify in advance the benefit of moving to a tablet based platform.

Lesson 2

Everyone involved with the project needs regular feedback from the project team. Such feedback would have helped identify and address problems with both the prototype and the vendor supplied capabilities earlier in its development process.

Lesson 3

Make sure that vendors and developers *really* understand, and commit to delivering, a capability that meets requirements. On several occasions in this project, it was incorrectly believed that this was the case, which in turn resulted in long delays in getting the project completed.

Lesson 4

It's important to include the correct personnel in the effort. In our case, this implied including personnel from Information Technology, Trixie Mairura, the Coordinator of Pre-Operative Services, Dana Porubska, surgeons, surgical secretaries, a member of the surgical services operations management team, Dr. Troy, and the project's champion, the Chief of Surgical Services, Dr. Lawrence Rosenberg.

Lesson 5

Had the project been sold better, it would have reduced the amount of time it took to implement it by several months that was spent in meetings trying to convince hospital personnel to take part in it.

Lesson 6

Follow through after implementation is extremely important to identify unimplemented capabilities, user problems, and tweaks that would make the overall capability work better.

Lesson 7

System response time is important as users get very frustrated when response times are long.

Lesson 8

Implementation time is important in that it is hard to maintain forward momentum in a project, and keep interest in it, when it progresses very slowly.

Lesson 9

After implementation, regularly check how users are using the new capability to see what problems they are having, to see if process changes made a positive impact, and to identify further improvements. This is critical because the likelihood of there being some problems in an initial implementation is typically very high, because users often don't report those problems, and because those problems can often be alleviated with minimal effort. It is also critical to ensure that the goals of the project are being achieved; in the hospital's case it was discovered that because one capability was not working, paper surgical requests were still being filled out in addition to the web

based requests. Finally, without doing this, it is difficult or impossible to identify further ways for improving the process.

Acknowledgements

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Biographical Sketch

Philip Troy is an Adjunct Professor Of Surgery at McGill University and chief scientist of Les Entreprises TROYWARE. In those roles, Dr. Troy provides process research and consulting services to the Sir Mortimer B. Davis Jewish General Hospital. He earned a bachelor of science degree in Engineering Science and a master of science degree in Quantitative Business Analysis at The Pennsylvania State University, and a doctorate in Operations Research from Yale University. His skills include Monte Carlo Simulation (including discrete event simulation), optimization, systems analysis, and software development. For the last several years, Dr. Troy has focused his efforts on analyzing and simulating peri-operative processes at the Sir Mortimer B. Davis Jewish General Hospital. His efforts at the hospital include an analysis of the surgical bed needs for the Intensive Care Unit, the development (in progress) of a simulation based optimization model for the proposed pre-surgery screening clinic, the development (in progress) of an enterprise simulation model of the hospital's peri-operative processes, and support of the hospital's transformational change effort. Recent presentations and publications, reflecting joint work with Dr. Lawrence Rosenberg and Valerie Vandal, include a presentation and published proceedings for the 2009 Winter Simulation Conference, a presentation at the 2009 Mayo Clinic on Systems Engineering and Operations Research in Health Care, a presentation for the 2009 Central Surgical Association with a corresponding publication in the refereed journal Surgery, and a presentation at the 2010 International Workshop On Healthcare In Operations Management.