

Original Research Article

## **Feasibility of standardizing pre-operative assessment clinics across a hospital system**

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### **Abstract**

Pre-operative assessments, which include patient history and physical examination, are fundamental in ensuring patient education about their procedure, and leads to successful post-operative outcomes. Within Niagara Health (NH), there are three main hospital sites where operations occur. Currently, there is inconsistency in the pre-operative assessments between sites for the same surgical procedures, demonstrated by variation in pre-operative assessment times, activities, and information given to patients. The aim of this project is to understand where standardization through quality improvement (QI) initiatives should begin within these pre-operative assessment clinics and determine the feasibility of standardization across varying hospital sites. To achieve this aim, Plan, Do, Study, Act (PDSA) cycles were conducted and involved structured observations at each site to gain a comprehensive understanding of pre-operative practices across sites. Root cause analysis found moderate correlation at two sites and strong correlation at one site between patient age and consult time. Affinity analysis determined that the most pragmatic and feasible area for improvement was through standardization of admission history forms. While the piloting of a new standardized form showed no significant increase in consult times, fundamental barriers such as nursing staff turnover, lack of familiarity with the new form, and concerns of comprehensiveness prevented the continuation of this new standardized form. Future attempts at standardization should begin with collaboration and co-design with pre-op clinic staff, followed by identification of elements of the complex adaptive system that can feasibly be standardized to reduce unnecessary variation while at the same time increasing buy-in for form use.

**Keywords:** Pre-operative assessment, Quality improvement, Standardization, Co-design, Surgery

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## Introduction

Pre-operative assessment clinics (PACs) are designed to improve efficiency, provide surgical information to patients, and promote improvement in post-operative outcomes; however, lack of standardization across institutions within the same healthcare system prevents these clinics from achieving optimal efficiency and patient satisfaction. Currently, there is inconsistency in the pre-operative assessments between three sites within the Niagara healthcare system for the same surgical procedures (i.e. urology, orthopedic, gynecological, and diagnostic surgical procedures). These inconsistencies include variation in pre-operative assessment times ranging anywhere between 20-45 minutes, assessment forms used by nursing staff, and information given to patients.

These inconsistencies can carry consequences that are reflected in every stakeholder group involved in the operation of PACs. At a higher level, these consequences include redundancy in information, such as prescriptions, longer patient wait-times, and increase in the potential for error that can negatively impact patient safety in the operating room (1). Lack of standardization in these Niagara PACs limits portability of care for patients, creating an inconvenience as well as preventing accessibility of patient information that is able to be collected at other Niagara Health (NH) sites – an element that can often pose frustration for patients accessing care at multiple sites. Unstandardized practices also impact staff function and burnout, particularly for nursing staff who must manage increased patient volumes in pre-op clinics. Lastly, one important additional consequence of inconsistency across PACs is the resulting variation in presentation and interpretation of clinical information by surgeons and other health care professionals who often rotate through and perform surgery at each of the three sites (1-2). Overall, the functioning of PACs may benefit from standardization, improved process, and new policy implementations in order to achieve higher satisfaction for patients and healthcare providers as well as reduce costs and shorten hospital wait-times. However, executing these goals can be difficult given the aforementioned complex adaptive nature of health institutions, the many stakeholders involved, the amount of effort required to implement and change processes, and the overall feasibility for such an undertaking.

As a starting point, the Choosing Wisely Canada Toolkit is a guideline designed to reduce unnecessary visits and investigations in pre-operative clinics and provides physician groups and organizations with an outline to optimize the pre-op process (3). Within this toolkit is a pre-op clinic consultation guideline which outlines which patients should be referred to the pre-op clinic for a consultation by their surgeon's office. For the surgeon to make this decision, complexity of the surgery and/or patient factors such as age, and co-morbidities, must be accounted for (3). The implementation of this toolkit and pre-op consultation guideline would reduce the number of lower-risk patients attending the clinic, and result in a shift in the overall patient population of the clinic towards higher-risk categories. Thus, the case-mix of the patient population attending the clinic will change (3).

To this end, the project presented focuses on developing a standardized pre-operative assessment for each of these three surgical sites within Niagara Health based on the Choosing

Wisely Canada framework. Overall standardization will ensure consistency, safety and efficiency for patients and health professionals. As such, the aim of this project was to understand where standardization through QI initiatives should begin within the pre-operative assessment clinics, identify any possible interventions based on stakeholder analysis, and to determine the feasibility of standardization across varying hospital sites in this local region.

## Methods

This QI project utilized Plan, Do, Study, Act (PDSA) cycles, which are a series of short-cycle, small-scale tests of change linked to assessment of each cycle's outcomes (4). PDSA cycles allow for low-risk tests of change based on input from front line staff and may therefore encourage useful staff engagement in quality improvement (4). In the context of this study, PDSA methodology was beneficial because the framework helps the user to understand the impact of small-scale interventions and the natural variation within a system through the measurement of data over time (5).

PDSA cycle 1: root cause analysis to determine the factor(s) contributing to the lack of standardization.

Structured observational visits were conducted at each site where patients were asked for consent to be followed through their pre-operative clinic consults. Ten patients were followed through their nursing consult at site A, eleven patients at site B, and ten patients at site C. Additionally, two of the patients at each site were followed through the entire process from check-in, visits with the nurse, anesthesiologist, occupational therapist, physiotherapist, and through their diagnostic testing and imaging procedures. This was done at each site to gain a comprehensive understanding of the flow in the pre-operative assessment clinic.

A structured observation tool was used to observe for patient, physical, and organizational factors which were hypothesized to contribute to the lack of standardization. This tool was created as a sensitizing framework from which to observe for specific activities (5). Patient factors included complexity of cases, type of surgery, and age. Physical factors included physical design and architecture of the pre-operative assessment clinic, assessment instruments available (i.e. ECG machine), and assessment forms filled out. Organizational factors included the number of staff and the types of surgery conducted at each site. The observers using this framework were cognizant of the fact that other valuable information may be present in the environment and therefore remained open to other important material that was outside of this observational tool (6).

PDSA cycle 2: focus group to identify feasible intervention.

A focus group with the chief of surgery and nurses from each hospital site was held, where an affinity analysis was conducted using the following guiding questions: What is the level of readiness to change within your PAC? In one year, what would you like to see done? What can we do to make the process more efficient, effective and better for staff and patients? This meeting was conducted to determine the most appropriate scope and focus for the QI project.

Attendees were presented with the current local problem and were instructed to use these guiding questions to come up with one long-term change and one short-term change that could be implemented within their hospital site's PAC. Common themes from each focus group were identified and utilized to determine an intervention that would be both feasible and relevant across all sites.

PDSA cycle 3: development and implementation of a standardized nursing assessment form.

Short-term common themes identified in PDSA cycle 2 were used to guide the course of intervention. It is protocol within NH to trial a paper copy of the new assessment form before building it into the Meditech system at the two other sites that currently use paper nursing assessment forms.

A standardized nursing assessment form was created using the Meditech computerized form from site A as a template (Appendix 2). The form was finalized by the nurse managers of each pre-op clinic and sent to a forms committee for approval prior to going live at sites B and C. Feedback forms were given to the pre-op nurses at each of these sites as a balancing measure to assess their satisfaction and to document any subsequent changes that should be made to the new assessment form. They were also instructed to document the duration of time and type of surgery for each consult that took place over the week.

## **Results**

PDSA cycle 1: root cause analysis to determine the factor(s) contributing to the lack of standardization.

The pre-operative clinic activities performed at each site gathered the same information (i.e. patient history, standardized anesthetic patient record filled out); however, the method by which the information was documented varied. The most prevalent difference was the variation in nursing assessment forms used and the way in which the nurses documented patient information. There was a computerized nursing assessment on Meditech at site A and paper assessment forms that were completed at sites B and C.

Although not significant at each site, nursing consultations for in-patients required more time than out-patients (Figure 1). This can be attributed to the increased complexity of in-patient surgery compared to outpatient surgery. There were significant differences in consultation times between site A and site B for both in- and out-patients, which can be attributed to the complexity of the procedures done at each hospital. There was a strong correlation between patient age and consult time at site A, with an r-value of 0.77 (Figure 2). At site B and site C, there was a moderate correlation between patient age and consult time, with r-values of 0.52 and 0.58, respectively (Figure 3,4).

Physical factors including design and architecture of the PAC and assessment instruments available (i.e. ECG machine) were also different at each site. However, only site A conducted ECGs within the nursing consult, whereas laboratory technicians performed this test separately at the remaining two sites. This process added time to the nursing consult at site A. Additionally, there were more examination rooms for consultations to take place at site A, whereas the remaining sites only had one room to conduct all pre-operative nursing consultations. An additional layer of complexity was added since site A had four to five pre-op nurses conducting consultations whereas site B and site C only had one pre-op nurse who conducted consultations.

Based on nurse feedback and the small sample of patients that were followed at each site, the time that each consultation takes is dependent upon the status of each individual patient. As outlined by the nurses throughout the observational visits, they felt that polypharmacy, additional comorbidities, and level of patient education received prior to pre-op all contributed to the nursing consult time, making it difficult to standardize the consultation times across each site.

PDSA cycle 2: focus group to identify feasible intervention.

The following long-term changes were identified through the affinity analysis conducted at the focus group: best possible medication history (BPMH) should be typed into a computer then printed for the patient chart, mandating pre-op for all patients, and frequency of anesthesia presence in the clinic. Additionally, the following short-term changes identified were: computerization of patient history and an updated computer system, updating of the patient history form in Meditech, and standardization of admission history forms (Appendix 1).

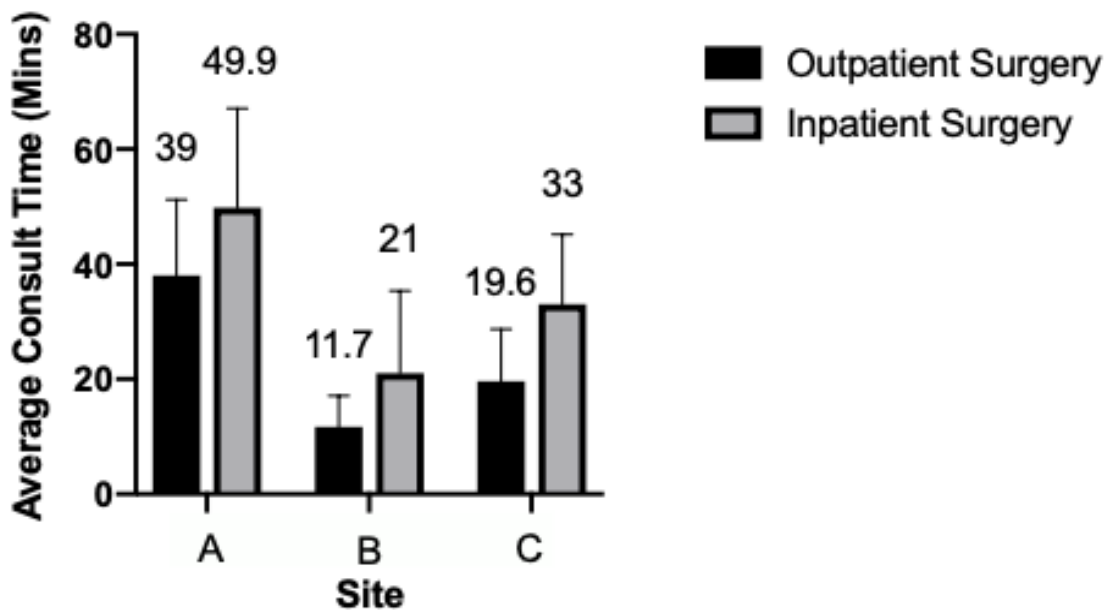
Medication reconciliation is currently in a phase of QI at NH and anesthesia schedules are highly inconsistent across the sites. These long-term changes are primarily related to staffing, which is a complex area that is out of the scope of this QI project. Within the time that the structured observational visits in PDSA cycle 2 took place, there were pharmacist cutbacks in the pre-operative assessment clinics, who historically conducted the BPMH. Anesthesia schedules had also changed. Therefore, due to the complexity of these two areas of the pre-operative process, it was more feasible to hone in on the short-term changes involving the standardization of nursing consults.

The most prevalent common themes that arose from the affinity analysis were the large amount of paperwork and the lack of standardization of the nursing pre-op assessment forms.

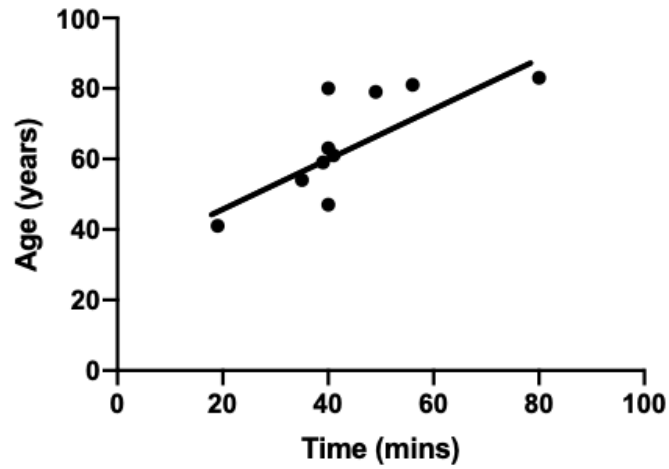
Based on the short-term results of the affinity analysis, it was evident that the course of intervention should focus on the standardization of nursing assessment forms (Appendix 1). As mentioned previously (2), standardized assessment forms improve the quality of information recorded, and thus, validates the course of intervention trialed in PDSA cycle 3.

PDSA cycle 3: development and implementation of a standardized nursing assessment form.

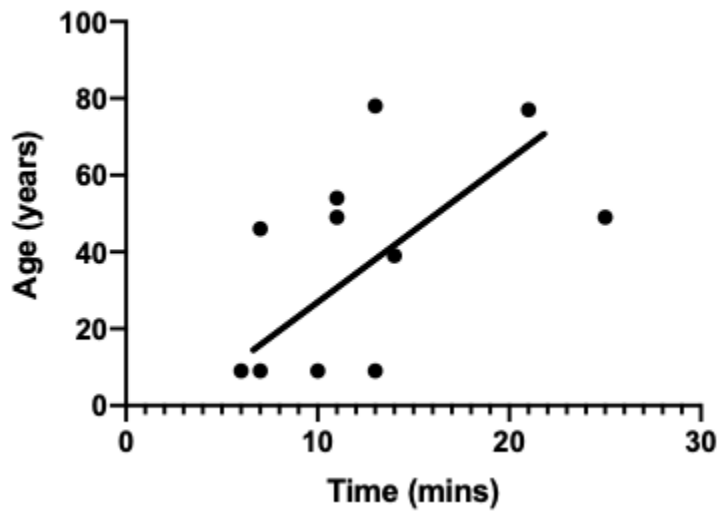
New form data was provided by the nurse for day surgery consults at site C, which showed that there was no statistically significant difference in the median nursing consult time before and after the implementation of the new standardized assessment form (Figure 5). Upon further feedback given by the nurses, nurse managers, and clinical educators, the use of the new form was stopped after one week to undergo further edits and review due to conflicting opinions and concerns with the comprehensiveness of the information being collected.



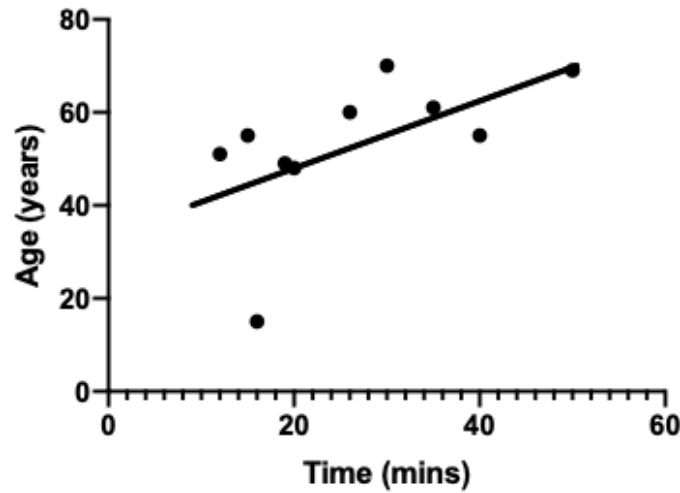
**Figure 1.** Consult Times for In-Patient Surgery & Out-Patient Surgery at Each Site.



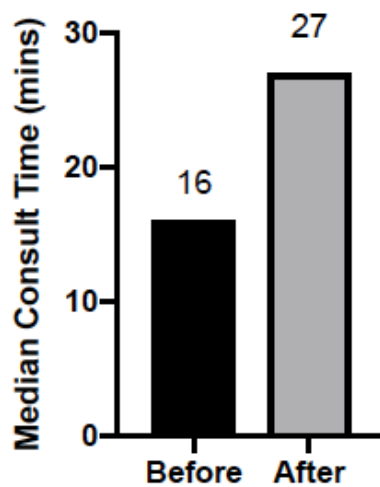
**Figure 2.** Site A Correlation Between Patient Age and Consult Time. There is a strong correlation between patient age and nursing consult time ( $r = 0.77$ ).



**Figure 3.** Site B Correlation Between Patient Age and Consult Time. There is a moderate correlation between patient age and nursing consult time ( $r = 0.52$ ).



**Figure 4.** Site C Correlation Between Patient Age and Consult Time. There is a moderate correlation between patient age and nursing consult time ( $r = 0.58$ ).



**Figure 5.** Day-surgery consult times before and after new nursing assessment form implementation at site C. The difference in median consult time before and after the implementation of the new assessment form was not statistically significant ( $P > 0.05$ ). Before  $n=5$ ; after  $n=6$ .

## Discussion

The purpose of this study was to use the PDSA process in order to 1) identify areas of potential standardization in the PAC, 2) identify any possible interventions, 3) Assess the overall feasibility of standardization. Using observational assessments, process mapping, and holding a focus group, it was identified that the most feasible way to begin the standardization of the pre-



operative process was to focus on standardizing nursing consults within the pre-operative assessment clinics.

Through the PDSA process the use of a standardized assessment form was identified as a potential intervention to increase overall standardization in PAC. Following consultation with stakeholders it was implemented in three PACs. Analysis of the form showed that at site C the new form was found to have no significant impact on the consult time and required change management interventions such as utilizing nurse educators to assist with the transition (Figure 5). Although nursing feedback was considered before the implementation of the form, it was not until the form was utilized in the context of the clinic that significant changes and areas for improvement were identified. A barrier to satisfaction and implementation of the new form at site B included a turnover in staff, including a nurse working in the clinic who was just becoming familiar with the pre-operative process and undergoing training in their new role. It was noted by the staff that the form was much less comprehensive than its predecessors, which prompted the nurses to revert back to utilizing old forms as a precaution to ensure that sufficient patient information was collected during the consult. What emerged from this finding was that including a pilot trial phase before implementation of subsequent forms would allow nurses to provide more comprehensive feedback by identifying problem areas earlier in the process, with the goal of having them feel more confident utilizing it in the clinic.

What emerged from this study was the importance of placing emphasis on gathering feedback from frontline staff, in order to come up with an appropriate course of action for the short term (Appendix 1). When implementing QI projects within a complex adaptive system, it is crucial to focus on interventions that are relevant and feasible for all hospital sites within the system and to gain a comprehensive understanding of the environment and culture in which these interventions will be implemented through co-design.

It is recommended that future renditions of a standardized patient assessment form be created using a co-design thinking framework, where nurses, nurse educators, and front-line staff are directly involved with its creation rather than having a quality improvement team develop it and ask for their feedback and approval. This process would be more efficient and would increase satisfaction and buy-in, by prioritizing deep empathy for end-user desires, needs, and challenges, while fully understanding the problems with the form in order to develop more comprehensive and effective solutions from the beginning (7,8).

The results of the root cause analysis in PDSA cycle 1 (e.g., identifying standardization issues) reinforce that there are substantial structural and organizational differences between each site's PAC. While a potential intervention—standardized assessment forms—was identified, factors that posed a greater challenge for intervention, such as variability in patient cases, different technology, the varying number of clinic staff, and the physical architectural differences of each PAC were all found to contribute to the lack of standardization. To standardize the differences in technology, staffing, and physical elements at each PAC, significant investments in capital and human resources are required. These are factors beyond the scope of this project and do not warrant the utilization of rapid PDSA cycle methodology.

The variability in patient cases, which was quantified using patient age and type of surgery in this study (Figure 1-4), also posed a difficult challenge to standardizing consult times. Due to the varying ages of patients that attended each clinic, consult times were highly variable. Figures 2-4 suggest that older patients required longer consultation times, which is especially relevant to NH due to the aging population in Niagara. Figure 1 suggests that out-patient surgery consults require less time than in-patient consults. This could further assist pre-op clinics in allocating appropriate amounts of time to each appointment to streamline the standardization process. Addressing this issue was beyond the scope of this paper, however, further research should focus on the impact of patient cases on consultation time by quantifying the number of additional co-morbidities, type of procedure and health-literacy levels, and their effect on consult time.

The Choosing Wisely Canada guidelines provide a framework for standardizing the pre-operative process, which is important in increasing efficiency and decreasing wait times. In the context of NH, the first step to implementing the Choosing Wisely Canada guidelines is to assess the pre-operative clinics. This project accomplished that objective by including an assessment of necessary changes based on staff feedback at each site. By gathering specific recommendations that are targeted and sensitive to the local environment at each site, credibility and buy-in for this pre-op assessment style can be achieved (3). This study identified many barriers to implementing standardization of pre-op assessments, many of which would be expensive to address and are therefore not feasible. However, one possible initiative that was not addressed here was the extreme variability seen in the clinic, due to individual factors. While we have recommended that this be investigated in future studies, it would also be a possible area of application of the Clinical Decision Tool. This toolkit provided by the Choosing Wisely Canada guidelines would allow surgeons to identify patients requiring a pre-op clinic visit based on pre-determined indicators such as patient physiological status, and surgical category (3). The adoption of these guidelines is predicted to eliminate the extreme case-mix and reduce the large amount of variability seen in the pre-op clinic (3).

The research conducted through this project connects directly with Institute for Healthcare Improvement's New Rules for Radical Redesign in Health Care (9). For future standardization projects with a focus on pre-operative assessment clinics, the specific rules that should be the core of the project are: collaborate and cooperate; standardize what makes sense; and move knowledge not people (9). Thus, the process of standardization must begin with collaboration and cooperation through co-design with pre-op clinic staff, followed by identifying elements of the complex adaptive system that can feasibly be standardized to reduce unnecessary variation. A larger scale PAC standardization will require utilization of modern digital care, such as an electronic patient pre-op record (10), and adoption of Choosing Wisely Canada's guideline to eliminate unnecessary pre-op visits. By focusing on these elements, the standardization process can take place more efficiently and effectively, especially across a complex adaptive system where there are many key stakeholders who play a crucial role at all stages of the process,

rather than onboarding the frontline staff into the project after the creation and identification of the QI initiative.

A limitation of PDSA cycles is that the resources, skills and expertise that they require are often significantly underestimated, which can hinder their success (11). This was apparent when trialing the new form, as the nursing staff were required to devote additional time to learn the new form and provide feedback on what should be changed. In a clinical setting where the patient is their main priority it is recognized that concurrent engagement in the “Study” phase of the PDSA cycle may be a competing priority, which in turn can reduce buy-in and willingness to engage in the intervention.

## **Conclusions**

By using PDSA cycles to assess the feasibility of implementing a standardized pre-operative process across a hospital system, it was evident that there is a need to evaluate the factors that affect the case-mix of patients that attend the pre-operative assessment clinic. Patient age, complexity of their scheduled surgery, and additional co-morbidities are all factors that affect the course of action that is to be taken to prepare the patient for their surgery, as well as the time it takes to conduct the pre-operative consults. Given the extreme case-mix of patients, varying staff resources, and differences in technology at each hospital site, it was not feasible for us to implement a standardized nursing assessment process. These findings support the future implementation of Choosing Wisely Canada guidelines to reduce unnecessary pre-operative visits, which in turn will reduce the case-mix of patients, allowing for feasible system-wide standardization. Furthermore, this research highlights the strong need for a co-design framework to be used in the identification and planning phases of the standardization process. To implement a standardized pre-operative assessment process at a system level, it is crucial that key stakeholders from each hospital site, such as frontline staff, are engaged in all stages of the process.

## **Acknowledgements**

We would like to thank the pre-operative clinics and associated staff within the Niagara Health System for their support in the undertaking of this project.

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**Appendix**

Pre-Op Clinic Staff Feedback	Long Term Changes	Short Term Changes
<ul style="list-style-type: none"> <li>• There is a great deal to cover in a short amount of time</li> <li>• Volume of paperwork results in consults taking more time than scheduled</li> <li>• Patient population has an impact on consult time</li> <li>• Best Possible Medication History (BPMH) filled out electronically would be more efficient</li> <li>• Patients with more co-morbidities require more time</li> <li>• Seniors require more time</li> <li>• Varied information is provided to patients by surgeons</li> <li>• Collecting a proper medication history is very time consuming</li> <li>• For mandatory pre-op at site B, it would require another clerk and another nurse</li> </ul>	<ul style="list-style-type: none"> <li>• Electronic and printable BPMH</li> <li>• Mandating pre-op for all patients</li> <li>• Increased frequency of anesthesia presence in the clinic</li> </ul>	<ul style="list-style-type: none"> <li>• Computerization of patient history and an updated computer system</li> <li>• Update the patient history form in Meditech</li> <li>• Standardization of admission history forms</li> </ul>

**Appendix 1. Qualitative Feedback from Pre-Operative Clinic Staff.** Comments collected during the observational visits that took place at Pre-Operative Assessment Clinics across NH. Long Term Changes and Short Term Changes were identified by staff at a focus group and were used to guide future interventions intended to standardize the pre-operative process across NH.

