

A collaboration to improve perioperative acute pain care at the University Teaching Hospital of Butare, Rwanda

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ABSTRACT

BACKGROUND: A perioperative acute pain care program integrating standardized assessment and treatment forms into pain care was developed and implemented at an urban hospital in Rwanda through a collaboration between Rwandan and Canadian experts. This study evaluated the perioperative acute pain care program using a quality improvement lens.

METHODS: Using the Model for Improvement: Plan, Do, Study, Act (PDSA) cycle, a mixed methods evaluation was performed. Over one year, 519 randomized patient chart audits were conducted and analyzed through control charts. Through purposeful sampling, focus groups comprised of surgeons and nurses (N=34) involved in pain care in surgery, obstetrics, and anesthesiology were performed and analyzed via thematic coding.

RESULTS: The average attempted form completion rate across all forms varied monthly between 56-93% (mean=79%; median=81%). Across all forms, both the mean and median total number of errors per form were 12.5. Enablers of form use included improved pain care for patients and feelings of professional satisfaction. Program implementation was challenged by resource constraints, form integration, and health care provider training.

CONCLUSION: Future quality improvement collaborations should identify and address improved pain care while working with local experts to ensure PDSA cycles are continuous, and evidence based.

Keywords: Acute Pain, Quality Improvement, Pain Care, Rwanda

INTRODUCTION

The focus on pain care effectiveness, implications for patient recovery, and recognition of pain management as a human right have become

issues central to the discourse around equitable healthcare [1-3]. Providing effective perioperative pain care is a challenge in Africa and around the world [4-7]. Beyond human suffering, poor acute pain treatment can result in the development of

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chronic pain, a condition that is experienced by one in five individuals in African countries [6,8-10]. Although the science of pain management is continually evolving, core practices include pain assessments alongside pro re nata (PRN, or as needed) medication, effectively scheduled (SCH) analgesic administration, non-pharmacological interventions and early movement [11].

Challenges including resource constraint and ineffective knowledge translation are commonplace across integrated quality improvement collaborations (QICs) between high-income countries and low- and middle-income countries (LMICs) [12]. A large scale systematic review in *The Lancet* of 337 studies and 118 QIC strategies demonstrated limited overall impact from small scale QICs [13]. More effective QICs incorporated both training and supervision, whereas approaches limited by materials, training, and/or the implementation of technology had less effect [13]. Low quality data often resulted from administrative challenges, lack of resources, and process misalignment between team members [14,15].

A meta-analysis demonstrated modest and inconsistent results from QICs employing a variety of tactics for training, supervision, and infrastructure development [15]. This is consistent within a large Rwandan hospital, where no improvement in post-operative pain was reported between 2013-2017 [4]. It is unfortunate that there is limited longitudinal data demonstrating sustainability of QICs as “progressive implementation of affordable, cost-effective, and equitable NCDI [non-communicable disease and injury] interventions between 2020 and 2030 could save the lives of more than 4.6 million of the world’s poorest” [12]. Although some qualitative interviews have established factors contributing to pain management (e.g., the concept of pain as curative and a lack of access to analgesics) in African countries [16], no published literature has evaluated the enablers and barriers to pain management subsequent to a longitudinal quality improvement (QI) project [15-20].

The aim of the study was to evaluate the perioperative acute pain care program using a quality improvement lens. This work was framed within the Plan, Do, Study, Act (PDSA) [21] and complies with SQUIRE 2.0 guidelines [22]. The approach followed effective QI practices including local and collaborative discovery, tool creation,

local monitoring, evidence-based tool revision, and development and training of a local QI team to monitor and respond to challenges [23-25]. This paper presents a mixed methods evaluation a pain care program collaboratively developed between Canadian and Rwandan pain care, QI, and healthcare services experts.

Plan: In 2012, two authors (JP, AJ) visited two hospitals in Rwanda to investigate the approach to and effectiveness of acute pain care through the Canadian Anesthesiologists’ Society International Education Foundation. An agreement was made between the hospitals and Canadian investigators to work towards improving pain care [26]. In 2015, our team conducted a study to “[i]dentify opportunities to improve knowledge translation for post-operative pain management in Rwanda [27] at the Centre Hospitalier Universitaire de Butare (CHUB) and the Centre Hospitalier Universitaire de Kigali. The results identified a need to enhance care and mitigate fears of adverse events through improved pain assessment and documentation. CHUB is a national referral, university teaching hospital in Rwanda serving approximately 3.3 million people.

Do: Adjustments to CHUB’s existing pain care processes and documentation were developed and translated by two team members in collaboration with local healthcare providers (HCPs): a Rwandan researcher, anesthesiologist, and pain care expert (GN), and a Canadian researcher, nurse practitioner, and pain care expert (RW). Five integrated forms and processes were created including a Multimodal Analgesia Order Form, PRN medication administration record (MAR), Scheduled (SCH) MAR, Pain Assessment Flow Sheet, and Patient Chart Audit Tool.

METHODS

An audit team was created to review patient charts for pain care form use and accuracy. Data were collected (January-December 2019) to determine the completion rate and number of documentation errors of the PRN MAR, SCH MAR, and Pain Assessment Flow Sheet. Patient charts were identified through randomization and data were captured and monitored using a graphical interface developed by a Canadian QI expert (RE). Descriptive statistics were calculated, and control charts (a single line of data over time to identify process change) were created using Excel. Each

control chart was analyzed using significance rules published by the Institute for Healthcare Improvement [28].

The control charts were reviewed for non-random changes including runs (series of points in a row landing on one side of the median), trends (five or more consecutive points all going up or down), shifts (six or more consecutive points all above or below the median), and astronomical points (unusually small or large numbers)[29]. Focus groups were formed in Fall 2019 to identify enablers and barriers to the implementation of the program. The interview protocol, questions and recruitment information were developed and translated collaboratively with local team members (WN & GN). Purposeful sampling via informal networking, department meetings, and/or text messages were used to recruit participants. All consenting participants were included, resulting in five focus groups: two with surgery nurses (SN), one with obstetric nurses (ON), one with only surgeons (S) and one with both surgeons and non-physician anesthetists (S&A). Focus groups were conducted in parallel over multiple days by two teams (GN & JB, WE & RE).

Participants were provided with a bilingual (Kinyarwanda and English) consent form and letter of information. Verbal and synchronous translation was provided by a Rwandan collaborator (WN) and transcribed in English by a Canadian research assistant. Analyses were conducted by three team members (RW, RE & JB) who also coded, categorized, and themed/grouped data according to the approach described by Boyatzis [30] using NVivo. Feedback was provided by GN to ensure cultural and interpretative validity. Ethics approvals were obtained by both the Rwandan and Canadian ethics boards (Queen's University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board file ANAE-230-12 #6007523 and Hospital file: RC/UTHB/003/2019).

RESULTS

Over 12 months, a total of 519 patient chart audits were completed. Patient population characteristics are summarized in Table 1.

The forms were coded as “initiated” if any portion was filled out. An error was documented if the form had missing or incomplete data, such as HCP signature, evidence of a pain assessment and

sedation scores, or medication dose, route, and date/time. Form completion across all forms varied monthly between 56-93%, with an average of 79% and a median of 81%. The control charts showed no significant results (i.e., runs, shifts, trends). Form-specific utilization data are provided in Table 2.

Table 1: Characteristics of patients whose charts were audited

Variables	n (%)
Gender	
Female	214 (41)
Male	305 (59)
Post-Operative Day Recorded	
One	374 (72)
Two	84 (16)
Three	61 (12)
Type of Surgery	
Ear, Nose, Throat	53 (10)
Orthopedics	130 (25)
Obstetrics/Gynecology	97 (19)
General	239 (46)

Accurate completion of the Multimodal Analgesia Order Form varied monthly from 74-100%, with both a median and average of 89%. Control chart analyses indicated no significant differences. Both the average and median number of form errors per patient across all pain forms was 2.1, with a range of 1-3. Across all forms, both the average and median total number of errors per form was 12.5. Form-specific control charts indicated no significant results. Form-specific accuracy data are provided in Table 3.

Table 2: Form utilization over one year

Form	Range	Average	Median
PRN MAR	60-98%	85%	87%
SCH MAR	64-100%	89%	89%
Flow Sheet	34-88%	63%	61%

PRN: *pro re nata (as needed)*; MAR: *medication administrative record*; SCH: *scheduled*; flow sheet: *pain assessment flow sheet*.

A total of 34 HCPs participated in the focus groups. The focus groups defined/determined two themes and six subthemes, including program implementation challenges (subthemes:

Table 3: Form accuracy over one year

Form	Error Category	Errors per Form		
		Range	Average	Median
SCH MAR	Documentation	0.5-2.8	1.6	1.5
SCH MAR	Dosage	0.5-2.7	1.6	1.6
PRN MAR	Documentation	1.0-2.8	2.1	2.1
PRN MAR	Dosage	1.1-3.0	2.1	2.2
Flow Sheet	Incorrect PRN Criterion	1.6-3.5	2.6	2.6
Flow Sheet	Incorrect Pain Assessment	1.5-3.3	2.5	2.4

PRN: *pro re nata* (as needed); MAR: medication administrative record; SCH: scheduled; flow sheet: pain assessment flow sheet

integration of program forms, workload and staffing, continuity of care) and program sustainability (subthemes: program benefits, training and knowledge dissemination, lack of medication availability).

Challenges related to integrating the forms into practice included the complexity, length, and redundancy of the forms, as well as the continued use of previous processes. SNs predominately identified form length and complexity as barriers to completion. One SN explained, "The way these forms are designed, it is very difficult to understand. If there is a way to put them on the same sheet... [it might] be easier to explain it to others." As for redundancy, surgeons described situations where prescriptions could be recorded in both patient charts and the Multimodal Analgesia Order Form. One surgeon explained, "[Analgesia] is written in the theater notes or the progress notes and then there you copy in the multimodal [form] which is still in the patient file. So, you find it is written in more than two areas." ONs stated that patients are receiving pain care; however, the obstetric nurses are not using the forms. One ON explained, "we are not filling these forms, but medications are given as prescribed by the doctor." Additionally, some nurses described using previous documentation methods (e.g., progress notes) instead of using the new forms. A SN shared that, "we stopped completing these forms. ...We are using treatment sheet[s], as it was before." Another ON stated, "But this doesn't mean that we [don't] help a patient when they are feeling pain; we help with them, but in non-organized way."

Participants from all disciplines identified workload as a factor influencing form completion. One SN summarized, "[For] one patient, you need to do bed bathing, to do bed making, to do wound dressing, to monitor vital signs, to do everything regarding

the care of the patient. And also, assess all of these things they are asking in the flowsheet."

All participants, except anesthetists, identified shift type (e.g., day or night) as a factor affecting form completion as "[d]uring daytime, it is 16 patients per nurse and during the night, it become 30 patients per nurse, so it is very difficult." (SN) Furthermore, a surgeon explained the difficulty of completing forms between patients. "As a surgeon, most of the time you have ... a big list of patients you have to operate [on]. And then it seems you are as hurr[ie]d as possible."

As the Multimodal Analgesia Order Form needs to first be completed by a surgeon or anesthesiologist for nurses to transcribe the medications, an anesthetist identified how workload and frustrations with upstream adherence negatively affected form completion. "Nurses in the PACU (post-anesthesia care unit) are overloaded and they say that this is for an anaesthetist. When surgeon doesn't complete them, nurses leave [the forms] and don't complete them."

Participants identified the importance of consistent documentation across hospital units, indicating that forms were not completed by all HCPs, specifically surgeons, and shared the downstream effects.

"These forms are very important but when they are not well completed for the operating theatre, when a surgeon is doing their protocol after operation, even in the recovery room, they miss where to start" (S&A).

One SN shared their dejection, "The most discouraging thing is that people are not willing to fill these forms. When you [arrive to] your shift, you see that the previous shift didn't fill the forms, [and] you feel discouraged and do not do the follow-up as it could be."

Nurses highlighted the benefits of form completion and effective pain care. A SN explained, *“when these forms are completed, you are able to evaluate how important drugs are for the patient, [and] you are able to measure the improvement of management of the patient.”* Another SN shared, *“I feel up when I find that these forms are well completed because it doesn't take me much time to look after the patient when the forms are well complete[d]; it shows that the follow-up is well done.”* Additionally, an ON shared their satisfaction when the forms are completed.

“...no one can feel happy when the patient or the mother is crying [due to] pain. This will make us happy and proud of our work because if I'm hand[ing]-over at the end of my shift, to hand over the screaming patient is disturbing.” (ON)

Nurses expressed that training is required to complete the forms. One ON shared that, *“we are not yet familiar with these forms.”* Another ON said, *“most of our staff [do not] know anything about these sheets and [do not] know how to fill them.”* A SN explained, *“it is not all people who understand or who have common understanding [on] these forms.”*

Furthermore, one ON clearly stated that *“we need training”* while emphasizing that nurses rotate to different departments and require *“training on this [so I] can help to contribute, to give m[y] contribution wherever I am located in the hospital.”* Some nurses explained that their colleagues who have received training on pain care processes do not share their knowledge. *“They don't [have] time for disseminating what they learned. So that's the big problem-where people who went for training... don't share what they learned with the others.”* (SN)

Participants from all disciplines, except anesthetists, discussed challenges including patient's inability to afford medications and the hospital not stocking medications. Surgeons described experiences prescribing medications that were not available in the hospital. One surgeon referred to the Multimodal Analgesia Order Form as *“useless”* as it prompts the HCP to prescribe paracetamol and morphine, but *“you find there is no paracetamol, there is no morphine.”* Another surgeon echoed this, stating that the patient must *“go to the pharmacy outside of the hospital to buy [their medications]. Sometimes, you may find the patient has no money to go there. That means in the post-op the patient will have no analgesia.”* One SN shared their experience when medication

was not available and described the impact on documentation processes.

“...when you go [to] assess the patient, you find he is in intense pain. If you find tramadol somewhere you can give even if it's not written anywhere in his file... What you do is to write down what you give in the progress notes, not filling them on these sheets because they are not prescribed.”

Similarly, a SN explained their actions when the patient could not afford their medications.

“When the patient can't afford to buy pain medication and still feel[s] pain, he can continue to scream [in] the room. [In] the end, ... you feel uncomfortable because you can't even continue your work, hearing the patient [scream]...due to pain. Sometimes we took others, we borrow[ed] drugs from other patients, then you help[ed] that one who [was] screaming.”

DISCUSSION

Our study examined the results from a mixed methods evaluation of a perioperative acute pain care program implemented by an international collaborative at a Rwandan hospital. The QIC used QI best-practices including facilitating the development of a local QI team to create tools, collect and monitor data, and drive local improvement. Through this and by using the Model for Improvement as a framework, patient chart audits were conducted to identify use and accuracy of pain care forms, and focus groups were formed to identify enablers and barriers of the program. Over the 12 months, form completion varied between 56-93% showing inconsistency over the year and highlighting that despite the forms being initiated and the perceived benefit of completion, factors that were identified in the focus groups including training and resources constraints acted as barriers to their completion. Similarly, researchers looking at nursing documentation practices in Ethiopia found that documentation was inadequate and suggested further training [31]. A study from CHUK, concluded similar findings when reviewing quality of patient charts, identifying that standardized patient documentation was not used or completed correctly; however, 100% of the documents included a patient assessment [32]. In our study, focus group participants stated that patients were receiving help with pain but in a “non-organized way” which sometimes meant using the progress notes instead of the new forms.

On average the pain assessment flow sheet had the lowest utilization. This may be the case because this document seemed to be the most unfamiliar to focus group participants. An Ethiopian study found that 38.2% of nurses had good pain assessment practices; however, just under half of nurses documented pain assessment scores [33]. The average number of form errors per patient across all forms was 2.1. This demonstrates opportunity for improvement and a baseline measure for future QIC initiatives at CHUB. The literature indicates that quality of care including good medical documentation practices can prevent patient safety challenges, and as critical standards for hospital accreditation includes management of health information, strategies to improve documentation and form use would be a priority for most acute care facilities [34]. Control charts created from the chart audits did not indicate statistically significant improvement; however, they did demonstrate relatively good form initiation. Future, QICs can leverage this finding, coupled with strong change management supports, and HCP engagement to improve form completion.

Focus groups provided meaningful feedback, including a general acknowledgement of the importance of pain care and satisfaction from providing patients pain relief, hopefully aided by form completion. Barriers to the program and its sustainability included form integration, training, continuity of care, and resource constraints. The effective provision of pain care can be a challenging problem in any healthcare setting, but even more so in contexts with resource-scarcity. Inadequate training and resource constraints as barriers to nursing documentation were also seen in an Ethiopian study [31]. Similarly, a 2020 study from South Africa found that staffing shortages, high nurse workload, and lack of knowledge were barriers to compliance with quality standards in a primary healthcare setting [17]. Additionally, another study exploring the enablers and barriers to quality pain management in Ethiopia identified a lack of resources as a barrier and concluded that barriers to pain management are not mutually exclusive [1].

Conversely a South African study reporting on barriers and enablers of clinical guideline uptake, concluded that enablers to guideline activities included a strong network of allied health professionals and opportunities to support reflective practice [35]. These enablers were not mentioned by the participants in our study;

however, knowing this provides an opportunity for the local QI team to implement strategies to promote reflective practice and act on the form improvement recommendation identified in our study. There is currently a dearth of literature presenting longitudinal data associated with complex, contextually embedded, and interdisciplinary pain care QIC initiatives [15]. Further, in the case of Rwanda, because of the 1994 genocide, there is a lack of literature on medical form documentation practices and trends, as these documents were destroyed or misplaced [32]. This provides ample opportunity for future research in medical documentation studies in Rwanda and longitudinal studies on international QICs.

The use of mixed methods provided a comprehensive understanding of the program, and the use of the PDSA cycle and control charts allowed for the identification of non-random change that can inform future iterations. However, since the evaluation was conducted in one Rwandan hospital, the results may not be generalizable. Our study provides a model of systematic engagement and demonstrates challenges and opportunities for future QICs. Patient chart audits are a well-established approach to identifying areas of improvement and causes of errors in clinical practice [36], yielding administrative and clinical insights; however, it may not be the most accurate reflection and can be highly variable. Our analysis did not control for the post-operative day the form was initiated, and there was an uneven distribution of post-operative day data collected. Although we obtained focus group representation from frontline HCPs, it was beyond the scope of the study to include patients or administrators. The use of both Kinyarwanda and English made focus group facilitation and transcription a challenge, but two bilingual researchers (WN & GN) allowed for the contextualized integration and translation of participant messages.

CONCLUSION

The willingness to engage in the program and collaborate on QI committees has demonstrated that local skill and dedication can lead to improvement. Discussions with the QIC and focus group participants suggest that the quality and knowledge of pain care have improved over the years. Systemic barriers to improved pain care are evident at CHUB, but the chart audits provided evidence that HCPs are initiating the pain care

forms despite these challenges. As such, we posit that the processes to effective pain care have been adopted but remain undocumented and unevaluated.

Our study demonstrated enablers and barriers to the improvement of pain care in LMICs and will inform similar QIC initiatives and evaluations proposed for the future [37]. Future QICs should be dedicated to long-term commitment and collaboration with local experts, as fostering these relationships cannot be rushed and are the foundation to sustained improvement. As experienced through an international conference, ZeroPain Rwanda, raising awareness of and harvesting interest in the QIC project is a worthwhile means to empower stakeholders, create a culture of improvement, and mitigate challenges. We recommend QICs to focus on approaches to ensure that PDSA cycles are continuous, and that feedback is provided to HCPs.

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