Innovation in Nursing Practice: Specimen Handling

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This paper will address the need to decrease high surgical specimen error rates at a major military treatment facility (MTF). The surgical specimen-handling problem will be identified. A literature review of specimen-handling related issues will be performed. The inherent needs and possibilities surrounding specimen-handling will be discussed, followed by an innovation proposal. This nursing-focused innovation will focus on the creation of an inclusive specimen tool for perioperative nurses, surgeons, and surgical technologists. This tool will mitigate pre-analytic surgical specimen errors.

Problem Identification

Specimen handling errors occur at both the pre-analytic and post-analytic phases of specimen management (Lee, 2016). Verbal and written communication errors can lead to specimen loss or mishandling, which may be detrimental to the patient. For example, at the target location, on two separate occasions within one week, tissue specimens that were sent for "Lymph Node Protocol" were mistakenly delivered to the microbiology department first, wherein the tissues were crushed for culturing. This meant that the tissue could not be examined microscopically for cancerous cell growth patterns. These errors occurred after hours, when there were not many people around to assist the operating room or laboratory personnel.

The target location for implementation of the innovation project is a 17-operating-suite MTF located within the continental United States. There are approximately 6800 inpatient and outpatient surgical cases performed at this MTF annually, resulting in approximately 4000 surgical specimens processed. [The number of surgical specimens is lower than expected when compared to a civilian hospital of comparable size, due to hospital policies not requiring standard reflex cultures for all indwelling urinary catheterizations during surgical procedures, as well as the option for minor "gross analysis only" specimens to be omitted from submission at the surgeon's discretion.] The target MTF utilizes Essentris electronic health records and CHCS physician ordering systems. Specimens are sent to one of four distinct areas for testing: cytology, histology, microbiology, or the morgue.

The current specimen-handling process is as follows. One of the surgeons dictates the specimen name as tissue is handed to the surgical tech. The surgical tech writes the specimen name on the sterile back table. The nurse charts the specimen name and type in the Essentris intraoperative note. The specimen name and type, in addition to pertinent communication and patient history information are then type onto the Essentris Tissue Requisition form, which is printed and later delivered with the specimen. The nurse next writes the lab orders in CHCS, which include not only the orders themselves, but the aforementioned information from the Tissue Requisition form as well. Next, the nurse free-texts a shipping label that includes information from all three forms (patient identity, specimen identity and type, surgeon contact information, and collection information). Two labels are printed: one for the specimen itself and one for the collection book. There are separate books for each specimen type (fresh, frozen section, permanent, culture, or cytology), wherein both the nurse or surgical tech and the laboratory representative must sign for the specimen. This redundancy takes more time than necessary, which increases stress and the likelihood that workarounds and mistakes will be made (D'Angelo & Mejabi, 2016).

Literature Review

Ample literature exists to suggest surgical errors are a multifaceted, but largely avoidable, occurrence. Surgical specimen errors include specimen versus label mismatch (including incorrect patient or specimen name), unlabeled specimen, incorrect label, and missing specimen

(Lee, 2016). Thiels, et al. (2015) contend that in addition to systems engineering approaches, human factors engineering (such as cognition and communication errors) must also be taken into account when considering errors. Thiels, et al. (2015) analyzed conditions for surgical never events (such as retained foreign objects and wrong site surgeries) by nano-coding and categorizing 161 human factors utilizing the Human Factors Taxonomy for Healthcare (HFACS) tool. Over a five-year period, Thiels, et al. (2015) found preconditions to actions and unsafe actions to result in the most never events. Preconditions for never events may mirror those for specimen errors, such as 1) poor communication during handoffs (verbal from the surgeon to the surgical tech and nurse, or the nurse and the surgical tech who delivers the specimen, as well as written from the nurse to the lab via labels, charting, and orders) and 2) environmental/ situational issues (poor lighting, high noise level).

At one teaching hospital that was similarly-sized to the target MTF (18 operating suites with 5000 annual surgical specimens), the primary problem was surgical staff neglecting to check patient identifiers prior to sending specimens (Zervakis Brent, 2016). Primary error drivers were identified using the Healthcare Failure Mode and Effect Analysis (HFMEA) approach, and with limited success (62% error reduction over 10 months), the plan-do-check-act model was used. Gitelis et al. (2017) found that healthcare workers were able to increase their utilization of surgical safety checklists from 48% to 92% when checklists were integrated into the electronic charting system. Building checklists into existing processes thus increases adherence. The author postulates that confirmation omissions in regards to surgical specimen collection may be due to automation of the process, resulting in a lack of attention to detail. Integration of visual checklists into the surgical specimen collection process may be met with disdain, but they can increase compliance over time, since both scheduled (collecting specimens) and unscheduled (changing a specimen's form from routine formalin-based to STAT frozen section, or the addition of specimens) events drive behaviors (Schaumann, et al., 2016).

Inherent Needs

Due to the transient nature of its personnel, MTFs have a distinct need for clarity and simplification when working with complex tasks that are open for interpretation. One need that should be addressed is the charting system itself. While on the hospital ship, charting is done by hand. While home ported at the hospital, charting is performed on no fewer than three outdated electronic records. Current electronic health record training does not include specialized tasks for operating room nurses. Offering a one-time course that focuses on Essentris and CHCS tasks related to specimen handling is the first step to alleviate this issue.

Additionally, a simple algorithm quick-reference guide can be developed. Checklists have been cited for reducing process variation and increasing adherence to best practices in other stressful environments, such as the emergency department (Haydar, Bhattacharyya, Kerr, Leger, & Strout, 2014). The tool may include type of specimen (tissue, fluid), storage (fresh, frozen, permanent), destination (histology, microbiology, cytology), and test to be performed (gross analysis, frozen section, lymph node protocol, margin analysis, cultures, or dozens of other options). Maneuvering through the charting in order to record the specimen, write the orders, and send it to the proper department for processing is a feat for the experienced nurse and surgical tech. It is nearly insurmountable for the inexperienced team, which is largely composed of military reservists and newly stationed operating room personnel.

Inherent Possibilities

While perioperative nurses do not control the type or brand of health record they are required to keep, they can develop novel ways to cope with their role constraints, as well as the needs presented above. Checklists have been shown to be effective in improving communication between surgeons and pathologists (Osarogiagbon, et al., 2015). Checklists and visual algorithms can be used to assist operating room nurses and surgical techs in clearly communicating the surgeon's needs to the pathologist by helping them to determine how to label and prepare surgical specimens, as well as how to order the appropriate lab tests. While the possibilities are endless, care must be taken to streamline and simplify the tool wherever possible.

Innovation Proposal

Several efficiency and error-reducing processes are available to MTF healthcare workers. Combining and repurposing existing ideologies can work to enhance the specimen-handling process at MTFs. Six Sigma was originally designed to increase manufacturing efficiency. Despite healthcare organizational barriers, such as lack of knowledge and managerial support (Deniz & Çimen, 2018), Six Sigma variants have been successful in decreasing healthcare-associated infections (Improta, Cesarelli, Montuori, Santillo, & Triassi, 2018). Thai researchers trialed a multimodal approach to specimen-handling that pooled attributes of Six Sigma, Value Stream Mapping (VSM), and HFMEA. Hung, Wang, Lin, Chen, and Su (2015) built upon Six Sigma's flagship efficiency process: define, measure, analyze, improve, control (DMAIC) by using VSM to locate waste and HFMEA to decrease specimen errors.

With these modalities in mind, the author proposes the creation of a specimen-handling tool specific to MTFs utilizing Essentris and CHCS electronic charting systems. This multifactorial tool will feature a visual algorithm for the perioperative nurse, a quick reference guide for perioperative nurses, surgeons, and surgical technologists, and an online training component. Because MTFs are not cost-driven, Hung, Wang, Lin, Chen, and Su's (2015) focus on decreasing non-value-added work will be attenuated. Instead, in the interest of maximizing direct patient benefit, HFMEA will be the Six Sigma process' primary influencer.

Care must be taken in order to ensure the tool is a usable entity. If the tool becomes too complex, it will be rejected for lack of time and clarity. However, if the tool is visually appealing and contains helpful basics in addition to resources (links or phone numbers), it can be invaluable to the healthcare team.

Conclusion

This paper identified the urgent need to decrease pre-analytic surgical specimen-handling errors. A literature review of specimen-handling errors was performed in order to uncover existing knowledge and to illuminate inherent needs, as well as to catalyze possibilities. The innovation proposal delineated the steps necessary to increase efficiency and to mitigate patient risk related to surgical specimen handling.

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2. I have not submitted this paper to satisfy the requirements of any other course.

Student's Signature Melissa A. Gillespie

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