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Standardizing Handoff: From Operating Room to Intensive Care Unit

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Abstract

The transfer of patient information that is shared among health care providers during transitions of care is an integral component of the handoff process that ensures patient safety and continuity of care. The postoperative period is one of high acuity. Communication failures during the acute phase of transfer from operating room to intensive care unit leave critically ill patients vulnerable to devastating adverse outcomes. The problem identified in the Surgical Intensive Care Unit (SICU) of a North Philadelphia hospital is a lack of standardization with postoperative patient handoffs. The purpose of this project is to assess the impact of utilizing a standardized postoperative handoff tool and to evaluate the satisfaction of SICU nurses through a Plan Do Study Act (PDSA) methodology of quality improvement (QI).

Keywords

surgical intensive care unit nurses, anesthesia providers, handoff, communication tool, provider satisfaction

Disciplines

Nursing

Standardizing Handoff: From Operating Room to Intensive Care Unit

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Abstract

The transfer of patient information that is shared among health care providers during transitions of care is an integral component of the handoff process that ensures patient safety and continuity of care. The postoperative period is one of high acuity. Communication failures during the acute phase of transfer from operating room to intensive care unit leave critically ill patients vulnerable to devastating adverse outcomes. The problem identified in the Surgical Intensive Care Unit (SICU) of a North Philadelphia hospital is a lack of standardization with postoperative patient handoffs. The purpose of this project is to assess the impact of utilizing a standardized postoperative handoff tool and to evaluate the satisfaction of SICU nurses through a Plan Do Study Act (PDSA) methodology of quality improvement (QI).

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Standardizing Handoff from Operating Room to Intensive Care Unit

There are various complexities that commonly arise during transitions in patient care. Postoperative handoffs from the operating room (OR) to the intensive care unit (ICU) involve patients who are at high risk for developing clinical instability (Petrovic et al., 2012). These patients can elicit a set of unique and unexpected challenges that require urgent and collaborative responses from the clinical team. In this context, concise and accurate information sharing between anesthesia providers from the OR to the receiving ICU staff is necessary to ensure patient safety. The handoff process is used as an audit point, knowledge transmission, and transfer of responsibility (Smith et al., 2008). The intentions of handoffs are to ensure that optimal patient safety and continuity of care is maintained during the transferring of care responsibilities from one provider to another, while effectively communicating information that is relevant to the patient's current condition (The Joint Commission, 2017). Effective communication during handoff includes intraoperative occurrences and anticipatory measures that allow the critical care team to guide their immediate provision to anticipate, detect, and facilitate the efficient management of potential postoperative complications (McElroy et al., 2015).

Accumulated evidence over the years consistently supports the idea that inaccurate communication amongst healthcare professionals is harmful to patients. In the ICU setting, presence of numerous distractions and lack of handoff standardization negatively impacts effective communication (McElroy et al., 2015). Several environmental factors disrupt the handoff process in the ICU including high-volume multitasking by clinicians, a unit of critically ill patients who require close attention, and the presence of ambient noise. These contributing factors can progressively complicate the handoff process and induce risk of failure that can

resultantly lead to the patient's safety becoming jeopardized (McElroy et al., 2015). An ideal approach which minimizes gaps in communication has shown to reduce the rate of complications from incomplete or inaccurate information exchanges during handoffs (Siddiqui et al., 2012). Without standardization, information sharing is at the discretion of the individual provider. While the information communicated among providers may appear sufficient in detail, underlying personal opinions of some content's significance can unknowingly be excluded. A tool that standardizes transitions in patient care may enhance communications between healthcare providers and effectively guide recommendations for any challenges that may arise throughout the patient's postoperative course (McElroy et al., 2015).

National Significance

In the United States (U.S.), The Joint Commission (2017) recognizes communication failures during the immediate postoperative period as the leading cause of patient adverse events, resulting in twice as many deaths when compared to surgical or clinical inadequacies. From 2004 to 2015, The Joint Commission also reported that communication errors were the primary cause of all anesthesia related sentinel events (Park et al., 2017). Within the past five years, communication failures have accounted for nearly 30% of all malpractice claims among U.S. hospitals alone, resulting in 1,744 deaths and more than \$1.7 billion in malpractice costs (Ruoff, 2015). Inadequate communication burdens healthcare facilities with preventable increases in healthcare costs and poor satisfaction rates from both patients and providers (The Joint Commission, 2017).

Local Significance

The facility's problem identified by the nursing staff in the SICU at the project site is dissatisfaction in quality and lack of standardization with the current handoff process that is

conducted between anesthesia providers and registered nurses (RNs). Current methods demonstrate a lack of standardization in the patient handoff process as all transfers in care between the OR and ICU are performed verbally at the bedside. The SICU RNs at the project site use an Electronic Medical Record (EMR) for all patient related information and documentation purposes, in contrast to the anesthesia team, whose records are documented by use of a paper charting method. Pertinent patient information can be easily misplaced, misread, or inaccurately transcribed, further compromising patient safety and care.

Proposed Solution

There are various methods of standardization for anesthesia communication as well as a plethora of nursing communication tools. Multiple studies, including a systematic review by Segall et al. (2012), found the quality of handoffs are improved by up to 35% with the implementation of some type of structured format (McElroy et al., 2015; Lambert & Adams, 2018). Although standardization methods varied across studies (i.e., checklists versus mnemonics versus written tools), consensus for best practice standardization of handoffs is that the approach should be multifaceted and institution specific (Lambert & Adams, 2018). Based on the existing evidence in the field, successful handoff tools must engage multidisciplinary clinicians to adapt and address facility specific needs (Lambert & Adams, 2018). Regardless of the setting or clinicians involved, standardizing the postoperative handoff process by use of a communication tool improves the quality of information exchanged between healthcare providers to ensure patient safety remains well preserved (Petrovic et al., 2015).

Specific Aims

The primary goal of this project is to determine whether the utilization of a standardized communication tool for postoperative handoff will lead to improved satisfaction of SICU RNs

receiving patient handoff from anesthesia providers. This project aims to evaluate the overall perception of handoff quality and satisfaction of anesthesia providers and SICU RNs prior to and following the implementation of a standardized postoperative handoff tool. Existing handoff practices at the project site were thoroughly surveyed for evaluation and analysis against the impact of this QI modification in the postoperative patient handoff process.

Methods

Context

The QI project site is a private non-profit tertiary-care teaching facility located in North Philadelphia. Accredited as a Level 1 Trauma Center, the 697-bed hospital is among the leaders in kidney, liver, and pancreatic transplantations throughout the Philadelphia region. Due to growing concerns surrounding the handoff process conducted between anesthesia providers and SICU RNs during transitions in patient care from the OR to ICU, the project site strongly supports the proposed intentions of this QI change. The SICU at the project site is an 18-bed multispecialty critical care unit serving to provide imperative management for unstable and high acuity patients that require invasive hemodynamic monitoring and mechanical ventilation following surgery. The SICU clinical staff functions to provide specialized care for general surgery, organ transplantation (kidney, liver, and pancreas), thoracic, vascular, neurosurgery, abdominal, otolaryngology (ENT) procedures, complicated orthopedic surgery, gynecological, and adult Level 1 trauma patients. The clinical providers staffing the SICU include attending physicians, surgical residents, and registered nurses. The SICU care team model employs a 2:1 patient-to-nurse staffing ratio. Although strictly dependent upon staffing availability, unit census, isolation precautions, and patient acuity, the care team model has the capability to flex up or flex down to a 3:1 or 1:1 ratio respectively.

Intervention

Based on evidence obtained from literature we propose the use of a standardized OR to ICU patient handoff tool. This protocol was developed from the SBARQ (Situation, Background, Assessment, Recommendations, Questions) tool for enhancing handoff communication in combination with modifications to the facilities existing cardiovascular ICU (CVICU) OR exit checklist and handoff sheet. For site-specific components, surveys were administered to identify critical pieces of data. The components were included at the request of the Chairman of Anesthesiology and Medical Director of Operating Rooms at the project site. The purpose of this handoff tool is to simplify interprofessional communication by standardizing collaborative exchanges between providers. The primary objective of the SBARQ handoff aims to ensure patient safety and continuity of care through a standardized format for reducing communication-based errors (Institute for Healthcare Improvement, 2004). The components of the SBARQ handoff are multifactorial and serve to enhance receptive communications by systematically guiding transfers of vital information between providers. Conceptual elements encompassing the SBARQ handoff ensures the distribution, exchange, and interpretation of information remains systematized to accurately reflect the patient's current state. The viability of multidisciplinary collaboration is founded on the basis of establishing effective interprofessional communications.

Upon handoff initiation, the anesthesia provider is designated as the handoff leader—mediating clinician dynamics, maintaining workflow consistency, and ensuring interprofessional communications continuously adhere to a standardized format. The receiving SICU RN facilitates the organizational aspects of the patient handoff to enhance communications among the multidisciplinary team. The handoff concludes following a brief discussion, allowing

providers to address concerns and ask questions regarding the patient's current condition, as well as establishing recommendations to guide their care.

Situation

This entity serves as a formal introduction between providers conducting the OR to SICU patient handoff. The information discussed focuses on the problem and the events preceding the patients transfer.

Background

This phase of the handoff represents the act of transferring information that addresses the patient's immediate needs, including, but not limited to, (a) resuscitation status, (b) allergies, (c) past medical history, (d) lab values, and (e) additional factors augmenting initial management strategies.

Assessment

A descriptive report provided upon transfer entails the patient's current physiological state. The comprehensive assessment transcribes factors that are considered to be of critical significance, including, but not limited to, (a) neurologic condition, (b) respiratory management (i.e., intubation technique, anesthesia complications, mechanical ventilation), (c) cardiovascular support (i.e., inotropes, vasopressors, etc.), (d) coagulation deficits and/or bleeding dysfunction, (e) limb or positioning deficits, and (f) peripheral/central line access with infusing medications.

Recommendations

Providers that had participated in the postoperative handoff further disclose guidance and recommendations to ensure continuity in care remains well preserved. This phase of the handoff serves to minimize delays that patients may be subjected to and propagates the most appropriate treatment for their perioperative success.

Questions

Prior to anesthesia provider departure, the final phase of the handoff includes addressing any inconsistencies or potential concerns to ensure the information exchanged was conducted accurately and with completeness. Identifying clear insight for the anticipatory care of the patient was a component specific to the facility and concludes with the anesthesia provider conveying what it is that they are most concerned about with regards to the patient's current condition.

Study of the Intervention

Based on evidence obtained from literature a Plan Do Study Act (PDSA) methodology for quality improvement was selected to assess the impact of standardizing the OR to ICU patient handoff and evaluate its effect on SICU RN satisfaction. Implementation took place over the course of 4 weeks between November 9, 2020 and December 4, 2020. The total duration of this QI project occurred over a 7-week period, beginning October 19, 2020 and concluding December 4, 2020. To understand the current process of postoperative handoffs that occur in the SICU, we worked closely with the Chairman of Anesthesia who presented us with this opportunity for improvement efforts as SICU report from anesthesia has been an area of underperformance with expressed dissatisfaction. Project operations incorporated the use of multidisciplinary staff satisfaction surveys and interviews. Project leaders and key stakeholders mitigated discussions and integrated feedback from staff to identify the probability to achieve long-term sustainability.

To minimize distractions and communication breakdowns during the patient handoff, the anesthesia provider completes the OR handoff checklist tool prior to departing the OR. Upon arranging the transfer in care, the anesthesia provider presents the receiving SICU RN with a preliminary report via telephone to facilitate the necessary preparations required for the patient's

arrival. Common practice may or may not include a courtesy call to the SICU prior to leaving the OR including basic patient information, estimated time of arrival, and any necessary equipment to have available. The handoff checklist tool standardizes the information that's transferred and includes the following information: (a) reason for SICU admission, (b) airway/respiratory requirements (e.g., inspired oxygen, endotracheal tube, spontaneous ventilation), (c) extubation plan if patient remains intubated, (d) peripheral intravenous access and central venous lines with continuous infusions, (e) intraoperative medications administered (e.g., antibiotics, narcotics, vasoactive, muscle relaxant reversal), (f) fluid intake/output and blood products, (g) allergy status, (h) past medical history, (i) isolation precautions, (j) laboratory values and hemodynamic assessment, and other key recommendations considered to be pertinent.

Once arriving to the SICU, the handoff sheet is used as a conversation catalyst to guide the bedside report. At the conclusion of report, and once the anesthesia provider expresses their most significant concerns, the physical transfer of the handoff sheet prompts an opportunity for the SICU RN to ensure that all questions have been answered. The SICU RN can utilize the handoff sheet to clarify information that was either missed or previously excluded during the initial exchange. The SBARQ mnemonic will assist to guide the progression of communication transfers between the anesthesia provider and SICU RN. The handoff sheet also contains a "Notes" section so that RNs can document any additional information that is received at the time of bedside report considered to be pertinent for the safe transition in care, including, but not limited to, (a) hemodynamic goals and (b) other considerations.

The handoff checklist was modified and adapted, with permission, from the cardiac OR exit checklist utilized by the CVICU at the project site. Although the checklist may potentially lack completeness due to elapsed time gaps between transfer of report and surgery completion,

the information provided serves to preemptively initiate handoff communications without having to divert attention away from the patient upon arriving to the SICU. The standardized handoff checklist serves as a quick reference guide for SICU RNs that simplifies processes of obtaining vital pre-, intra-, and postoperative information that would normally only exist across multiple locations such as the patient's EMR, anesthesia record, and paper chart.

A pre-intervention survey was administered 2 weeks before employing the OR to SICU handoff tool to assess satisfaction and gauge overall perception with current handoff processes. During week 1 of implementation, project leaders coordinated to introduce the project's purpose and expectations, initiated the formal distribution of the standardized handoff tool, and sent out emails to staff. Project champions such as senior anesthesia providers and the SICU charge nurse assisted staff with proper handoff tool utilization, enhance interprofessional communications, and further clarify any ongoing inquiries.

From weeks 4 through 7, project leaders continued educating staff on handoff tool utilization, effective communication processes, and project expectations until all providers had received adequate training. Project leaders also conducted audits of OR to SICU handoff tool utilization. Project updates and feedback were distributed to staff involved with this QI initiative via email and unit huddles. Throughout the 4-week implementation period, a post-utilization survey was administered among staff to assess the perception of handoff quality and satisfaction immediately after using the OR to SICU handoff tool.

To measure pre-intervention satisfaction and gauge an overall perception of handoff quality, surveys administered to SICU RNs and anesthesia providers were sent through email or by scanning the quick response (QR) code on staff engagement forms located in high-traffic areas within each department. Survey items consisted of closed-ended questions that were

relative to professional title, as well as descriptive concepts pertinent to the handoff format in order to procure baseline satisfaction rates with the current process. Open-ended questions were elicited to obtain feedback and recommendations for improvement from staff. The pre-implementation period focused on conceptual aspects of the handoff to determine what goes well, identify factors that obstruct efficient communications, and examine the quality of information exchanged.

Measures

The satisfaction of SICU RNs was evaluated using an itemized 5-point Likert scale before and after implementing the standardized postoperative handoff tool. SICU RNs were asked to rate their satisfaction with the patient handoff as *extremely dissatisfied* (1), *somewhat dissatisfied* (2), *neither dissatisfied nor satisfied* (3), *somewhat satisfied* (4), or *extremely satisfied* (5). All of the participants were asked to rank the possible components included in handoff as to what they felt was in their opinion to be *critical*, *necessary*, or *extraneous* information. For the context of this project, we defined *critical* information as the inclusion of this data is vital to the immediate postoperative care of the critically ill patient, *necessary* as the inclusion of this data is needed for patient care in the immediate postoperative setting, and *extraneous* as the inclusion or exclusion of this data will have no effect on postoperative care. This information was used to develop the SICU specific tool and address any knowledge deficits. Participants were then asked how often they feel that they, SICU RNs – received, or anesthesia providers – reported, *critical*, *necessary*, and *extraneous* patient information. SICU RNs and anesthesia providers were asked if there were opportunities for questions or clarification to the information transferred. The survey also asked about barriers to communication and recommendations for improvement. Additionally, SICU RNs were asked how often they felt the

information received was sufficient enough to provide immediate postoperative care to the critically ill patient, how often they were required to look elsewhere for necessary information, and how often the handoff information they received did not match their clinical assessment.

Due to narrow time constraints and suboptimal participation in our pre-implementation surveying, project leaders integrated QR codes for post-utilization surveys at the bottom of each handoff sheet in order to prevent a loss to follow-up and facilitate greater SICU RN participation immediately following patient stabilization. Post-utilization surveys asked the SICU RNs to rate their satisfaction on handoff utilizing the OR to SICU handoff tool as compared with previous processes using the same 5-point Likert scale. After handoff completion, anesthesia providers were required to file a copy of the intraoperative record in the billing office. Above this area, post-utilization surveys were accessed by scanning a QR code. Anesthesia providers were asked for qualitative feedback and recommendations to be studied for common themes through additional PDSA cycles. Additionally, anesthesia providers were prompted with a simple yes or no question regarding whether they experienced improved SICU RN participation with utilization of the OR to SICU handoff tool, as this was uncovered during preliminary surveying to be an existing barrier to effective communication.

Analysis

To ensure respondent anonymity throughout the duration of this QI project, data collection was conducted using the Qualtrics (Qualtrics, Provo, UT) software hosted at the University of Pennsylvania. Qualtrics is a secure, web-based survey creation, collection, and analysis software tool designed to support data capture. Qualtrics incorporates an intuitive interface for validating data, conducts audits to track data manipulation, and integrates data and interoperability using external sources. The data from the pre- and post-implementation survey

questionnaires were collated and further analyzed to determine whether satisfaction of SICU RNs increased and whether the perception of handoff quality improved with the utilization of a standardized handoff tool during OR to SICU transitions in care.

The data collected from our pre- and post-implementation surveys were evaluated as ordinal variables to determine a change on satisfaction with OR to SICU handoff tool utilization. Qualitative and descriptive methods of statistical analysis through means of frequencies and identification of common themes were used to evaluate the data collected. The impact from utilizing the standardized handoff tool to improve SICU RNs satisfaction is represented through the use of bar graphs. From the data collected, ordinal scale variables were assigned for visual analysis and represents the findings of our primary outcome measure.

Ethical Considerations

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Competing Interests The authors have declared no competing interests.

Ethics approval This quality improvement project was submitted to the University of Pennsylvania’s Institutional Review Board, who determined that it qualified as a quality improvement initiative.

Results

Prior to implementing our OR to SICU handoff tool, the SICU nursing staff was surveyed to establish a baseline for satisfaction to existing handoff practices. Among the 7 SICU RNs that completed the pre-implementation survey, 6 (85.7%) participants had reported being *somewhat dissatisfied*, while 1 (14.3%) participant reported being *neither dissatisfied nor satisfied*. Data collected from pre-implementation surveys included recommendations for improving the current handoff process. Barriers that currently interfere with effective communications during handoff were also identified. Common themes included a lack of participation, attitude during handoff, and inconsistencies among various providers. The general consensus conveyed many opportunities for quality improvement that would allow for greater efficiency and a more transparent process. Among all surveyed respondents, 100% recommended utilizing some form of standardization, whether it be a handoff sheet or a checklist tool, to enhance organizational workflow and improve multidisciplinary communications during OR to SICU transitions in care.

Following the implementation of the OR to SICU handoff tool, a total of 7 SICU RNs completed the post-utilization survey – 5 (71.4%) participants reported being *somewhat satisfied*; 1 (14.3%) participant reported being *extremely satisfied*; and 1 (14.3%) participant reported being *neither dissatisfied nor satisfied*. Upon assigning numerical values to the 5-point Likert scale, bar graphs were used to demonstrate quality of change on SICU RNs satisfaction before and after implementing the OR to SICU handoff tool. Satisfaction levels, represented on the horizontal x-axis, were analyzed according to the SICU RNs scored responses from the 5-point Likert scale. The total number of responses, represented on the y-axis, were collected from the surveys. Upon visualization of the findings, a rightward shift can be appreciated as the number of responses clearly indicate satisfaction of SICU RNs improved with utilization of the OR to SICU

handoff tool. A sample size that consisted of 7 pre-implementation responses and 7 post-utilization responses was used to calculate the mean of frequencies. The mean score of responses is represented on the y-axis of the bar graph. The pre-implementation satisfaction score of 2.14 and post-utilization satisfaction score of 4 represents significant improvement, accompanied by a narrow standard deviation of 0.3 and 0.5, respectively.

In the context of this QI project, drawing inferences from this ordinal, unpaired data is not recommended. Our data collection includes unpaired results; therefore, we are unable to fully understand the association between variations as we cannot track where post-utilization responses came from and our sample size limits us from extrapolating any inferential statistics. Furthermore, as far as the association between the outcomes and our intervention, we cannot definitively attest that our significant positive outcome did or did not occur by chance or as a result of other unidentified contributing factors. Due to a limited sample size and reduced timeframe, we cannot account for other contextual elements that may or may not have influenced our data.

Other important incidental findings included common themes of the largest barriers existing for effective communication at the time of handoff. Open-ended responses from SICU RNs and anesthesia providers included common themes such as their counterparts prioritizing tasks over the immediate needs of the patient, lack of participation or inattention during handoff, and unavailability of providers at the time of handoff. Personal behaviors were also cited as contributing elements to an unproductive handoff process, including dismissive actions and inappropriate projections of emotion and attitude. When asked for recommendations to improve the handoff, both SICU RNs and anesthesia providers included suggestions that involved the

avoidance of lengthy and unnecessary reports, along with a strong desire for SICU attending physician representation.

After ranking the components of handoff in the pre-implementation survey, SICU RNs were asked how often the components they felt to be “critical” were reported using a scale of *rarely, about half of the time, and most of the time*. Consistent with our synthesis of the literature, only 60% of the SICU RNs reported critical components to be included *most of the time*, whereas 100% of the anesthesia providers answered that they included critical components *most of the time*. From the post-utilization survey, 100% of SICU RNs reported that anesthesia providers express what they are most concerned about regarding the patient *most of the time*, compared to 43% of SICU RNs during the pre-intervention period. The pre-implementation survey included two methods of responding for participant populations. Pre-implementation surveys incorporated the use of anonymous links sent through email and scannable QR codes which were posted in high-traffic areas within each department. Despite yielding a small sample size, participants had been found to utilize QR codes significantly more than the accessible links sent through email. Thus, this method of engagement could be an important modality used in future study designs to facilitate the participation of staff in these departments.

Discussion

Summary

The result of this QI project demonstrated the pre-existing handoff process to be inconsistent, and at times, the information exchanged was misguided and inefficiently communicated between the anesthesia provider and SICU RN. Inadequate communications lacking accuracy and completeness during exchanges of critical information is hazardous to patient safety, increases risks of failure, and contributes to greater incidences of unexpected

postoperative complications (McElroy et al., 2015; Siddiqui et al., 2012). As demonstrated, we found that implementation of a standardized postoperative handoff tool improved SICU RN satisfaction with transfers in care and led to significant increases on satisfaction to the quality of information exchanged between SICU RNs and anesthesia providers that was previously unsatisfactory.

Similar to these findings, as well as those conveyed throughout the literature, the transfer of care responsibilities optimized with utilizing an effective communication strategy preserves patient safety and assists with guiding anticipatory measures for any potential concerns that may arise throughout the postoperative period (Smith et al., 2008; McElroy et al., 2015; The Joint Commission, 2017). Although we were unable to fully understand the association of the outcome and our intervention, thorough surveying revealed the OR to SICU patient handoff as an area that would greatly benefit from standardization and continued QI efforts. While the pre-existing handoff protocol did not necessarily induce risk of failure, a number of providers felt that there were opportunities for improvement that would ultimately enhance interpersonal congruency and yield greater efficiencies amid the OR to SICU handoff. We believe that the particular strengths of this project led to the discovery of various opportunities for future improvement efforts as pre-implementation surveys identified many contributing factors of ineffective communication that lie outside the solution of standardization alone.

Interpretation

According to the evidence distributed throughout the literature, best practice methods for standardizing handoff incorporates the use of a multifaceted design that's institution specific and accurately tailored to address the needs of the multidisciplinary team at the facility (Segall et al., 2012; McElroy et al., 2015; Petrovic et al., 2015; Lambert & Adams, 2018). Although we did see

a significant improvement on SICU RN satisfaction with patient handoff, we cannot definitively attest that this change was associated with implementation of our OR to SICU handoff tool. A small sample size and narrow time of study makes it difficult to quantify the impact of this QI project on the entire system and process. This improvement on satisfaction could be observed by chance or as a result of response, or non-response, bias which could have influenced the participation of our target populations or other unaccounted, unknown elements. The strategic trade-off of maintaining participant privacy and ease of surveying ultimately limited our ability to obtain paired data, therefore, we are unable to fully understand any variations as we cannot track where post-utilization responses were derived from.

Limitations

There were several important limitations in this QI project. Although the significance of our findings had revealed substantial improvement it's possible that the data obtained was overly inflated owing to the small sample size of this study. Most notably, the unprecedented impact associated with the global pandemic required frequent alterations to be made in order to ensure the continued progressions of this project remained safe, feasible, and effective. While awaiting clearance to return back to the project site profound delays were experienced. In accordance with compliance measures issued by local health agencies for social distancing and communicable transmission risks, in-person meetings and educational in-services were prohibited, making it difficult to engage staff and actively promote participation.

Although the project design accounted for extraneous variability and unprecedented time constraints, the intended purpose of utilizing multiple PDSA cycles to evaluate the impact of our standardized postoperative handoff tool was ultimately minimized; having been reduced from the originally planned 12-week period to just 4 weeks of implementation. Additionally, ongoing

concerns associated with the pandemic led to unanticipated staffing shortages and procedure cancellations due to SICU beds being allocated for the suspected influx of coronavirus disease 2019 (COVID-19) patients at the project site. Furthermore, local health agencies recommended that facilities reduce their capacity for elective procedures to ensure beds would be available in the likely event that health care systems became overwhelmed by a second surge of COVID-19 patients requiring admittance or critical intervention. While this initiative was not designed to detect for this level of causation, accounting for these factors was beyond the capability of this study.

To account for compliance with handoff tool utilization, the authors collaboratively divided their assigned OR responsibilities to cover the majority of anticipated ICU admissions from surgeries scheduled throughout the week; thereby minimizing any potential gaps or missed opportunities to enhance information exchanges between the OR and SICU. Although the focus of this study was not intended to assess compliance, future strategies may benefit from instituting a provider that's solely responsible for the mitigation and maintenance of the newly implemented handoff protocol in order to improve participation among the entire multidisciplinary team.

Conclusions

The result of implementing our standardized OR to SICU handoff tool demonstrated a significant improvement on SICU RN satisfaction. Due to obtaining strong buy-in from key stakeholders at the project site the sustainability of this QI project is expected to increase with continued utilization, however, its long-term success remains dependent upon the ability to procure similar results indicative of improving provider satisfaction and handoff tool compliance. According to feedback obtained from the post-utilization survey, our OR to SICU handoff tool bears a high probability for utilization amongst several other units at the project site.

The implications for practice and future of this QI project coincides with a willingness to accept, modify, and adapt the standardized handoff protocol on the premise of tailoring the tool to meet the specific needs of each unit. By ensuring the information exchange between providers remain conducted with efficiency and standardization, our handoff tool and its future modifications bear a high probability of achieving widespread, and sustainable, utilization for other units that also seek to improve multidisciplinary communications amid transitions in patient care.

Considerations for representative involvement at time of handoff, such as surgery and respiratory therapy, was also highly requested in post-utilization surveys. A thoughtful next step would be to establish a team-based approach to facilitate greater staff participation, responsive collaboration, and a complete multidisciplinary presence at time of patient handoff. To evaluate the performance of each member comprising the multidisciplinary team, incorporating additional PDSA cycles into the study design would be of great benefit to effectively perpetuate the process of transferring responsibility and continuity in care. Paralleled by the ongoing assessment throughout each PDSA cycle, profound implications that warrant corrective action should be approached based on the capability of the intervention to meet the specific needs of the care team and without disrupting the precision of the handoff process.

Furthermore, as the project site begins to transition from standard intraoperative paper documentation to a computerized charting system, considerations that acknowledge the accuracy and interoperability of the handoff checklist tool should be further investigated to evaluate the efficacy and reproducibility of this QI initiative. Moving forward, integrating intraoperative data sets from the patient's EMR can be generated into a summary sheet which can be utilized among clinicians to facilitate greater accessibility to pertinent information that's typically spread across several portals. Future educational opportunities and innovative designs that function to enhance

the newly implemented handoff process should be examined, and if deemed credible, utilized for progressively streamlining the handoff tool with the intent of minimizing communication gaps or inefficiencies that may occur throughout the patients transition in care.

As the COVID-19 pandemic has been detrimental to healthcare systems across the globe, anesthesia departments and ICUs are amongst those suffering most. We recognize that OR to SICU handoff considerations are not prioritized as an essential focus in this particular climate as that valuable time and energy is required to be spent elsewhere. Future surveying, modifications, and adjustments should continue to be made on a case-by-case basis and efficiently reviewed to ensure patient safety remains highly prioritized and adequately preserved. Any determinants of change which alters the standardized communication format or the handoff tool itself should be subject to further review, and if deemed credible, conducted on the basis of incorporating the most recent evidence-based data supported throughout the literature. We believe our efforts serve as a useful foundation for future QI initiatives between the SICU and anesthesia department.

Other Information

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