Dealing with Uncertainty and Ambiguity in a Complex Project: The Case of Intravenous (IV) Pumps in a Healthcare Center

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A University Hospital for the 21st Century

In 2008, the Quebec government approved a CAD$2.3 billion budget to build a modern academic healthcare facility that would provide state-of-the-art, highly specialized healthcare services to the Montreal population and to a broader community of 1.7 million Quebecers scattered from Nunavik to the U.S. border. The new facility would house a great part but not all of the McGill University Health Center (MUHC) activities.

The opening of the Glen site in 2015 was the conclusion of a multifaceted project involving hundreds of workers, over a period of close to eight years. The physical architecture conveyed only a glimpse of the complexity and magnitude of this redevelopment project, much of which resided 'within its walls,' where clinical teams from different hospitals needed to prepare to work together day one after the move. The programs and activities of the two larger general hospitals, the Royal Victoria and the Montreal General, had to be reconfigured and redeployed, which required many teams to merge and many clinical practices to be harmonized. In addition, throughout the organization, many major clinical and administrative processes had to be streamlined and optimized to meet the expectations set for the new MUHC.

The physical move to the new Glen site of the MUHC took place between April and June of 2015 and represented the largest hospital move in Canadian history. A total of 273 patients were transferred, a very complex task. The Royal Victoria Hospital, the Montreal Children's Hospital, and the Montreal Chest Institute sites closed down, while the reconfigured Montreal General Hospital, the NEURO, and the Lachine Hospital remained on their existing site.

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A Turning Point: The Creation of the Transition Support Office

In preparation for this redevelopment project, MUHC executives visited hospitals in Europe and in the United States that had undergone similar redevelopment projects. What they learned was alarming: close to 50% of managers had resigned from their position in the months following the move. Testimonials pointed to a lack of dedicated resources to support clinicians and managers in preparing this major transformation. Typically the time needed to prepare for the transformation was scheduled very late in the process, as part of the move planning activities. This situation led to operational disruptions and disconnects, raising the level of stress and distress among clinical teams. In other words, bricks, mortar, and IS/IT considerations represented just the tip of an immense iceberg. First and foremost, the success of a redevelopment project would lie in preparing the people to transition seamlessly to a radically new work environment, while maintaining a high quality of care and uncompromised patient safety.

It was with this in mind that the MUHC created the Transition Support Office (TSO) in 2008. This project management office was intended to support teams in harmonizing practices and processes across sites as well as to facilitate the merger and the move. The TSO had to act on the following three areas to facilitate the merger:

1. Harmonization of clinical practices;
2. Review of all processes; and
3. Consolidation of work teams that would be merged with the move.

Suzan was appointed as head of the TSO. She played a strategic role on projects under her responsibilities by linking with senior management when needed. She held a doctoral degree in nursing and had proven strong

leadership qualities, fueled by an inspiring vision of the future of the new MUHC. She firmly believed in project management as a philosophy of management to lead the overall organization transformation for the benefit of patient care.

At its peak, the TSO was staffed with 26 full-time equivalent persons, who collectively managed a portfolio of no fewer than 100 projects, a third of which focused on supporting clinicians across the different sites to harmonize their clinical practices based on the best available evidence from the scientific literature. Nearly half of the TSO employees had an education in project management, either a master's degree in project management or a PMO certification.

Maggie was a former Associate Director of Nursing, responsible for the Clinical and Professional Staff Development Service at the MUHC from 2004 to 2011, and had developed a large network of contacts within the organization over the years. One of her department's numerous responsibilities included the harmonization of clinical practices. In 2012, she was recruited as a project manager by the TSO to manage projects related to the harmonization of clinical practices, befitting her background. In this role, she would be supported by a project management specialist and the results would be a winning combination of clinical and project management expertise

One early morning in 2012, Suzan met with Maggie to inform her that the TSO had just been asked to provide support for the selection, implementation, and use of a new float of IV pumps.

The Intravenous (IV) Pumps Project

IV pumps known as infusion pumps were commonly used to provide care in a variety of clinical settings. Nurses used them to administer intravenous fluids and medications to patients. There were two basic kinds: a volumetric pump for continuous infusion and a syringe pump for intermittent infusion. Maggie referred to them as "*an essential, everyday tool for nurses.*" Patients often had more than one IV pump at a time for the administration of multiple medications; for example, premature babies might need up to 14 pumps at any given time. "Infusion pumps were manufactured with software that could alert users to potential errors. The pumps with this additional software were often referred to as "Smart Pumps" or "Intelligent Infusion Devices." This software allowed an organization to create a library of medications that provided medication dosing guidelines, by establishing concentrations, dose limits, and clinical advisories."[1] This security feature was called the Dose Error Reduction System (DERS) or drug library and when not used, pumps were referred to as being "dumb."

Before the move and consolidation to the Glen site, IV administration procedures varied across MUHC hospitals, and there were as many as eight different types of pumps being used. As Maggie recalled it, "*There were always pumps missing, in fact through our investigations, we found out that there was a lot of 'hunting and gathering' by staff members. This situation meant that staff spent much time looking for pumps because they were not readily available to them.*"

Biomed Engineering was responsible for the acquisition and maintenance of medical equipment for the MUHC. In 2012, it was time to renew IV pumps contracts and, given the impact this type of technology would have on clinical practices, the TSO was asked to assist with the process.

The goal of this project was to address the long-standing clinical and operational issues surrounding the use of IV pumps at the MUHC. It would be a system-wide, inter-departmental project that needed to be conducted before the move to the Glen site. Not only would it include the harmonization and optimization of practices, but it would also encompass the selection and implementation of IV pumps. For the project to truly meet clinical needs, clinicians needed to be involved, which posed a challenge since, traditionally, clinicians' involvement in the decision-making process was limited. As Maggie put it, "clinical was going to drive the project."

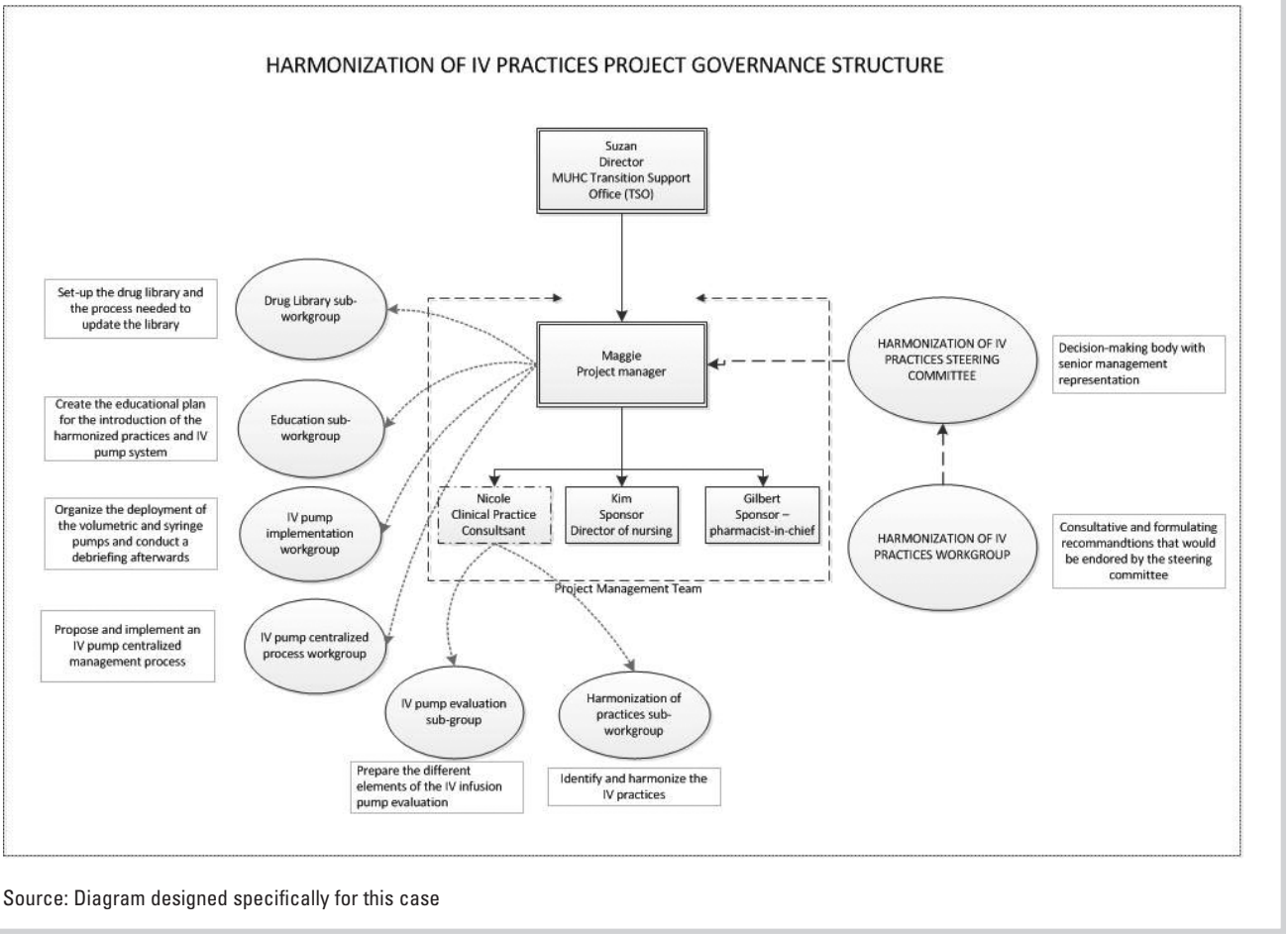
Project Organization

The first thing Maggie did was to put in place the project plan and governance structure. The project sponsors would be the Director of Nursing and the Pharmacist-in-Chief. The core project team consisted of the two sponsors plus a clinical practice consultant (Nicole) and a knowledge broker (Martha). Many ad hoc members—clinicians, experts in process review and evaluation as well as representatives from different departments, such as Quality, Patient Safety, and Performance, Biomed, Finance, Logistics—were solicited as needed for their expertise at different junctures during the project (see Figure 1).

The objective was to engage the multiple stakeholders around strategic decisions that would have to be made, and at the right level. She, therefore, created two committees: one at the executive level and another at the operational level. The first was the Harmonization of IV Practices Steering Committee that would include director-level representatives from Nursing, Pharmacy, Biomed, Information Technology (IT), Finance, Quality, and Logistics. The operational committee consisted of a group known as the Harmonization of IV Practices Workgroup. The committee represented inter-professional clinicians from all MUHC sites (adult and pediatric care) and various clinical settings. All these representatives were brought together to guide the clinical decision process regarding the selection of IV pumps, the elements to support their use, and the harmonization of IV practices.

Maggie hoped that the involvement of clinicians from the very onset of the project would ensure that the selected pumps would suit the needs of the many clinical settings in which they would be used. She also hoped it would help the TSO obtain buy-in from participants across the MUHC. Moreover, if they supported the initiative, she believed that

[1]Proceedings from the Institute for Safe Medication Practices (ISMP) summit on use of smart infusion Pumps: guidelines for safe implementation and use.



Source: Diagram designed specifically for this case

Figure 1: The organization and governance structure for the harmonization of IV practices project.

it would be easier to achieve the required behavioral change and shift.

Project Kick-off Meeting

Eager to get the stakeholders involved, Maggie held the project kick-off meeting of the Steering Committee on 20 March 2012 (see Table 1). The objective of the meeting was to arrive at a common vision of the project; agree on the scope, major elements; and timetables for the project and establish the next steps. The main goal and objectives of the project were to:

1. Harmonize all the practices linked to the administration of IV medications based on the best available evidence;
2. Acquire IV pump equipment based on the best technology, in a sufficient number that met all the clinical needs of the MUHC;
3. Improve the safety of use of IV pumps across the MUHC; and
4. Improve the management of the pump fleet across the MUHC.

A fifth objective was added as a result of the kick-off meeting, and that was to ensure sustainability by putting in place a decision-making structure to address and communicate issues promptly. This exemplified the importance of the communication needed across departments and professions to ensure ongoing involvement and cooperation from all parties throughout the project.

See Table 2 for the Project Charter. The project scope was defined as "The Harmonization of IV Practices across the MUHC" sites, and the renewal of the pump fleet for the adult sites, excluding the Lachine and the MCH sites. These sites were to be involved in identifying the selection criteria for the pumps, but would not renew their pump fleet until later. The MCH site had recently purchased pumps and would not benefit from the project until the expiration of that contract, but it was important for them to have a say in the decision-making process.

Next on the agenda were the proposed timetables. The tight deadlines along with the budget needs of the project

	Items	Discussion/Decision/Action
1	Review of the agenda	Maggie explained the agenda and the objectives of the meeting: • Arrive at a common vision of the project (see if the expectations are similar and address the divergence) • Agree on the scope of the project, its major elements, and the timelines • Agree on the next steps Maggie explained that Julie would be with the project until the end of April 2012. She will be able to assist on moving certain aspects of the project, such as the needs assessment.
2	Context of the project	The harmonization of IV practices project is supported by the Transition Support Office. It is a system-wide inter-professional, inter-departmental project that needs to be addressed before the move to the Glen. In addition to the harmonization and optimization of practices, selection and implementation of IV pumps are integral parts of this project.
3	Definition of the project	1. Goal and objectives of the project: A document called "Needs statement" had been circulated to the group members before the meeting and was discussed. The main goal was presented as well as the four main objectives of the project. The group agreed on these and asked that a fifth objective be added and that is: Put in place a decision-making body that would address and communicate issues related to IV practices and pumps post implementation as a strategy to ensure sustainability. Therefore, part of the sustainability plan of this project is to recommend to senior administration the appropriate structure needed to ensure ongoing quality improvement related to IV practices post implementation. The importance of communicating explicitly the need for inter-professional and interdepartmental ongoing involvement and commitment in this project was also mentioned. The group agreed with this. 2. Scope of the project: Harmonize IV practices across the MUHC sites and renew pump fleet for the adult sites excluding Lachine (proceeding currently with call for tender but will participate in identifying selection criteria) and the MCH (who will participate in identifying selection criteria only because they purchased the pump a few years ago). It excludes pumps used for pain management (PCA pumps). The available budget is 3 million dollars for the first year (2012–2013) and up to CAD$9 million. Colin explained that this amount was determined based on historical data and market references. It is a onetime capital investment required to create, sign, and get the contract running in order to have access to the pumps that we need. This would permit 1.5 IV lines/patient. The CAD$9 million will pay for the equipment, the professional support to implement, educate, and deploy. It was suggested to include the notion of partnership with the vendor. 3. The preliminary timeline: The proposed timeline was presented. We are facing a tight timeline linked to the call for tender. Colin needs the selection criteria and plans to have a detailed call for tender document by the end of July 2012 and he plans to organize an evaluation workgroup thereafter. He plans to proceed with the call for tender at the beginning of August 2012, followed by the evaluation of the call for tender thereafter and finish this by the end of 2012. A needs assessment with front line staff regarding IV practices, pump storage, and management is planned. The nurse managers have been solicited to identify their current pump situation and forecast future needs. She should receive all the information by the end of March 2012. Colin mentioned that there are internal and external factors that might impact on the project and that is the ministry is thinking about selecting a pump system that would be used provincial-wide. Internally, the fact that we aim to ensure each patient has at least one pump is a big change and will greatly impact the logistic aspect (storage, maintenance, cleaning). We discussed also the infrastructure needed to support the smart pump technology like setting up drug library and needing Wi-Fi technology to update the library in a safe manner. There will be Wi-Fi at the Glen and at the MGH, it will not be for another five years. This means that we will purchase smart pumps, but not use the library for two to three years until we move to the Glen and it could be for five years for the MGH if we do not have access to Wi-Fi technology. We will need to include this in our risk management analysis when we look at the different scenarios. It was clear from all present that as senior person from IS/IT needs to be a member of this coordinating committee.
4	Next steps	1. The members present agreed to be a member of the harmonization of IV practices coordinating committee knowing they are a decision-making body for this project. It was mentioned that a senior person from IS/It also needs to be a member. We informed the group that we have solicited IS/IT to delegate someone to join our group. Some of the next steps are: 1.1. Proceed with the needs assessment 1.2. Form the harmonization of IV practices workgroup and the management of IV pumps workgroup as well. 1.3. Set the next harmonization IV practices Coordination Committee meeting

Table 1: Minutes of the kick-off meeting.

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Project Identification	
Project Name: Harmonization of practices linked to the administration of IV medications	
Department: Nursing, Pharmacy, Logistics, Biomedical, Finance, Information Services, Quality, Risk and Performance	**Site:** RVH, MGH, CHEST, Neuro, MCH, and Lachine
Project Start: January 2012	**Project Completion (expected):** July 2014
Project Governance	
Requester: Pharmacy/Nursing	**Sponsor(s):** Director of Nursing Pharmacist-In-Chief
Clinical or Other Leader(s): Assistant to the Director of Nursing Pharmacist	**Project Manager(s):** Maggie, Transition Support Office Clinical Practice Consultant: Nicole
Project Environment	
Strategic Justification: Within the context of the redevelopment project, it is imperative to optimize and harmonize the practices related to the administration of IV medications, based on best evidence and supported by state-of-the-art technology.	
Project Context: Across the MUHC we find: • Diverse IV administration practices • Different IV administration systems (different pump system and tubing) obtained from different vendors (different contracts and end of contract dates) • Shortage of IV pumps and time constraint related to renewal of pump contract • Absence of a comprehensive system of pump management (tracking system and central management and rotation of stock), preventative maintenance and cleaning The above elements are contributing to: • Having a negative impact on quality and security of patient care by contributing to an increase of infection risks, medication errors • Increasing caregiver stress due to pump not being accessible when needed • Increasing the risk of errors and inefficient use of human resources • Difficulty in providing adequate servicing to pumps, difficulty in keeping track of inventory, and depletion of IV inventory due to loss of the pumps • Difficulty in ensuring appropriate level of training for the different types of pumps in circulation, often done by word of mouth, contributing to increased risk of errors • Lack of confidence in the system in being able to provide the equipment needed in working order when it is needed, thus contributing to hoarding and stashing and also tension between caregivers	
Problem/Opportunity Statement: • Engaging in the harmonization of IV practices must be done before 2015, opening of the new Glen site • As part of the redevelopment plan, a budget has been reserved for the purchase of new equipment such as IV pumps • IV pump contracts are coming to an end, creating the sense of urgency to look at purchasing new pump technology to support the harmonized IV practices	

(continued)

Key Stakeholders:
Pharmacy
Nursing
Biomedical
IS/IT
Finances
Logistic
Infection control
Quality risk and performance
Patients
Union
Anesthetists
Respiratory therapists

Project Definition

Aim:
Within the context of the redevelopment project, it is imperative to optimize and harmonize the practices related to the administration of IV medications, based on best evidence and supported by state-of-the-art technology

Project Description:
The purpose of the project is to identify, optimize, and harmonize IV practices, based on best practices, and support these practices with the state-of-the-art technology that best meets the clinical needs of the MUHC in order to improve the quality and security of the patient care linked to the administration of IV medications.

Expected Benefits:

- Improve the quality and security of the patient care linked to the administration of IV medications
- Optimized and harmonized practices, contributing to decreasing medication errors
- Increasing ease of providing appropriate training to pump users
- Accessibility of the IV pumps when needed, functional and clean
- Optimal use of human resources
- Increased caregiver satisfaction
- Demonstration of effective inter-professional and inter-departmental collaboration
- Efficient management system of pumps, contributing to decrease expenditure related to continual crisis management because of pump shortage

Objectives:	**Evaluation Indicators:**
1. Harmonize all the practices linked to the administration of IV medications based on the best available evidence 2. Acquire IV pump equipment based on the best technology, in sufficient number, that meet all the clinical needs of the MUHC 3. Improve the safety of use of IV pumps across the MUHC 4. Improve the management of the pump fleet across the MUHC 5. Ensure sustainability by putting in place a decision-making structure to address and communicate in a timely manner issues linked to the IV practice and pumps	1. Percentage of IV practices harmonized

Scope (Inclusions):	**Scope (Exclusions):**
• Harmonization of all practices linked to IV practices across all sites • Identification of selection criteria for IV pump selection to meet the needs of clinical areas across the MUHC • Renewal of the IV pump fleet for all MUHC sites except MCH (purchased IV pumps not that long ago) and Lachine (carrying own call for tender) • Estimated budget: first year—CAD$3 million (2012–2013), the remaining funds about CAD$6 million for a total of CAD$9 million (includes purchase of equipment, professional support to implement, educate, and deploy)	• MCH and Lachine for the call for tender • Pumps for pain management such as PCA pumps

(continued)

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Constraints:

- Sense of urgency—move to the Glen in 2015
- Urgent need of pumps
- Having to manage different IV pump contracts
- Diverse IV practices across the different sites
- Wi-Fi technology not available for many of our current hospitals except for the Neuro and certain units. Although, the Glen will have WI-Fi, the installation of Wi-Fi at the MGH is not forthcoming (lag time of possibly five years or more)
- Lack of confidence in the process from the users due to previous failure of previous initiatives
- Culture of hoarding and stashing equipment in order to meet the urgent needs of pumps on the units and lack of confidence that the caregivers will have easy access to the equipment they require to provide safe care.
- Multiple projects that will impact on this project and where alignment is crucial such as OACIS, CPOE, Pharmacy system
- Missing important stakeholder presence and involvement such as IS/IT

Preliminary Project Planning

Working Hypotheses:

- The plans and models that are developed will guide the implementation
- The users and various stakeholders will take active part and assume accountability in the different phases of the project
- The result of the user needs assessment will be adequately integrated in the project and will help in shaping and choosing the different scenarios for the harmonization of practices, the selection criteria for the pump selection and the pump management model
- The identified risks will be taken into consideration and addressed throughout the project

Risks:

- Gap between the chosen scenarios and the user needs
- Inability to put in place the needed infrastructure to support the full use of the smart pump safety features
- Absence of allocated budget post implementation to ensure daily operations
- Absence of a department willing to take on the management and upkeep of the IV pumps
- Lack of coordination between related projects such as equipment, harmonization of IV practices
- Absence of full-time dedicated resources to the project

Key Milestones and Deliverables:	Expected Completion:
1. Needs assessment with front line caregivers regarding the IV practices and IV pump **Milestone 1:** Completed needs assessment	1. End of June 2012
2. Analyzing different scenarios: (a) practices requiring harmonization, (b) model for continuous infusions and intermittent IV medication administration, (c) pump management model **Milestone 2:** Chosen and validated scenarios	2. End of August 2012
3. Develop selection criteria for call for tender for IV pumps **Milestone 3:** Selection criteria chosen and validated as well as the call for tender needed	3. September 2012
4. Call for tender for IV pumps **Milestone 4:** Choice of equipment and validated	4. December 2012
5. Development of detailed plan to: harmonize the IV practices (a), pump logistics (b), deployment and communication (c) **Milestone 5:** Detailed implementation plan for the three aspects	5. February 2013
6. Operationalization of the plan, deployment, follow-up of the harmonized practices, pumps (with or without library), training, pilot project, full-scale implementation and monitoring of indicators **Milestone 6:** Established targets met	6. February 2014
7. Development and implementation of sustainability plan **Milestone 7:** Quality indicators reviewed, transfer to daily operations completed, and IV pump decision making structure in place and functional	7. July 2014

(continued)

Resources Needed: Resources from Transition Support Office needed: • Project manager 2 ½ days a week for 2 ½ years • Process expert (IV pump management workgroup) • Knowledge broker • Change management expert • Clinical practice consultant • Evaluation consultant **Resources Needed from Other Departments** • Risk and performance expert • Pharmacist • IT/IS • Biomed	**Estimated Number of TSO Hours:** 15 hours/week for 2 ½ years = 2,000 hours 14 hours/week 12 months = 670 hours 15 hours/week 6 months = 360 hours 14 hours/week for 12 months = 670 hours 15 hours/week for 2 ½ years = 1,800 hours Ad hoc 100 hours Total hours = 5,600 hours
Steering Committee: Director of Nursing and Sponsor Pharmacist-in-Chief and Sponsor Director of Biomedical Department Director of Purchasing To be named, IT/IS Department Clinical lead pharmacy Clinical lead and Assistant to the Director of Nursing Associate Director, Quality, Risk, and Performance Purchasing sector of Finances Department Project Manager Clinical Practice Consultant (TSO)	
Project Authorization	
Sponsor's Signature: _____ Clinical Leader's Signature: _____ Project Manager's Signature: _____ **In the absence of signatures, electronic approval is required*	Date: _____ Date: _____ Date: _____

Table 2: Project charter for the IV pump project.

were presented to the Steering Committee. The Biomed department representative informed the committee that he would need a detailed call for tender by the end of July 2012. He would then set up an evaluation group that would be in charge of evaluating specifications as the project evolved. A project management student intern would be in charge of soliciting input from the pump users to identify their current pump situation and forecast future needs.

The Biomed representative was concerned that some internal and external factors might pose challenges to the project. He informed the group that the Quebec Health Ministry was considering selecting a pump system that would be used province-wide. Internally, the fact that the project aimed to ensure a ratio of one pump per patient was a significant change that would greatly impact the logistics department regarding storage, maintenance, and cleaning.

The infrastructure needed to support the smart pump technology was discussed. This required setting up a drug library with the names of all medications and dosages that could be administered through the pumps. A Wi-Fi network was also needed to support and update the drug library safely for all sites and all departments at all times. This new technology minimized the risk of medication administration and dosage errors. At that time, Wi-Fi was to be available at the Glen site in 2015 as well as at the MGH by 2017. It would hence have precluded the use of the drug library for two to three years until the Glen site opened. This situation represented a major risk for the project and would require the assessment of several scenarios to select the best options. From then on, a senior representative from IS-IT needed to be involved in the coordination committee's decision-making process.

It was already clear after the first meeting that the main challenges to address were going to be:

1. Budget, as the funding was not finalized and the number and types of pumps needed had yet to be determined. It was important to (a) ensure that clinicians had the number of pumps needed and (b) eliminate the "hunting and

gathering" phenomenon. A challenge would be to obtain the budget approval in a timely manner to post the tender according to the set timeline.
2. External pressures from the Ministry would be an issue, since the implementation of a province-wide tender system would prevent hospitals from posting tenders individually. This situation represented a risk with regard to the feasibility of meeting the tight timelines and the organization's need for an integrated pump system that could be used in adult and children sites alike.
3. The technological infrastructure to support the smart pumps would require the development of a business case to support the additional cost for the purchase of Wi-Fi.

Maggie knew that the next step would be to identify the number of pumps needed to obtain proper funding for the project. She and her team would have to conduct exhaustive research and a needs assessment across all sites to estimate the number of smart pumps required to meet the MUHC's needs. It quickly became apparent to Maggie and the steering committee members that the budget would be an ongoing concern.

Budget Constraints

In September 2012, the Workgroup and the Steering Committee agreed to (see Table 3):

1. Purchase smart pumps (volumetric infusion pumps) and a syringe pump for intermittent medication administration and to view these as an integral part of an overall medication safety program;
2. Work toward the integration of different systems and put in place the infrastructure to support the use of the smart pump technology;
3. Adopt the syringe pump as the method of intermittent administration of certain IV medications (major change for the hospitals moving to the Glen); and
4. Opt for a tender evaluation with an adjusted price.

In October 2012, based on a report prepared by the members of the Workgroup and by the clinical practice consultant for this project, the Steering Committee approved the acquisition of 2,087 volumetric pumps and 743 syringe pumps.

For the tender, the Finance representative suggested that they would have to submit a more conservative amount as a firm purchase and place the balance of the pumps needed as "optional." At first, the budget was estimated at CAD$8 million over three years. However, on 7 November 2012, the budget was presented at CAD$5 million with a possible overrun of CAD$1 to CAD$2 million. This budget did not include the acquisitions of syringe pumps. The Biomed representative believed they could accommodate the number of pumps but suggested a deployment over time, which meant that the budget would not be available all at once. This budget also excluded two sites that would need to be budgeted at a later date.

Maggie reflected that: "We knew that it would be a challenge to acquire the amount of pumps needed, so we had to act carefully. The budget was a moving target, and it was very difficult to grasp exactly how much money was available to us. Knowing how much money you need and getting approval for that budget is crucial in order to post the tender."

The Call for Tender Saga

In January 2013, to comply with the law, it was announced that two separate tenders would have to be posted; one for the syringe pump and another for the volumetric pumps. Biomed explained that the funding would most likely come from two separate sources. The first source represented funds awarded for the replacement of equipment that came from the Ministry and the second source represented funds made available to purchase new equipment as part of the new hospital project. The group was told that more efforts would be needed to secure funding for the purchase of the syringe pumps. The volumetric pump tender was posted from July 2013 to 6 September 2013, more than one year from the original target date of July 2012, and the contract was signed on 18 December 2013, a testament to the complexity of the project.

Meanwhile, in September 2013, the source of the funding and the amount available for the syringe pumps were still not clearly defined, impacting the project team's ability to post the tender and subsequently the implementation of harmonized practices and introduction of the new syringe pumps within the acceptable timeline.

Maggie expressed her concerns: "We were getting closer to the "no fly zone," which was that as of September 2014, no new changes could be implemented before the move to the Glen."

Before implementing the use of the syringe pump, a major change in practice had to occur, which was to prepare the RVH and the NEURO to shift from the way clinicians were used to administer medications (from a regular intravenous bag to a syringe pump). This situation was an important change for the pharmacists and nurses from these sites. Furthermore, this work could not begin until the syringe contract was signed and the syringe pump manufacturer known.

Maggie summarized the situation as, "*These were major issues that created urgency to post tender for the syringe pump; at this point the tender had already been posted for the volumetric pumps."*

Throughout the project, availability of Steering Committee members for meetings was a constant challenge because of the competing priorities these leaders faced on a daily basis, attending to the daily operations and the redevelopment project obligations. In one particular instance, in September 2013, Maggie held a Steering Committee meeting that the Biomed representative could not attend and she said to the committee: *"This was a problem because this*

Agenda	
MEETING:	IV Harmonization coordinating Committee
PROJECT:	Harmonization of IV practices and pumps
DATE:	21 September 2012
TIME:	13:30–15:20
VENUE:	2155 Guy Street–7th Floor–Suite 790.12

Participants:	Judy	☐	Colin	☐
	Terry	☐	Sandra	☐
	Greg	☐	Geoffrey	☐
	Gilbert	☐	Alan	☐
	Mike	☐	Angela	☐
	Bretch	☐	Conni	☐
	Maggie	☐	Nicole	☐

Meeting objectives:

- Learn about smart pumps implementation and agree on the vision for MUHC
- Identify actions that can be taken now to help bridge some of the gaps needed to support the vision
- Decide on the continuous and intermittent IV administration system we need at the MUHC
- Agree on how we will address the language issue
- Validate the scope of the project
- Discuss the call for tender process needed

AGENDA

13:30–13:40	Review of the meeting objectives and agenda (Maggie)
13:30–13:55	Lessons learned about implementing smart pump technology (Maggie)
13:55–14:15	Discussion and decision on MUHC vision related to smart pump technology (All)
14:15–14:30	Identification of action points to address some of the gaps (All)
14:30–15:00	Progress report on preparing call for tender process: (1) Agreement on the choice of continuous and intermittent IV meds administration methods and number of IV lines needed; (2) agreement on the language issue (Maggie)
15:00–15:20	Tender process we need: (1) validate the scope of the project; (2) our reflection thus far (Maggie)

Table 3: Agenda of the project steering committee of September 2012.

representative's input was very important and it was difficult to make decisions in his absence." The Biomed representative had sent a table presenting a budget that was different from the original one. The Board of Directors had approved the acquisition of 1,750 volumetric pumps with a CAD$6 million budget, whereas the table indicated a CAD$4.5 million dollar budget. It was clear that the budget would be insufficient and that more funds would have to be secured. After much confusion and many queries, the Committee was informed that the Biomed representative had been instructed by the Ministry to reduce the equipment replacement budget for the upcoming year by 25%.

TSO Director Suzan, who fully supported the project, would present the issues at the Senior Leadership meetings regularly and would flag the pump financing as an urgent matter and a major roadblock to the success of the project. Following one of those meetings, Suzan informed Maggie that she and her team would have to prepare a report to present the situation and the impact of not deploying the project. The project team immediately got to work and prepared a document highlighting the financial and potential patient risks associated with the decision to decrease the number of volumetric and syringe pumps. On 7 October, this document was presented to the Associate Director General, Finance, Procurement, and Biomedical.

Following this presentation, Maggie explained the harmonization of the clinical practice to committee members: "We presented our vision, our premises, and our methodology for the pump assessment, etc., but this was not enough. The Associate Director General told us we needed to prepare a report justifying the needs in greater details. He also wanted an external player to assess and validate our report, so we got to work with the Quality Department. We undertook further environmental scans, looked into the literature. Finally, we were able to demonstrate that the number of pumps we were recommending was appropriate. Judy, Director of Quality, Patient Safety and Performance, external to the project, contributed to the validation of the report, confirming the TSO's assessment."

The team submitted the document to the Associate Director General, Finance, Procurement and Biomedical in November 2013, and he accepted the recommendation, including the number of pumps needed. The syringe pump tender was posted from 31 January 2014 to 3 March 2014. Meanwhile, the project team and collaborators were preparing the 25 March 25 2014 deployment of 800 volumetric smart pumps and the centralized process to manage these at the pilot site, the MGH.

The pressure was on to get the syringe pump contract signed by 15 June 2014, to proceed with the implementation of their use before the move to the Glen. By June, the MUHC's Director General had signed the needed exemption, but negotiations were still ongoing with the manufacturer to get the absolute best price. After much effort from all concerned, the syringe pump contract was signed on 3 July 2014. The project was able to proceed, after obtaining sign-off from clinicians, Pharmacy, and Nursing for the implementation of the new method of intermittent medication administration by syringe pumps beginning with the RVH in September 2014 and the other sites after that.

One More Challenge: The Need for Wi-Fi

From the onset of the project, it had been clear that Wi-Fi was going to be a crucial element for the implementation of the project. Maggie knew that this was going to be a major challenge and that she and her team would have to be persistent.

At an earlier Steering Committee meeting, everyone had agreed to move forward with the purchase of smart pumps and to put in place the infrastructure to support the use of smart pump technology. It did not make sense to buy a smart pump and not use it to its full capacity, so they needed to implement Wi-Fi to be able to update the drug library.

In March 2013, the Steering Committee discussed the business case for Wi-Fi at the MGH. This analysis would eventually lead to the pilot project site. Wireless access was already in place in certain areas but not sufficiently to support the use of smart pumps in all clinical areas. The MGH IS/IT infrastructure needed to be upgraded. The need extended well beyond the requirements of the pilot project, since after the opening of the new facility the MGH would receive patients from the Glen with smart pumps. Without Wi-Fi at the MGH, the risk of a medication error would be extremely high. Wi-Fi was a crucial element of the project; the infrastructure needed to support it was lacking and would need to be acquired. The main issue, however, remained the budget.

On 19 March 2013 Maggie held a Steering Committee where the IT representative explained that no single project could warrant the funding of a Wi-Fi network and that it would require a decision at the Ministry level. He informed the group that efforts would be made to find funding. Maggie knew that a business case to support these efforts would be required.

Suzan supported Maggie on the need to develop a business case to bring this dossier forward. She suggested that the Quality, Patient Safety, and Performance collaborate with Maggie's team in the development of the business case. She agreed to inform the Senior Leadership Team that the business case was being prepared.

The project team worked in collaboration with Finance (which was spearheading this initiative), and Logistics, Biomed, Quality, Patient Safety and Performance to collaborate in the preparation of the business case. The Director of the TSO supported the Wi-Fi case and presented it as a priority at Senior Leadership meetings. Maggie proudly informed the workgroup that the Business case was being presented. She also explained that the cost structure for Wi-Fi implementation would be broken down into two phases:

1. Wi-Fi in designated areas that supported smart pump implementation; and
2. Wi-Fi in remaining clinical areas.

Making a Decision on How to Use New Pumps: Dumb or Smart

The team had to determine which of three implementation plans to recommend based on analysis of the project, and they had to justify this recommendation:

Option 1: Implement as dumb pumps in non-critical care areas and as smart pumps in critical areas
Option 2: Implement as smart pumps in all clinical areas
Option 3: Implement as dumb pumps in all clinical areas

They set to work preparing their recommendation for the meeting to come, undertaking a detailed risk analysis for each of the three options.

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