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CASE STUDY RESEARCH ON NURSES' PERCEPTIONS OF VARIOUS EDUCATIONAL STRATEGIES FOR LEARNING PERIOPERATIVE NON-TECHNICAL SKILLS

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ABSTRACT

Operating rooms are complex interprofessional environments. Nurses must ensure patient safety through effective, advanced, communication and teamwork skills, task management expertise, and focused awareness of all intraoperative activity as situations evolve. This research explores the gap in the literature about what educational strategies nurses perceive to be effective in learning non-technical skills (NTS) within current college hybrid programs. Results contribute to perioperative education and the teaching of NTS.

INTRODUCTION

The operating room is a fast-paced setting where preparation and detailed execution of all aspects of the operation are meant to ensure optimal, safe patient, outcomes. This time constrained environment is, however, replete with incidences of adverse events. In Canada 7.6% of surgical patients suffered harm

from 2014 to 2015.¹ The severity of negative surgical patient outcomes justifies researching intraoperative perioperative patient safety, the impact of errors on patients and the healthcare system, and root causes.² Despite concrete interventions over the last 15 years, such as the Surgical Safety Checklist that includes implementing the surgical pause, funding focused on patient safety, and training of hospital personnel in harm reduction, improvements have been slow due to the complexity of determining root causes.

Adverse events are not commonly attributed to poorly performing healthcare professionals but are, rather, the result of healthcare delivery processes, or causal pathway failure.³ The focus is thus turning to teamwork and the impact on non-technical skills on patient safety processes.⁴ Non-technical skills (NTS) are the cognitive and social skills needed to communicate, coordinate actions and make decisions. It requires healthcare practitioners to be

aware of evolving patient care situations, the ability to prioritize tasks in complex environments and assume a leadership role when appropriate.⁵

Providing the opportunity for professionals to learn non-technical skills is important as they are acquired over time and with practice.⁴ Developing and implementing educational opportunities for team members to learn profession-specific NTS can enhance surgical patient outcomes.^{6,7,8} For many entry-level perioperative nurses, there are no specific learning opportunities to acquire perioperative NTS such as teamwork and communication, situational awareness, and task management until they enter the clinical environment. If patient safety is a primary driver for developing non-technical skills, it is inherent to introduce NTS in the perioperative certificate curriculum so novice nurses learning both scrub and circulating roles are aware of, and can integrate, non-technical skills upon entering the perioperative environment.

Nurses are adult learners who are practical and self-directed and their life experiences are important.

STUDY FRAMEWORK

In order to explore the topic of educational strategies that can be used to teach NTS, the Primary Investigator (PI) proposed a concurrent, mixed methods approach combining quantitative and qualitative paradigms on a spectrum (qQ) which enables the PI to corroborate results from differing perspectives.⁹ A constructivist paradigm framed the Qualitative aspect of the study. It presumes that knowledge is contextually and socially constructed¹⁰ based on learners' perceptions of unique experiences and what they deem useful and actionable.¹¹ Learning, as a process of inquiry, results in cognitive development and deep understanding evolves from reflecting and can serve as a basis for action.

This research on educational strategies for learning NTS takes the adult learner and contexts of online and simulation lab learning into account. Nurses are adult learners who are practical and self-directed and their life experiences are important. They reflect on and analyze their practice, valuing learning that has a social element and is immediately applicable to their professional or personal lives. These attributes mesh with the inherent qualities of online learning that appeal to adults: accessibility, flexibility, and accommodation of different learning preferences through the use of a variety of media.¹²

LITERATURE REVIEW

Prior to the study an extensive literature review was conducted to:

- Define NTS;
- Examine patient safety and NTS; and
- Explore educational strategies used to teach NTS.

Peer reviewed articles, published from 2008-2019, were assessed from the following databases: PubMed, CINAHL, MEDLINE, ProQuest, PsycINFO. Articles were categorized according to these themes: non-technical skills related to perioperative nursing,

NTS related to perioperative patient safety, categories/elements of non-technical skills, and educational strategies for learning NTS.

Defining Non-technical Skills

Flin and Mitchell (2008)⁵ spent several years investigating the non-technical skills required to provide safe patient care in the operating room. They developed a common language and definitions across perioperative professions with profession-specific objective rating scales and validated, structured feedback tools for non-technical skills performance for surgeons (NOTTS), anesthesiologists (ANTS) and scrub nurses (SPLINTS).⁵ With the focus on the scrub and anesthesia nurses NTS, there remains is a gap in the research regarding NTS as they relate to the circulating nurse, despite the complexity of this primary role within the interprofessional team.

Research has linked observed NTS behaviour of nurses and the OR team to clinical performance and patient outcomes.^{13,14,15} In a review of scrub nurses' NTS the common root causes of intra-operative error were determined to be inadequate communication of essential patient information and lack of situational awareness which often contributed to safety breaches such as medication errors, wrong-site surgery, and other patient morbidities.⁷ One study described a lack of situational awareness and task management when the circulating nurse mismanaged surgical equipment that jeopardized the patient.¹⁶

Researchers recommended creating education programs that improve nursing NTS through coaching or mentoring.¹⁷ When nurses have the opportunity to practice performing mock surgical procedures, as in a simulation lab with instructor oversight, they become aware of contextual cues. Nurses with more surgical experience may exhibit situational awareness by anticipating the surgeon's instrument requests and thus respond faster, may make fewer mistakes and are able to

focus during intraoperative surgical counts.^{18,19}

Patient Safety and NTS

In Canada, in 2004, a reported 1:14 hospitalized patients suffered from harm and in 2016 the incidence of preventable patient harm was 1:18 in hospitals and is 1:10 for patients in other healthcare settings.²⁰ In 2015, the Canadian Patient Safety Institute published a report on 'never events', preventable patient incidences that result in serious harm or death. Of the 15 identified never events, 9 can possibly be initiated or occur in the surgical environment.²¹

Healthcare experts in North America describe the lack of progress in harm reduction as a broad-based problem in healthcare organizations that experience ineffective teamwork, lack transparency, and have been unable to learn from harmful incidences.²² These findings are especially relevant for successful surgical outcomes that rely on high performance perioperative teams.

High performance teams consist of professionals with unique skills²³ who are working toward a common goal of delivering exceptional patient-centric care. High performance healthcare team members share similar patient care values, ideas, and responsibilities. Team experiences are honed through repetitive interactions. They become proficient in communicating, cooperating, coordinating tasks, reflecting on actions, and evaluating results. This synergy can result in outstanding performance.²⁴ Surgical teams are, however, rarely trained together²⁵ and may not work together on a consistent basis. Although current research focuses on the need for high performance, flexible perioperative teams, with well-developed technical and non-technical skills,²⁶ this is difficult to achieve.

In the OR intraoperative errors can be related to system breaches and team dynamics; distractions, inattention to detail, or lapse in communication. Researchers have observed that when incidents do occur intraoperatively,

situational awareness, task management, and team communication are frequently observed to have been compromised.^{12,14,16,26} One study showed, for instance, surgeons and nursing personnel disregarded the importance of communication and team responsibility by completing surgical procedures where the sponge count was incorrect. Protocols such as stopping surgery, inspecting the surgical site, and radiographic confirmation that there was no retained item were not performed to reconcile the possibility of a retained surgical item.²⁷

Recent research demonstrated that the simultaneous application of both technical and non-technical skills in OR teams improves patient care. Team training strategies should focus on communication, leadership, situational awareness, mutual trust, and evaluation. These attributes, combined with the ability of surgical teams to work together consistently, helps them develop a shared mental model where they modify personal behaviour according to the expectations of their colleagues.⁶

The current consensus is that intraoperative risk reduction requires a systems approach to learning and practicing NTS.⁶ Perioperative nurses identified ten prominent safety issues, in order of necessary prevention, whose negative outcomes may be due to inadequate attention to specific NTS:^{29 (p.681)}

1. Wrong side/site/patient surgery;
2. Retained items during surgery;
3. Medication errors;
4. Failures/errors in instrument reprocessing;
5. Pressure injuries;
6. Specimen management errors;
7. Surgical fires;
8. Perioperative hypothermia;
9. Burns from energy devices; and
10. Adverse effects from difficult intubation or difficult airways.

Although nurses are taught how to perform procedures correctly to avoid negative outcomes, mistakes often occur due to distractions or disruption in the workflow. Nurses who have acquired

NTS are attuned to the environment and more focused to the immediate task.

Education Strategies to Teach NTS

Simulation is one educational strategy described in the literature to learn NTS. Researchers determined that educators should integrate both technical and non-technical domains into OR simulations so teams could simultaneously develop excellent communication skills and successfully manage the patient.⁶ Ongoing NTS training improves behaviours over baseline measurements³⁰ and enhances interprofessional collaboration.⁷

Wunder⁷ described providing student registered nurse anesthetists with simulated video-recorded experiences that were scored using the ANTS rating system.³¹ This was followed by 3-hour educational lecture with digital slide instruction of nontechnical skills in the ANTS system. Several vignettes of anesthesia scenarios were reviewed and rated by students. After rigorous data analysis of pre- and post-test scores, the researcher concluded that the 3-hour educational intervention on nontechnical skills resulted in significant improvement in learning over simulated experiences. This demonstrated that NTS are not exclusively acquired through experience but also through instruction.

The available literature on learning NTS is contradictory. Research focused on educational strategies is primarily limited to clinical settings. There is a paucity of research available on perioperative nursing educational strategies in non-clinical settings.

RESEARCH METHODS

Between September and December 2018, case study research was conducted in a community college hybrid perioperative nursing graduate certificate program. The intrinsic case study³² occurs within a contextually and socially bounded system. Case study design is appropriate to explore the complex communication and educational processes as experienced by the postgraduate nurses

participating in a perioperative program. The PI obtained College Research Ethics Board approval and adhered to the Canadian Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) protocols.

The setting for this case study was a hybrid perioperative nursing program consisting of two hundred hours of facilitated, didactic, course content accessed online through a learning management system. Laboratory practicum (60 hours) was conducted in the colleges' operating room simulation facility with the capability of audio-visual capture of students practicing in the lab, a debriefing room, and a private environment for individual interviews. The PI had no educational responsibilities in this program.

Participants included a purposeful sample of 14 nurses, holding Bachelor of Science in Nursing, registered in the 15-week perioperative program. Their nursing experience ranged from 5 months to 19 years. Half of the participants had no previous experience with online learning. The PI ensured nurse anonymity by numerically coding participants for data analysis and publication.

Data collection

The research design included quantitative data collection generated from online, pre-lab tests and post-lab tests that assessed for understanding of non-technical skills, and a post program survey for nurses to rate their preference of different educational strategies. These items were embedded in a new college learning management system that 'went live' at the start of the data collection. Due to technical problems, the quantitative data collection was intermittent and incomplete. The PI decided that the incomplete quantitative data could not be used to substantiate qualitative results. However, as there was rich qualitative data, the research question was reframed. Originally the research set out to examine what educational strategies assist nurses to learn perioperative non-technical skills

but in order to proceed as a qualitative case study the question was reframed to: What are nurses' perceptions of various educational strategies for learning perioperative non-technical skills?

Methods that captured the qualitative realities of the fourteen nurses' experiences with various educational strategies used to learn non-technical skills included: PI observation and video review of learner performance in lab (28 episodes) and 14 written reflective learning journals. The PI conducted fourteen semi-structured individual interviews using a question guide and open-ended questions. This allowed the PI to extract and give voice to nurses' unique experiences through a narrative approach that relates the stories of those having the experience.³²

Audio interviews were transcribed and the PI and two certified perioperative nurse educators thematically coded transcriptions and reflective journals. Reviewers reported on relevancy and frequency of the themes: situational awareness, communication and teamwork (including interpersonal relations), task management, patient safety and skills acquisition. Qualitative data sources were triangulated. This is a process of that uses multiple sources of data to determine the repeatability of an observation that helps the researcher interpret and clarify meaning and provides trustworthiness of the results.³³

DATA ANALYSIS

The analysis and interpretation of each category examines how nurses made individual connections between strategies to learn non-technical skills and what their perceptions were of supports and barriers. Table 1 outlines definitions of the three nursing categories of NTS described by Flinn and Mitchell with corresponding elements⁶ and themes identified by study participants. These themes emerged when nurses discussed the educational strategies that they encountered in the program and are reflected in the following analysis.

Case studies

Case studies can take many forms – from a simple scenario for the reader to examine and critically think about to unfolding case studies with specific learning objectives and assessments. Simple perioperative case studies were based on safety themes such as patient positioning and fall prevention, avoiding medication and specimen errors, avoiding surgical item retention, and preventing wrong site surgery. All nurses reported that the case studies were particularly useful if they explained real events, and had questions at the end. Cases with severe adverse outcomes acted as precautionary tales to the reader. One nurse mentioned her surprise in reading the case of a patient who was unrestrained and placed in steep Trendelenberg. This

anesthetized patient slid off the head of the OR table during the procedure and sustained life-altering injuries.³⁵ The learner had never considered the possibility that a patient could fall once on the OR table and under general anesthesia.

Another incident involved mislabeling of fluid on the OR table leading to the anesthesiologist injecting glutaraldehyde intrathecally and the patient died.³⁶ Nurse 15 commented “I mean, you wonder how these things can happen but they happen. [This case study] shed some light on the fact that literally anything can happen. You have to be careful and learn safety protocols.”

The nurses agreed that case studies helped them with situational awareness and the need to focus on everything that

goes on with the patient. The goal that some voiced was to pay better attention to detail and be vigilant and accurate while performing patient interventions such as drawing up medications and confirming surgical counts during the simulated lab surgical procedure.

Learners recommended the use of more case studies as a tool for understanding the management of patient progression in the OR and perioperative dynamics needed to handle untoward events such as Malignant Hyperthermia that is reviewed in the program but not practiced in the simulation lab.

Text Readings

Nurses liked the seminal perioperative nursing text⁸ used in this program. Prior

Table 1. NTS Elements and Themes.

NON-TECHNICAL SKILLS	ELEMENTS	NURSES THEMES
Situational Awareness	Gathering information. Recognizing and understanding information. Anticipating.	Being in the moment. Focusing on everything. Being aware of sterile environment. Identifying breaches in aseptic practice. Thinking deeper about practice.
Communication and Teamwork	Acting assertively. Exchanging information. Coordinating with others.	Overcoming shyness and fear of embarrassment. Trusting competence of others. Anticipating each other's movements. Developing a rhythm. Cueing and helping each other.
Task Management	Planning and preparing. Providing and maintaining standards. Coping with pressure.	Saving time. Thinking about each action. Decreasing unnecessary movements. Respecting handling of specimens. Coping - with time everything will be ok.

These nurses were able to capture video images in their minds and mentally replay them in lab as they practiced skills such as surgical hand preparation or setting up the back table.

to lab they were instructed to prepare to perform their tasks by reading the logical sequencing of procedures such as prepping and draping or use of electrosurgical units and other equipment. After the mid-term lab, Nurse 11 reflected “Not only do I require significantly more hands-on learning going forward, but I know that I also need to go back and refresh on the relevant textbook readings to refill myself with the pertinent foundational information that we read back at the beginning of the course which has faded over time.”

Many recommended more focused reading as the text was time consuming and they needed to choose wisely where to spend their study time. Nurse 3 stated “I don’t mind reading but, in my opinion, it should be in two categories ‘nice to know’ and ‘need to know’. Maybe students would not read all the ‘nice to know’ but I find as you’re reading ... you realize you need to keep reading, and words bring you to want to read something else and go further.”

Nurses agreed that the text would be a helpful reference when entering perioperative practice as it provides an opportunity to review tasks and surgical procedures.

Videos

In addition to using text to prepare for labs nurses were also provided with videos to prepare for weekly labs. In this perioperative program videos were created by the lab instructors and viewed online. Eleven participants highly rated this educational strategy for learning technical and non-technical skills.

“The most valuable ones were the ones done in-house going through step by step demonstrating the procedures” Nurse 13.

“The in-house videos were great, they are the best way to learn.” Nurse 11.

Videos that focused on task management and safe patient practices helped prep for lab and several nurses noted that

they were reflective of the actual teaching methods and sequencing in the lab.

“It’s great to have videos then come into lab and act on the scenarios... you found that the videos were kind of a good preempt to lab.” Nurse 14.

Content in the videos was deliberately developed to adhere to the curriculum and the ORNAC Standards, Guidelines and Position Statements for Perioperative Registered Nurses (ORNAC Standards).³⁴ Nurses expressed appreciation for the fact that these videos matched their learning in a way that videos from other organizations, or countries, might not:

“In-house videos were specific to what we were learning – no deviation from the video and what we were doing in the lab.” Nurse 5.

Self-proclaimed visual learners described watching videos as more effective than reading about procedures in a step-by-step process or looking at illustrations in a textbook.

“It is useless to read about doing a hand scrub... the video is a better and a quicker way to learn.” Nurse 6.

“I liked being able to see what you are supposed to be doing rather than just reading about it.” Nurse 7.

Learners valued the relevance and immediacy of viewing procedures that they could watch repeatedly to refresh their memories. Four self-identified visual learners described that after watching the videos they were able to come to lab and recall the images and sequencing of events in their heads. These nurses were able to capture video images in their minds and mentally replay them in lab as they practiced skills such as surgical hand preparation or setting up the back table. Nurses commented that visualization allowed them to act out the tasks and scenarios with more confidence and accuracy, attesting to the efficacy of online videos as an adjunct for learning non-technical

skills like task management, communication and teamwork.

“I’m a very visual learner so actually seeing the video and then acting out scenarios; seeing and touching things is important for that hands-on experience... So in terms of preparation for lab, yes, it’s great to have videos but then coming into lab and acting on the scenarios, you found that the videos were kind of good as a preempt to lab.” Nurse 14.

Nurses identified some drawbacks to learning via videos. Most videos were not in real time as procedures took longer to perform due to the explanations given by the instructors. This gave three learners an unrealistic impression of how much time it should take to do certain tasks required to prepare the OR for the patient. These nurses suggested filming the entire surgical set-up in real time and then providing shorter clips with sequenced, narrative explanations of what was happening and the rationale for nursing actions. Nurse 7 suggested chunking videos that were too long as small-labelled clips and snippets of procedures would be easier to digest without having to pay attention for as long.

Throughout the program, external, open-access, web-based videos were used to review practices that were not available through the in-house films, such as patient prepping and equipment set-up and use. All nurses became frustrated if these video practices differed from what they learned in lab.

Scholarly Articles

Scholarly, peer reviewed, articles pertaining to aspects of patient safety and emphasizing NTS were required reading. Articles helped nurses think about, and anticipate patient needs and consider ways to organize tasks to meet these needs. For instance, reading about surgical management of diabetic patients made nurses aware of the sequencing of intraoperative tasks and the need for team collaboration in order to monitor the patient’s

perioperative blood glucose, determine medication needs, anticipate potential adverse events, and ensure a safe outcome.

A couple of nurses admitted that they only gave articles a cursory overview by scanning the abstract and conclusions. Opinions varied about topics. An article about the perioperative implications of patient body piercing,³⁷ prompted Nurse 13 to say, “the body piercing article was not overly useful. It is more important to know why [piercings] need to be removed prior to surgery... and to know the rationale why we cannot leave them in and to be able to explain this to patient.” Another nurse liked the article because it showed piercing removal tools, demonstrated the task of removing piercings and included a cultural perspective on piercing that the nurse found engaging and said could open up lines of communication.

Nurses discussed that they were selective when determining what articles to read. They perceived an article to only be relevant when it related to their specialty area and had direct implications for their practice. For instance, pediatric nurses appreciated the article on implications of sickle cell disease on surgical pediatric patient care³⁸ while non-pediatric nurses did not see the relevance and one person said they found reading the article wasted their time.

Online Discussion Forums

Discussion forums are one strategy used in online learning to help a group of participants, with common interests and goals, share opinions on topics resources, knowledge, and experience. Discussions may encourage the development of NTS such as communication, social sharing of knowledge, and collaborative problem-solving.⁴⁰

In this program, discussions did not have the desired communication effect. Graded discussions were based on research articles and situational topics meant to elicit sharing and trustful

conversations. Most participants (9/14) did not like, or had mixed feelings about, discussions.

They were unsure of the goals of open conversation and found the discourse disengaging. Some participants were sensitive to opinion-based topics, like dealing with traumatic patient cases or discussing treatment trends in breast cancer. One nurse described that some discussions turned into therapy sessions. Several did not like sharing their thoughts and feelings when they did not know who was reading them. They perceived that some conversations got derailed and participants lost focus. For five nurses the perception was that discussions did not enhance collegiality. Although they stated they knew the importance of teamwork and communication, they felt it was not important for independent learners to make connections with colleagues within a course. Two nurses made the suggestion to consider face-to-face discussions during the labs and to keep the topics research-based rather than affective and subjective. Nurse 13 commented that they felt “Time would be better spent focusing on skills.”

Four participants were fans of the discussion forums and considered the conversations to be beneficial as nurses reflected on and shared opinions and stories that were based on their own, and their patients’ experiences. Novice nurses appreciated the comments of nurses with more knowledge and experience. Nurse 12 stated “I absolutely loved the discussions: the sharing, hearing different takes on issues, other nurses’ personal experiences. It was one of most positive aspects of the course.” This was reiterated by Nurse 8 who declared “It was actually one of my favourite parts.”

ORNAC Standards

The ORNAC standards³³ were a teaching tool and resource throughout the program. All learners stated they referred to the them for course assignments and lab prep. They appreciated the succinct bulleted format

of procedures followed by clearly stated, evidence-based rationale. Lab instructors used the ORNAC Standards to guide learners’ experiential learning.

All nurses claimed they would refer to the Standards in their perioperative practice. In fact, Nurse 10 who already worked in an operating room described the following:

“We learned about some new ORNAC Standards regarding the order of prepping and use of solutions that differ from our day to day practice. It made me think deeper into our practice... it has encouraged me to question more. [Prepping] is now something that is being revised and discussed at our hospital.”

This demonstrates how learners were critically thinking about professional practice issues and task management using the ORNAC Standards to initiate change.

Labs and reflective journaling

Perioperative nurse learners in this program reflected on, and wrote about, their individual and group actions in their post-lab journal. Non-technical skills elements for reflection were patient safety, task management, teamwork, communication, and situational awareness.

Personal reflection helped nurses understand their impact on colleagues during experiential learning, particularly related to communication, teamwork, and trust. Weekly reflection on elements of NTS led all nurses, at one point or another, to a conscious decision to improve upon specific skills. Journaling provided an opportunity to create learning goals, note struggles and progress and analyze their performance and professional development. This intrapersonal activity helped them reflect and internalize new knowledge.²¹

Communication

Nurses reported that in some labs they were satisfied with their level of

communication and at other times were determined to change behaviour.

“Learning how to communicate behind a mask, and with little facial expression, is very different. I can understand how easy it might be to have a misunderstanding in the OR when your style of communicating has to be completely different than in any other context. I’m interested in learning how to maintain a positive environment, particularly in intense situations or when things go wrong.”
Nurse 7.

Nurse 13 described the communication process when paired with a nurse they had not worked with before in lab:

“I noticed that we did not communicate as well as my usual lab partner and I do. I did not feel comfortable making suggestions when my partner was unsure of what to do, as I did not want to seem pushy. As well, I found that I hesitated to ask for my partner’s help or suggestions when I was not sure what to do. I did not want my partner to think that I wasn’t knowledgeable or prepared. There will be times when I will not be sure what to do next, so I will need to practice becoming more comfortable with consulting team members and asking for help without fear of embarrassment.”

Nurse 5 practiced assertiveness and stated “I liked that I was encouraged to speak out when a colleague was doing something like breaking technique. It is good to practice this in lab to prepare for clinical and be able to advocate for the patient.”

Learners critically analyzed their actions, and reflected on values, beliefs, and assumptions in order to improve future performance.³⁸

“Creating this [surgical] set up in collaboration with another nurse (regardless of which role we took on) really demanded a heightened level of attention, forethought, and communication. It required that we

were not simply recalling a series of steps, but really thinking about each action in relation to its effect on ourselves, our field, our colleague, and our environment, and anticipating subsequent outcomes to the patient. Today I feel as though I am beginning to think like a perioperative nurse.”
Nurse 11.

Situational Awareness

As nurses gained experience in the perioperative setting their ability to understand the intricacies of working in an aseptic environment improved.

Nurse 3 described an epiphany regarding situational awareness in lab:

“This is probably my biggest reflection of today’s lab: I had to be in the moment, aware and present all times. No daydreaming allowed! I intellectually understand that one of the perioperative nurse’s role is to be aware of sterility breaches and informing people, including oneself when a breach has occurred. It will probably become second nature to do so but for now, it is a constant effort to remain and be aware of my body, my movements [and surroundings].”

A perioperative nurse must be able to reflect on past situations, to assimilate and accommodate information in order to anticipate events.⁴⁰ As nurses gained experience in the perioperative setting two of the more experienced nurses discussed their ability to anticipate.

“The repetitive practice in today’s lab was excellent as my partner and I began to develop a rhythm and anticipate each other’s movements and the surgeon’s. Repeatedly going through the surgery helped me understand the process as a whole and start to think about what comes next and what could go wrong.” Nurse 2.

Nurse 7 described experiencing anticipation which is a reflection beyond action. This is the ability to transfer what has been learned in a past situation to future circumstances.

“As we continued to practice the setups and procedures I found myself thinking ahead of the surgery trying to anticipate what the surgeon would want next.”

Task Management

All learners made changes to their mental model about perioperative practice. Reflections indicate that learning the roles of the perioperative nurse were sometimes more challenging than they originally anticipated. Nurse 11 provided this feedback:

“This week we learned how to carry out some of the most basic and essential skills necessary to working in the OR; how to scrub and don/remove PPE [personal protective equipment] while maintaining sterility. As I watched the instructor demonstrate this process for the first time, I found myself quick to dismiss the procedure in my mind as being very repetitive and straightforward, and assumed that it would be a simple task to replicate after observing someone else do it. When I tried to do a return demonstration of this process, I quickly found myself very humbled and even a little embarrassed as I struggled to recall steps I had just witnessed and the rules I had just learned. I found myself freezing in the moment, making mistakes, and essentially crumbling my way through the first (and even subsequent) run(s).”

Nurse 4 described a reality check:

“When I saw all the little pieces that needed to be assembled to the various parts of [laparoscopic] instruments, I couldn’t help but just laugh. It felt over my head, and made me realize how nurses and care providers outside of the OR have no idea of the work that goes into preparing for a surgery, let alone while maintaining the patient’s health and safety. I am excited for the day I will finally feel competent at this!”

Two nurses gave feedback on their learning regarding surgical positioning. Nurse 4 said:

“Patient positioning on the OR table is something that I had no nursing background in. I would think this is not very important, and whatever position is needed to do during the surgery let’s put them in it and get going. I have learned a lot in the reading about brachial plexus strain and ulnar nerve damage that I have not previously known or realized. Skin integrity and prevention of damage is a large part of nursing care - is an area that I would have thought would have less of a focus in the operating room.”

Nurse 7 volunteered to be positioned by colleagues:

“I was the patient for the supine and lithotomy demonstrations. It gave me an opportunity to see and feel firsthand what it was like to be in such a vulnerable position. I had to trust my nurses to protect my joints and keep my hair out of my face. The longer I was in the positions the more I could appreciate how painful some areas might become if I was unable to move for the duration of a surgery. The candy cane stirrups were particularly uncomfortable.”

At week 9, one week before the conclusion of the labs, Nurse 4 reflected on their personal progress in this way:

“Efficiency and time were identified as a focus this week in the pre-lab conference. I have identified that I have a tendency to move slower when scrubbed due to some sort of cognitive preset I have that slower is more sterile. It feels as though I am protecting sterility more with slower more deliberate motions. This is a bad habit that I have noticed in myself.

I thought that having a chance to practice two days in a row was very positive to the repetitive learning process. It also felt that teamwork and camaraderie were established over the two days. Communication improved along with reminders for improvements and tasks. In lab you could co-ordinate with others and we learned to trust our partner’s

“The focus of our lab work has shifted over time, from simply learning and mastering individual skills/tasks, to really developing a deeper understanding of perioperative principles...”

competence. We could be vigilant when counting without fear of embarrassment.

I thought that performing a mock surgery was a great way to promote situational awareness in trying to anticipate and think a few steps ahead.”

Assimilating technical and non-technical skills

At the conclusion of the 10-week lab experience Nurse 11 summed up their progression in the acquisition of technical and non-technical skills:

“The focus of our lab work has shifted over time, from simply learning and mastering individual skills/tasks, to really developing a deeper understanding of perioperative principles, anticipating the needs and actions of our co-workers, learning to work parallel to one another but also in unison, refining our ability to communicate both verbally and non-verbally, and collaboratively orchestrating a variety of tasks simultaneously. In other words the learning has shifted from being relatively linear to becoming very multi-dimensional, and I feel very confident in the progression of both my technical and non-technical skills.”

DISCUSSION

Study results indicate that the top online preference for learning NTS is watching online videos created specifically for the program. Videos assist with learning positive behaviours and actions and helped them discern what NTS to focus on during specific perioperative tasks and procedures. Educators may consider creating videos that highlight team member usage of specific NTS – for instance ‘teamwork’ then offer the opportunity to systematically support skill and procedural learning through team practice in the lab setting. Further, videos could be used to demonstrate ineffective performance of NTS which could assist nurse learners to determine

appropriate behaviors and problem solve in adverse situations.

All nurses confirmed that case studies helped them work through unfamiliar patient situations specific to the perioperative setting. Case studies fostered significant cognitive learning as nurses worked through surgical scenarios or analyzed adverse outcomes related to perioperative nursing role functions. This synthesis of knowledge and practice enabled them to anticipate, recognize, predict, and apply appropriate interventions in the lab setting. Online instructors could integrate this finding by carefully choosing or creating case studies that expose learners to patient-related, intraoperative safety issues. Compiling a repository of case studies to enhance learning of specific NTS would be a valuable teaching tool.

Nurses comments on the reading requirements varied according to their preferences however all agreed that reading the text and ORNAC Standards helped them learn NTS related to necessary tasks. All textbook and online reading should be judiciously selected and constrained to what is necessary to meet learning objectives. Where possible, such as for an assignment, learners should have reading choices relevant to their practice. From a program design perspective, the educator should respect the time and effort it takes to read. An effective way to be cognizant of this is for the educator to personally read lesson materials to ensure they are reasonable.

Communication and teamwork are essential NTS in the operating room. In their reflective journaling, nurses discussed aspects of personal communication that had occurred in the labs. This provided a safe place to experiment with unfamiliar communication techniques. As noted, many nurses in this study did not find the online discussion forums to be useful communication tools for creating collegial bonds or sharing information. There are three potential reasons for

Journaling, as a venue for expression of nurses' attitudes, feelings, and cognitive learning, allowed learners to critically think about and connect new theory and knowledge to perioperative practice.

this. The first is that the discussion learning objectives may not have been clear or important for some learners. The second is that some topics were subjective and asked learners to share personal experience which made some uncomfortable. Studies have demonstrated that peer discussions of affective topics may negatively impact learner achievement and satisfaction, holding little social value.⁴ Finally, the discussions occurred without a lot of instructor intervention and students want and need instructor presence in order to engage in the course content. As research promotes discussions for critical thinking, effective communication and teamwork¹ educators can use the results from this study to reflect on appropriate topics for discussion, and to create guidelines for instructor participation. This can be accomplished through asynchronous or synchronous online discussions with the students or by conducting face-to-face, moderated discussions in the lab setting.

Journaling, as a venue for expression of nurses' attitudes, feelings, and cognitive learning, allowed learners to critically think about and connect new theory and knowledge to perioperative practice. Journals provided a resource for educators to determine how, when and why nurses learned NTS. Educators may use the study results on journaling to determine whether incorporating this activity into perioperative programs is appropriate for their learners.

Consideration must be given to providing a structured journal format to guide learners' reflections on specific aspects of their perioperative skill acquisition. Finally, educators must determine whether to use journaling for formative assessment with regular, informal feedback, or as a summative evaluation of learning, in which case rubrics should guide graded reflections. In simulation labs there are descriptive, measurable, procedural steps and rationale for learning and rating technical skills. However, NTS elements have not been described or rated in the literature for scrub and circulating roles in the pre-clinical setting. Educators

must gauge whether to add NTS as formal requisite skills in the lab practicum. This will require the development of observable criteria based on available research to describe and assess effective and ineffective performance of NTS appropriate for the novice perioperative learner. Formative and summative assessment of NTS during a perioperative program may provide valuable feedback so nurses have the confidence to improve their practice when they enter the clinical setting.

SIGNIFICANCE AND LIMITATIONS

To date there is little research on pre-clinical educational strategies for perioperative nursing NTS. The outcomes of this study demonstrate the preferences for and impact of using specific tools to help nurses learn non-technical skills such as communication, task management, and situational awareness in the pre-clinical setting.

The limitation of this research was the inability to triangulate quantitative data with qualitative data. This would have provided statistics on the level of NTS learning that was accomplished in the course and the statistical attribution of NTS to specific educational strategies. The study results are contextual and, by nature, one-of-a-kind so results are not generalizable across perioperative programs. The reader must extrapolate relevant information about learning non-technical skills to determine if results are useful, transferable and applicable in their specific environment.

CONCLUSION

Profession-specific non-technical skills training is an essential component for perioperative nursing educational programs as it promotes nursing effectiveness in high-performing team environments. It has been linked to a reduction in perioperative adverse events and increased surgical patient safety. This study showed nurse learners' perceptions of various educational strategies for learning perioperative non-technical skills. All nurses favoured the

online activities of watching in-house videos in preparation for lab and journaling about their weekly learning experiences. Online, judiciously chosen readings and working through case studies reinforced learning. Some learning strategies were more effective than others for elements of NTS, for instance communication improved through personal reflection in journals and repeated practice in labs. Labs were more convivial for communicating and sharing with colleagues than discussions forums.

With all forms of educational delivery, experimentation and assessment of strategies is ongoing. All successes of effective educational strategies can be attributed to the thoughtful educators who create the content and the learners who create personal meaning based on their unique interactions with content and personal experiences. The time is here for perioperative educators to take up the challenge of creating robust educational strategies to help nurses learn and confidently apply NTS that have the potential to improve surgical patient outcomes.

REFERENCES

- Canadian Institute for Health Information. Measuring Patient Harm in Canadian Hospitals, 2016. Available from: https://secure.cihi.ca/free_products/cihi_cpsi_hospital_harm_en.pdf.
- Urbach R, Govindarajan A, Saskin R, Wilton A, Baxter N. Introduction of surgical safety checklists in Ontario, Canada. *N Engl J Med* [Internet]. 2014;370:1029-1038. Available from: <https://www.nejm.org/doi/pdf/10.1056/NEJMsa1308261?articleTools=true>.
- Schwendimann, R., Blatter, C., Dhaini, S., Simon, M. Ausserhofer, D. The occurrence, types, consequences and preventability of hospital adverse events – a scoping review. *BMC Health Services Research*. 2018;18:521. Available from: <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-018-3335-z>.
- Kodate N, Ross A, Anderson J, Flin R. Non-technical skills (NTS) for enhancing patient safety: achievements and future directions. [Internet] *Japanese Journal of Quality and Safety in Healthcare*. 2012;7(4):360-370. Available from: <https://pdfs.semanticscholar.org/8511/90e49d6dd293ae6d6186054d25076dd18d67.pdf>.
- Flin R, Mitchell L, McLeod B. Non-technical skills of the scrub practitioner: the SPLINTS system. *ORNAC J*. 2014;32(3):33-8.
- Phitayakorn R., Minehart R., Hemingway M., Pian-Smith M., Petrusa E. The relationship between intraoperative teamwork and management skills in patient care. *Surgery*. 2015;158:1434-40. doi.org/10.1016/j.surg.2015.03.031.
- Wunder L. Effect of a non-technical skills intervention on first-year student registered nurse anesthetists' skills during crisis simulation. [Internet] *AANA Journal*. 2016;84(1)46-51. Available from: <https://pdfs.semanticscholar.org/1a2b/4deee326fca8693ac68f51b99327546355c4.pdf?ga=2.217332886.1233388145.1562607435-1679173414.1562607435>.
- Gordon M, Darbyshire D, Baker P. Non-technical skills training to enhance patient safety: a systematic review. *Med Educ*. 2012;46(11):1042-54. doi: 10.1111/j.13652923.2012.04343.x.
- Creswell JW. Steps in conducting a scholarly mixed methods. [Internet] *DigitalCommons@University of Nebraska – Lincoln*. 2013. Available from in *Conducting a Scholarly Mixed Methods Study* John W. Creswell University of Nebraska – Lincoln. Available from: <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1047&context=dberspeakers>.
- Dewey J. *Democracy and education*. New York: The Free Press. 1916.
- Guba E, Lincoln Y. 3rd ed. In: N. K. Denzin, Y.S. Lincoln editors. *Paradigmatic controversies, contradictions, and emerging confluences The Sage qualitative handbook of research*. Thousand Oaks, CA: Sage; 2005. p. 191-215.
- Clendinneng D. Exploring simulation and debriefing as an educational strategy for perioperative nurse learners: a case study [Internet]. 2011. Available from <https://ruor.uottawa.ca/handle/10393/30140>.
- Laflamme, L. Enhancing perioperative patients' safety: a collective responsibility. *ORNAC Journal*. 2017;35(4):13-33.
- Kang E, Massey D, Gillespie B. Factors that influence the non-technical skills performance of scrub nurses: a prospective study. *J Adv Nurs*. 2015;71(12):2846-57. doi: 10.1111/jan.12743.
- Siu J, Maran N, Paterson-Brown S. Observation of behavioural markers of non-technical skills in the operating room and their relationship to intra-operative incidents. [Internet] *The Surgeon*. 2016;14(3):119-128. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S1479666X14000754?via%3Dihub>.
- McClelland G. Non-technical skills for scrub practitioners. *The Journal of Perioperative Practice*. 2012;22(12)389.
- Lyk-Jensen HT, Dieckmann P, Konge L, Jepsen RM, Spanager L, Østergaard D. Using a structured assessment tool to evaluate nontechnical skills of nurse anesthetists. *AANA J*. 2016;84(2):122-7.

18. Koh RY, Park T, Wickens CD. An investigation of differing levels of experience and indices of task management in relation to scrub nurses' performance in the operating theatre: analysis of videotaped caesarean section surgeries. *Int J Nurs Stud.* 2014;51(9):1230-40. doi: 10.1016/j.ijnurstu.2014.01.005.
19. McClelland G. Factors that affect scrub practitioner non-technical skills: A literature review. *J Perioper Pract.* 2018;28(4):75-82. doi: 10.1177/1750458918762315.
20. Canadian Patient Safety Institute. The case for investing in patient safety in Canada, 2017. Available from: <https://www.patientsafetyinstitute.ca/en/About/Documents/The%20Case%20for%20Investing%20in%20Patient%20Safety.pdf#search=adverse%20events%202018>.
21. Canadian Patient Safety Institute. Never events for hospital care in Canada, 2015. Available from: <https://www.patientsafetyinstitute.ca/en/toolsResources/NeverEvents/Documents/Never%20Events%20for%20Hospital%20Care%20in%20Canada.pdf>.
22. Canadian Institute for Health Information. Measuring Patient Harm in Canadian Hospitals, 2016. Available from: https://secure.cihi.ca/free_products/cihi_cpsi_hospital_harm_en.pdf.
23. Rothrock J. Alexander's care of the patient in surgery. 16th ed. St. Louis: Elsevier; 2019.
24. Qureshi Y, Dhaliwal K. High Performance Team – Necessary in a Healthcare setting. *Bangladesh J Med Science.* 2016;15:10-14.
25. Entin B, Lai F, Barach P. Training teams for the perioperative environment: a research agenda. *Surgical Innovation [Internet]* 2006;13(3):170-178. Available from: <https://journals.sagepub.com/doi/abs/10.1177/1553350606294248>.
26. Mitchell L, Flin R, Yule S, Mitchell J, Coutts K, Youngston G. Thinking ahead of the surgeon. An interview study to identify scrub nurses' non-technical skills. *International Journal of Nursing Studies.* [Internet] 2011;48(7):818-828. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S0020748910003755?via%3Dihub#!>.
27. Stawicki SP, Moffatt-Bruce SD, Ahmed HM, Anderson HL 3rd, Balija TM, Bernescu I, et al. Retained surgical items: a problem yet to be solved. *J Am Coll Surg.* 2013;216(1):15-22. doi: 10.1016/j.jamcollsurg.2012.08.026.
28. Poore SO, Sillah NM, Mahajan AY, Gutowski KA. Patient safety in the operating room: II. Intraoperative and postoperative. *Plast Reconstr Surg.* 2012;130(5):1048-58. doi: 10.1097/PRS.0b013e318267d531.
29. Steelman VM, Graling PR. Top 10 patient safety issues: what more can we do? *AORN J.* 2013;97(6):679-98. quiz 699-701. doi: 10.1016/j.aorn.2013.04.012.
30. McCulloch P, Mishra A, Handa A, Dale T, Hirst G, Catchpole K. The effects of aviation-style non-technical skills training on technical performance and outcome in the operating theatre [Internet] *Qual Saf Health Care.* 2009;18:109-115. doi:10.1136/qshc.2008.0320452016. Available from: https://pdfs.semanticscholar.org/d54b/30f2e72d1501e9960402b2b433c32f332835.pdf?_ga=2.37871139.1233388145.1562607435-1679173414.1562607435.
31. Flin R, Patey R, Glavin R, Maran N. Anaesthetists' non-technical skills. *British Journal of Anaesthesia.* 2010;105(1):38-44.
32. Stake, RE. 3rd ed. Qualitative case studies. In: NK. Denzin, YS. Lincoln editors. *The Sage qualitative handbook of research.* Thousand Oaks, CA: Sage; 2005. p. 443-466.
33. Denzin, NK, Lincoln, YS. (Eds.), *The Sage qualitative handbook of research (3rd ed.).* Thousand Oaks, CA: Sage. 2005. p. 191-215.
34. Operating Room Nurses Association of Canada. *The ORNAC standards, guidelines and position statements for perioperative registered nurses.* 13th Ed. Ottawa (ON): ORNAC; 2017.
35. Prielipp R, Weinkauf J, Esser TM. Falls from the O.R. or procedure table. *International Anesthesia Research Society.* 2017;125(3):846-851.
36. Brown-Brumfield D, DeLeon A. Adherence to a medication safety protocol: current practice for labeling medications and solutions on the sterile field. *AORN J.* 2010;91(5):610-7. doi: 10.1016/j.aorn.2010.03.002
37. Larkin, B. The ins and outs of body piercing. *AORN J.* 2004;79(2):330-342.
38. Hendricks-Ferguson, V. Nelson, MA. Home study program. Treatment of cholelithiasis in children with sickle cell disease. *AORN J.* 2003;77(6):1168-1178.
39. Dreifuerst K. The essentials of debriefing in simulation learning: A concept analysis. *Nursing Education Perspectives.* 2009;30(2):109-114.
40. Raterink G. Reflective journaling for critical thinking development in advanced practice Registered Nurse students. *Journal of Nursing Education.* 2016;55(2) 100-104. 🌸