QR CODE LINKED VIDEOS TO ENHANCE COMPETENCIES IN RURAL NURSING

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ABSTRACT

In developed countries such as Canada and the United States (US), nurses who work in rural critical care and emergency settings are faced with many infrequent procedures and skills requiring high levels of competency to perform safely (Decker & Hine, 2015; Gibson & McDermott, 2014). Procedures such as ventilation and pacing are not part of everyday work for rural nurses but may be crucial to the survival of the patient (Decker & Hine, 2015; Gibson & McDermott, 2014). In addition to the low-volume nature of these competencies, they are often needed in urgent situations, with quick action required by the nurse to positively affect patient outcomes (Hendrickx & Winters, 2017; Lawford & Giles, 2012; MacKinnon, 2012). Rural nurses struggle to maintain these competencies due to issues such as infrequency and lack of exposure to critical care skills (Saqe-Rockoff et al., 2019).

A proposed solution to this practice problem involves applying a ‘just-in-time' (JIT) strategy where a brief, concise, and targeted informational video is offered via quick response (QR) codes placed at point-of-care, on or near the associated equipment in the rural emergency department (ED). This paper discuses the outcomes of a project designed to assess the validity of this proposed solution to improve competencies and self-efficacy among rural emergency nurses.

Supplementary Material

Video: Clinical Practice Bytes: Quick Review on How to Set Up a Pleur-Evac (Dry Suction) for Chest Drainage. This two-minute video demonstrates setting up a chest drainage unit.

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LIST OF ABBREVIATIONS

ED	Emergency Department
HA	Health Authority
JIT	Just-in-Time
QR Code	Quick Response Code
RN	Registered Nurse
PDSA	Plan-Do-Study-Act
SCT	Social Cognitive Theory
SME	Subject Matter Experts
US	United States

SECTION 1: INTRODUCTION

Competency is an important aspect of who we are as nurses, but it can be difficult to quantify. Fukada (2018) describes it as "the ability to perform clinical nursing care that is based on the nurse's ethical thinking and accurate nursing skills and that is provided to meet the needs of the cared" (p. 2). This definition highlights why competencies are essential to fulfilling our professional obligation to meet patient needs and why addressing gaps in competencies for nurses is such a crucial issue. Nursing competencies required for rare or infrequent procedures and skills are especially difficult to maintain and require innovative and strategic approaches for successful maintenance (Pavloff et al., 2017).

Nursing Practice Problem

In developed countries such as Canada and the United States (US), nurses who work in rural critical care and emergency settings are faced with many low-volume procedures and skills requiring high levels of competency to perform safely (Decker & Hine, 2015; Gibson & McDermott, 2014). "Low-volume" in this context is applied as a synonym for something that occurs infrequently or with low incidence. Procedures such as ventilation and pacing are not part of everyday work for rural nurses but may be crucial to the survival of the patient (Decker & Hine, 2015; Gibson & McDermott, 2014). In addition to the low-volume nature of these competencies, they are often required in urgent situations, with quick action required by the nurse to positively affect patient outcomes (Hendrickx & Winters, 2017; Lawford & Giles, 2012; MacKinnon, 2012). Another compounding factor is that the scope of knowledge required for nurses working in a rural setting is far more extensive than for those in larger centres (Goodridge & Marciniuk, 2016; Hendrickx & Winters, 2017; Lawford & Giles, 2012).

Infrequency and lack of exposure to critical care skills are argued to be two of the biggest factors contributing to challenges in competency maintenance (Saqe-Rockoff et al., 2019), but the nursing workforce of many developed nations is also becoming increasingly novice (Advisory Board, 2019). The lack of senior nurses for mentorship further exacerbates the issue (Virkstis, 2021; Advisory Board, 2019; Hendrickx & Winters, 2017). Ongoing, frequent, and repetitive education initiatives have been helpful in maintaining nurse competencies, but the resources to administer these methods are often lacking in rural settings (Bolin et al., 2011; Penz et al., 2019).

Purpose of the Project

A proposed solution to this practice problem involves applying a ‘just-in-time' (JIT) strategy where brief, concise, and targeted informational videos are offered via quick response (QR) codes placed at point-of-care, on or near the associated equipment in the rural emergency department (ED). This strategy addresses the time-limited nature of frontline nursing work, offers a quick and engaging method to review competencies, and facilitates access to evidence-based quick resources at point-of-care. The purpose of the project is to assess the effectiveness of this JIT approach to improve self-efficacy for nurses who must employ high-competency, low-volume skills in the rural ED. The anticipated outcomes of this project are improved self-efficacy for frontline nurses when they are required to perform infrequent skillsets and an overall better preparedness to provide competent, safe, and evidence-based patient care.

This project was implemented in a health authority in British Columbia, Canada. It involved engagement with frontline emergency nursing stakeholders to conduct a priority assessment for video topic selection. A video was then developed using manufacturer and health care organization evidence-based resources with evaluation integrated from subject matter experts (SME). A video-linked QR code was generated for conceptualization purposes only as the scope of the project did not involve posting them at point-of-care on equipment. Finally,

frontline emergency nurse stakeholders were engaged to review the video and provide feedback via a post-survey process on the video content, QR code strategy, perceived capacity to enhance self-efficacy, and likelihood of engagement with this strategy in the future.

SECTION 2: REVIEW OF RELEVANT LITERATURE AND NURSING EVIDENCE

In compiling literature to support this clinical project, varied search strategies were required to demonstrate the problem and support finding a solution to address the issue of high competency, low-volume skills in rural emergency and critical care nursing. Different databases were accessed depending on search terms and the possibility for non-nursing content to inform the evidence. Literature from the last 15 years was included in the search protocols to avoid excluding any older foundational work that might inform the current state; however, priority consideration was awarded to articles less than five years old. Results were narrowed to scholarly (peer reviewed with references) reports available in the English language. Some informal grey literature was also included due to high applicability and credibility of the content. Articles were limited to those with origins from developed countries with similar nursing professional standards including Canada, United States, Australia, and Great Britain.

When considering applicability to rural nursing practice, the skill training within any included literature did not need to be critical care or emergency focused (as this was difficult to find), but did need to demonstrate similar challenges for competency maintenance.

Applicable literature and research involving non-nursing health care providers was also considered if transferability to nursing practice seemed probable. Overall exclusion was determined by relevancy to inform the problem statement and applicability to nursing practice in rural acute care in developed countries.

Search Methods

Competencies and Rural Nursing

To gain a better understanding of the challenges rural nurses face in maintaining high-competency, low-volume skillsets in rural nursing, the CINAHL, ProQuest Nursing & Allied Health Source, Cochrane Database of Systematic Reviews, and Google Scholar were searched for

the following terms: “High risk or high competency” AND “skills or competence or knowledge AND low volume or infrequent*”; High risk competencies; Rural nursing education AND “competence OR competency OR competencies OR skills OR knowledge”. From these search criteria, 61 articles were initially retrieved based on a scan of the titles and abstracts for potential relevance to the practice problem. Other literature was obtained by searching reference lists or through colleagues’ recommendations. Once the final review of literature was completed, 10 articles remained to inform the nature of the problem specific to competencies and rural nursing.

Changing Nursing Workforce and Healthcare

Next, in an effort to better understand how the evolving composition dynamic of nursing as a workforce impacts the problem, specifically the trend towards overall decreasing age and experience levels in nursing, a specific search was conducted to learn more about how this might impact rural nursing competency maintenance.

CINAHL, ProQuest, and Google Scholar search engines were employed to explore the literature using the following terms: Nursing workforce AND “novice OR newly graduated OR junior OR new”; Experience Complexity Gap; “New graduate nurses OR new nurse OR novice nurse OR beginner nurse” AND workforce AND gap. An additional 20 articles were accumulated through this process for review. A total of six resources met final inclusion criteria to inform this project specific to the changing workforce and healthcare.

Learning and Technology

To better understand nursing preferences for learning and technology use, a search strategy was used to assess both overall and potential generational preferences for learning, and methods of refreshing knowledge prior to completing a new or infrequent skill. With a further narrowed search criteria limited to articles no older than five years, the databases of CINHAL and Education Research Complete were employed using terms: “Nurse OR Nurses OR Nursing”

AND “skills OR competence OR knowledge” AND “social media OR Facebook OR twitter OR Instagram OR snapchat OR Tumblr OR social networking OR TikTok OR YouTube”; “skills or competence or knowledge” AND “QR code OR quick response code”. The searches relating to nursing competencies and social media produced 62 results initially, but only five informed the evidence for this project. The QR code specific search produced 40 results initially and eight were applicable to the project to help inform how the problem is impacted by learning and technology.

Current Strategies

Literature reflecting current strategies to address the problem of high-competency, low-volume skillsets in rural emergency and critical care nursing needed to be collected next. This helped to clarify which education methods and resources were currently being employed for competency maintenance, give insight into the current state, and inform a solution to the problem.

CINAHL, ProQuest Nursing & Allied Health Source, Cochrane Database of Systematic Reviews, and Google Scholar were searched for the following terms: “maintaining competence*” AND “Nursing OR nurses OR nurse”; “Just in time” AND “competency OR competencies OR skills” AND “Nursing OR nurse OR nursing care OR nursing practice”. From these search criteria, 69 articles were initially retrieved based on a scan of the titles and abstracts for potential relevance to the practice problem. Of particular interest were studies and articles discussing educational strategies or models targeting rural nurses as well as high risk, low volume skills or competencies. Any strategies not specifically targeting rural nurses or requiring resource intensive measures, such as an educator, were excluded due to lack of feasibility in the context of this project.

A second more in-depth scan of the literature was then completed, further excluding studies that pertained solely to a group or clinical context of little or no relevance to nurses working in rural emergency departments. Most studies involving resource intensive measures to address competencies were also excluded as they did not fit within the scope of the practice problem, however several were retained for their potential contribution to the body of evidence. Several studies were also excluded due to their age (published more than five years ago) and lack of high validity and/or foundational contribution to the practice problem. Additional literature was obtained from reference lists and word of mouth. In the end, 17 articles remained for inclusion. During the literature review, a number of themes emerged regarding strategies to address competency maintenance needs including simulation, checklists, just-in-time (JIT) style methods, technology (web-based learning and virtual reality), and nurse-led initiatives.

Nature of the Problem

Competencies and Rural Nursing

Nurses working in rural emergency and critical care settings in developed countries have significant challenges in maintaining high-competency, low-volume skillsets. For the purposes of this project and literature review, high-risk competencies are defined as those requiring advanced knowledge and skills including, but not limited to, interventions such as ventilation, pacing, pediatric resuscitation, and hemodynamic monitoring. This literature review is an important first step in understanding and hopefully addressing the difficulties that rural nurses face relating to their competencies when caring for critically ill patients.

One of the key trends to surface in the literature is that in rural emergency nursing there are many infrequent procedures and skills requiring high levels of competency to perform safely. In addition, rural nurses have a more extensive range of nursing competencies required to work in rural acute settings compared to tertiary centres (Burrow et al., 2019; Goodridge & Marciniuk,

2016; Hendrickx & Winters, 2017; Lawford & Giles, 2012). This high volume and broad expectation for scope of practice, coupled with infrequency and lack of exposure to critical care skills are argued to be the biggest factors contributing to challenges in competency maintenance (Saqe-Rockoff et al., 2019).

Another compounding factor contributing to the challenging nature of the work is that, in addition to the low-volume nature of these competencies, they are often required in urgent situations and can be crucial to the survival of the patient (Banner & Zimmer, 2017; Hendrickx & Winters, 2017; Lawford & Giles, 2012; MacKinnon, 2012). This urgency further compounds the high-risk nature of the circumstances when critically ill patients present for care and require time-sensitive interventions. Resources such as traditional policy, procedure, and guidelines, housed either in a binder or online, are a reasonable solution for skills that are low-urgency where there is ample time for the nurse to seek out and process the detailed and often lengthy information contained within the documents. In an emergency situation however, the format of the detailed policy and procedure documents are incongruent to the needs of the rural nurse needing a quick, efficient, and immediate resource to support their work.

Lack of access to resources and experienced mentors also contributes to the competency deficit. Rural emergency centres in developed countries such as Canada and the US do not receive the same funding for educator positions as larger regional and tertiary acute care sites and thus have inequitable access to resources supporting their competency development and maintenance (Hendrickx & Winters, 2017; Pavloff et al., 2017). Rural healthcare is also chronically understaffed compared to urban settings, with nurse to population ratio significantly less than in more populated areas (Banner & Zimmer, 2017; Burrows et al., 2019, MacKinnon, 2012; MacLeod, et al., 2016; Wilson et al., 2020). These factors combined make it very difficult for rural nurses to access the resources required to successfully maintain those crucial

competencies. More equitable funding structures between rural, regional, and tertiary healthcare settings may help ameliorate these challenges, but are not the only factors contributing to competency difficulties, and would need to be part of a larger strategic plan to better support rural care in developed countries.

Evidence strongly demonstrates that many rural emergency nurses are underprepared to meet the needs of their patients when faced with infrequent high-competency skillsets (MacLeod et al., 2017; Burrows et al., 2019). This ultimately leads to patients being at an increased risk for health disparities due to these inequities. (Dywili et al., 2012; Hendrickx & Winters, 2017; Pavloff et al., 2017; Raphael et al., 2020). Competency maintenance for rural nurses is a challenging issue with numerous contributing factors, and it is unlikely one singular strategy will address the full scope of this complex problem.

Changing Nursing Workforce and Healthcare

In defining the problem, it was important to demonstrate the evolving dynamic and composition of nursing as a workforce, specifically the trend towards overall decreasing age and experience levels. North America's nursing workforce is becoming increasingly novice with lack of senior nurses to mentor them (Virkstis, 2021; Advisory Board, 2019; Hendrickx & Winters, 2017; Pavloff et al., 2017; Virkstis et al., 2019). Concurrently, patient care is increasingly complex, requiring an ever-evolving expansion in the scope of knowledge for nurses due to factors such as aging population and advancements in health care technology (Virkstis, 2021; Advisory Board, 2019; Schlairet, 2017; Virkstis et al., 2019). Experience-Complexity Gap is a term describing the trend where the current nursing workforce is becoming increasingly inexperienced while the overall care demands of the healthcare system are escalating in complexity (Virkstis, 2021). This phenomenon is becoming more widely recognized, with recommended mitigation strategies including improved orientation and education for newly

graduated nurses, differentiation of ‘novice’ versus ‘experienced’ nurses within staffing models and redistribution of experienced nurses into mentorship roles (Virkstis, 2021; Advisory Board, 2019; Virkstis et al., 2019). These strategies will likely be difficult to enact in rural nursing care areas because the funding, staffing levels, and access to educators and mentorship are already thinly distributed.

The increasingly novice nursing workforce is a concerning trend that will likely take years to ameliorate, even with the recommended mitigation strategies. Rural nurses are already at a disadvantage in accessing supports from resources such as experienced mentors and educators. The current shift towards a more novice nursing workforce is likely to further challenge the capacity for rural nurses to maintain competencies which, coupled with an upward trend in complexity of healthcare and an aging population, adds a challenge for even experienced nurses to navigate. Without innovative strategies to address nursing competency maintenance, specifically in rural ED settings, the risk to nurses and patients could be significant.

Learning and Technology

There has been a huge shift over the last 20 years in terms of how education and learning are offered in nursing to help with competency development and maintenance. Where historically only in-person classes or education were available, now there are multimodal strategies available to reach frontline nurses in ways that may be better suited to generational and individual preferences.

When reviewing the literature, a comparison of in-person offerings of nursing education and support to novel social media approaches found that in some circumstances social media was better due to factors such as increased flexibility and user-driven access to the resources (Casler, 2020; Hernandez et al., 2019; Kazemi et al., 2022). Social media and applications on personal electronic devices (cellphones) are already well used by nurses to advance and supplement their

clinical and professional knowledge (de Jong et al., 2020; Gause et al., 2022; Moorley, & Chinn, 2019; Planitz et al., 2013; Robalino, 2021) and are even preferred by younger generational groups over other learning methods (Hirsch et al., 2020; Gause et al., 2022; Planitz et al., 2013; Robalino, 2021). Considering the trend towards a younger nursing workforce, strategies appealing to the younger generations may be highly beneficial in addressing the challenges with knowledge translation and competency maintenance found in rural practice.

QR codes are a newer technology already proven beneficial in clinical education and competency maintenance to improve nurses' knowledge and competence (Hirsch, Bueno, & Tenure, 2020; Park, Lee, & Yun, 2019; Robalino, 2021) as well as in educating nursing students and other health professionals (Kenny et al., 2020; Marcus et al., 2021). Similar to social media and applications, QR codes are easily accessible via personal cell phones and may be an appealing option for many younger nurses practicing in rural areas.

Current Strategies

There are a number of existing strategies employed in developed countries to address competency maintenance in nursing, but many of those strategies are not tailored or specific to the unique needs and circumstances of the rural nurse. Simulation and "just-in-time" (JIT) approaches were shown to have the most potential for helping with competencies in the rural setting.

Simulation is a popular educational strategy with frontline nurses when used as an educational intervention. (Campbell, 2020; Herbers, 2016; Jutsum, 2010; Lee Farra et al., 2015; Risse et al., 2016; Saqe-Rockoff et al., 2019). Feelings of improved comfort with skills and increased confidence are typically reported by the nurses after participating in simulation, particularly when the initiatives were "grassroots" or nurse-led (Campbell, 2020; Herbers, 2016;

Saqe-Rockoff et al., 2019). Studies looking at simulation failed to demonstrate any sustained competency resulting from the intervention.

Just-in-Time (JIT) strategies for competency maintenance were shown to be the most helpful in improving health care worker confidence in high-risk situations, particularly in resource scarce environments (Helman et al., 2016; Pavloff et al., 2017). JIT methods identified in the literature review showed the strongest evidence for improving competency though resource utilization such as checklists and multimedia, providing an opportunity for a quick review prior to performing the skill. The studies demonstrated that JIT strategies allowed nurses to boost and refresh baseline knowledge prior to or during a patient intervention, reducing the need to rely on memory (Helman et al., 2016; Hirsch et al., 2020; Pavloff et al., 2017).

QR Code videos as a JIT strategy to address competency for high-risk procedures have already been employed in several tertiary centres in the US, with demonstrated increased confidence and performance by nurses in critical situations (Hirsch et al., 2020; Robalino, 2021). As a strategy this holds a lot of promise, particularly when considering the increasingly novice nursing workforce and generational preferences for using technology.

JIT methods demonstrated the strongest evidence in the literature as a strategy that requires minimal resources and is effective in boosting nursing self-efficacy, confidence, and performance. There are numerous ways in which JIT strategies can be implemented at the bedside in resource-poor settings; QR codes are one method that shows potential to impact the problem of low-volume skillsets.

Possible Gaps in Literature

One of the biggest limitations identified in the literature review is the lack of high-quality research specific to rural emergency nurse competency maintenance. Several high-level, evidence-based studies discuss promising competency maintenance strategies, including a

systematic review (Merriel et al., 2019), a randomized control trial (Branzetti et al., 2017), and a quasi-experimental quantitative study (Stephenson et al., 2015). Unfortunately, these studies were all conducted in acute tertiary-level facilities in Canada and the US, with advance practice nurses and physicians as the participants. Although the intervention methods in these studies have applicability to rural nursing, as they demonstrate low-resource strategies, it is difficult to know if that generalization is accurate without rural-nurse-specific trials. The lack of high-quality research for rural nurse competency maintenance may also be related to the identified overarching issue of limited resource allocation for rural areas.

Another identified gap is that none of the studies discussed competency as it relates to patient outcomes. This is a huge missing piece, as nursing competency is ultimately reflected in patient outcomes. An argument can be made that a strong research study on this topic would need to attempt to corroborate interventions with patient outcome statistics in some fashion.

There is also a gap in the literature pertaining to contrasting the generational preferences of experienced versus newer nurses for using cell phones to access information in clinical practice. Several studies discuss technology and cell phone use at the patient bedside, but studies discussing a generational breakdown of the issue were lacking.

Literature discussing nursing uptake of traditional organizational document-based policy, procedure, and guideline resources versus a trend towards ‘using the Google’ and searching the internet online, outside of the organizational intra-net, with a smartphone or computer was also lacking. Anecdotal observations reported by several educators consulted within the project health authority in BC indicate that nurses there are trending away from trying to interpret lengthy, traditional clinical decision support tools (documents that are often many pages in length) to find answers to clinical practice questions. Instead, they are opting to use internet search engines to find quick answers in the form of videos or other media. The biggest concern with this practice is

validity of content, but given the time constraints, understaffing, lack of mentorship, and escalating complexity of nursing care, it is understandable that nurses are tempted by the ease of this method of seeking information, despite the questionable sources.

Addressing gaps in competencies for nurses working in rural emergencies is a crucial issue, essential to meeting the needs of their patients. Competency maintenance for those infrequent, but critical and often emergent procedures and skills is difficult to maintain, particularly within the resource-limited reality of the rural emergency. Dynamic and creative solutions are required to address these needs. Just-in-time educational strategies hold promise as cost-effective, realistic, and achievable in resource-poor settings.

SECTION 3: PROJECT DESCRIPTION

Maintaining skills to perform high-competency, low-volume skillsets can be difficult for nurses working in rural critical care and emergency departments in developed countries. These high-competency skills are often needed in time-sensitive situations and stress levels can be high for the nurse due to the complexity and/or risk associated with the skill. A proposed solution to this practice problem involves applying a ‘just-in-time' (JIT) strategy where brief, concise, and targeted informational videos are offered via quick response (QR) codes placed at point-of-care, on or near the associated equipment in the rural emergency department (ED). The purpose of the project is to evaluate the effectiveness of this JIT solution to help increase rural emergency nurse confidence (self-efficacy) in performing skills that they rarely use, by providing them with an easy way to refresh their knowledge efficiently and immediately prior to performing a skillset. The anticipated outcomes of this project are that the frontline emergency nurses will report increased self-efficacy after reviewing the JIT resource and be better equipped to provide safe patient care when they perform an infrequent skill. Video-linked QR codes were generated for conceptualization purposes only during the project as the scope did not include point-of-care implementation.

Theory

Theory is essential to any endeavoured project in nursing as it provides a framework for understanding the complexities of healthcare, including concepts which guide nursing practice, and can be helpful when evaluating intervention effectiveness (Alligood, 2018; McEwen & Wills, 2019). Social Cognitive Theory (SCT) is particularly helpful in addressing the problem of high-competency, low-volume skillsets in nursing as it recognizes the role of cognitive processes, environmental factors, and personal factors in influencing and developing behaviour (Bandura, 1986). According to SCT, behaviour is learned through observation and imitation of others

(Bandura, 2001) and observational learning can be used to develop and maintain competencies by providing learners with clear demonstrations of effective nursing behaviours and skills (McCutcheon & Pincombe, 2001). Social Cognitive Theory also proposes the concept of self-efficacy, which refers to an individual's belief in their ability to successfully perform a specific behaviour or skill (Bandura, 1997).

As discussed in the literature review, JIT learning has been shown to be effective for improving nursing competencies, providing learners with on-demand access to information and resources when they need it. Social cognitive theory can be applied to JIT learning strategies by emphasizing the importance of self-efficacy and improving learners' confidence in their abilities through ready access to information and resources (Bandura, 1997). When learners have access to JIT learning resources and can successfully apply that knowledge to solve a problem or complete a task, it can increase their self-efficacy and confidence in their abilities (McCutcheon & Pincombe, 2001).

Social Cognitive Theory was also helpful in guiding the work of this project as it emphasizes the role of modeling in learning (McCutcheon & Pincombe, 2001; Bandura, 1997). Employed as a JIT strategy through video, modeling can demonstrate how to apply knowledge and skills in practice by providing a clear example of how to perform a specific task or behaviour (Shin & Kim, 2019). Applied in this way, modeling can help learners increase their self-efficacy in performing high-competency, low-volume skillsets.

Ethics

To help screen for any ethical considerations relating to the project an "A pRoject Ethics Community Consensus Initiative" (ARECCI) screen (Alberta Innovates, 2017) was completed using the online tool (See Appendix A: ARECCI Screening). The purpose of the screen was to identify the level of ethical risk associated with the project and give guidance on when ethical

safeguards and risk management strategies may be required (Alberta Innovates, 2017). The ARECCI screen for this project returned at score of 10 due to the project lead being novice at navigating projects as a student. This score indicates a somewhat more than minimal risk and necessitates a second-opinion reviewer which is satisfied with the involvement of an instructor with experience in project ethics.

One of the considerations in the ethics screening for this quality-improvement project was a power dynamic between the participants and the project lead. Although not in a formal position of power (i.e., supervisor) over the intended participant audience (thus not scoring for ethical concern) the project lead is both an educator and an experienced Registered Nurse (RN) within the health authority where the project was to be completed. As such, mindful to minimize any potential perceived risk due to the project lead's position and knowledge, the surveys were sent to ED nurses via an online survey tool where the responses could be collected anonymously.

Scope of Project

The target audience for this project were ED nurses employed within a health authority (HA) in British Columbia, Canada. Emergency nurses inherently have a broad range of knowledge and skill requirements as part of their work, including critical care competencies. To keep the feedback gathered within this project as relevant to rural nursing practice as possible, critical care nurses were not included in the target audience as the vast majority practicing in the HA work in large tertiary centres. Stakeholders in this project include the target audience of frontline emergency nurses, nursing leadership, educators, and SME from the HA Critical Care and Emergency Service Networks.

Project Development and Implementation Process Plan

This project involved the development and evaluation of a just-in-time (JIT) strategy using brief videos that could be accessed through QR codes to help improve rural critical care

and emergency nurse self-efficacy and competency. An evaluation methodology was developed to help outline the plan for project development, and eight steps were identified for inclusion within the scope of the project (see Appendix B: Evaluative Methodology for QR Code Video Project). The methodology was developed using the Plan-Do-Study-Act (PDSA) model which is a quality improvement tool commonly used in healthcare. The PDSA cycle is an organized sequence of actions aimed at gathering important learnings and information for the continual improvement of a process, service, or product (Taylor et al., 2014). The PDSA cycle was applied to the evaluation methodology as follows:

1. Plan: Goal identification, formulating a theory, defining metrics for success, and actioning a plan. This aligned with the development of the evaluation methodology for the project.
2. Do: Implementing the plan. This included sending out a frontline nurse survey for topic prioritization, building the deliverable video, sending out a survey for SME feedback, video revisions based on that feedback, and a frontline nurse post survey.
3. Study: Outcomes are evaluated to test the validity of the plan and assess for problems and areas for improvement. This aspect aligned with the subject matter expert consultation phase of the project as well as the frontline nurse post-survey evaluative process to assess the overall perceived utility/effectiveness of the strategy.
4. Act: Reflection and evaluation. Insights gained through the topic prioritization survey and SME feedback on video content were used to adjust methods and goals within the project and considered for future implementation at point-of-care (beyond the scope of this project).

The PDSA cycle helped to inform a systematic and continuous improvement approach, focusing on stakeholder engagement, topic prioritization, video content development, subject

matter expert consultation, and an evaluation process with the intent of maximizing the effectiveness of the strategy and assessing value and efficacy of the intervention.

Stakeholder Engagement and Priority Assessment Survey

In this first phase of the project (Step 1 of the evaluative methodology) a request was made to the director of the HA Emergency Services Network (ESN) for involvement in the project. The director's involvement was to help vet survey and video content for ethical conflicts, validate accuracy of content, and to assist with stakeholder recruitment through distribution of surveys to frontline emergency nurses via email. Stakeholder involvement in this project was informed by Stakeholder Theory which proposes that any group or individual who can affect or is affected by the achievement of a project's objectives is a stakeholder, and that success of an initiative comes from integrating the interests and needs of stakeholders (Parmar et al., 2010). Stakeholder involvement helped to ensure that the project met individual and organizational needs, increasing likelihood of successful outcomes.

To fully integrate stakeholder feedback, a priority assessment survey was required to help determine the video topic for the project. Topic prioritization for the video content, guided by stakeholder consensus, provided the benefit of a sense of shared ownership amongst the stakeholders and agreement that the content created would be germane to their clinical practice needs. To capture this input, a priority assessment survey question was developed requesting stakeholders to rank in order of priority (#1 ranking as highest priority) a list of six common high-competency, low-volume skills required in rural EDs (Appendix C: Priority Assessment Survey). The highest voted "video idea" would then inform the video creation for the project. The University of Lethbridge Qualtrics online survey engine/tool was used to build and distribute the survey. It was an obvious choice as a survey tool for the project as it already has affiliation with

the University of Lethbridge, is a trusted online platform, and allows for anonymous collection of survey data from participants.

Next (Step 2 of the evaluative methodology), an email containing the link to the survey was developed, explaining the scope of the project, and inviting voluntary participation from frontline emergency nurses within the HA (see Appendix D: Priority Assessment Survey Email). The director of the ESN was then sent the survey email to review and distribute to frontline emergency nurses in the HA.

The priority assessment survey was distributed via the health authority ESN to all the ED education leads to share among frontline ED nurses. The exact number of frontline ED nurses reached via email is unknown. The respondents were given a period of 10 days to complete the survey, and 33 front line emergency nurses responded within that timeframe. The top choices (ranked as highest priority) for the video topics resulted in a three-way tie of seven votes for "7-Point Restraint Using Pinels", "Setting up Transvenous Pacer", and "Setting up Large Volume Chest Drainage System". Other options for topics included "Setting up Transcutaneous Pacing", "Setting up Ranger Warmer", "Setting up Hemodynamic Monitoring Line" and "Other Ideas" (see Appendix E: Priority Assessment Survey Results).

Because there was a three-way tie, the second highest priority position was employed to discern the overall highest vote among the top three identified topic choices. "Large volume chest drainage system" obtained the highest second choice ranking overall with nine votes. This resulted in a factored 16 total votes as either first or second choice of respondents. Overall, "Large Volume Chest Drainage System" accumulated the highest priority placement in the survey when the top two priorities were considered.

Building Draft Deliverable Video

Step 3 of the project methodology involved developing a brief, concise, and evidence-based video on the setup of a chest drainage system. The video was developed using manufacturer resources and HA specific clinical decision support tools to guide video content and ensure accuracy. A video-based strategy was chosen as the JIT method to address the problem of high-competency, low-volume skillsets in rural nursing because the application of multimodal approaches to learning and knowledge review, such as visual aids, has been proven to enhance the comprehension and retention of information (Jang & Kim, 2012). This is particularly relevant within the healthcare environment, where demonstration of procedures and techniques is often necessary.

The video content was limited specifically to the initial setup process for the Pleur-Evac® Dry Drainage System, which is the product used within the HA. Expired products were obtained with permission from a local health care facility and used along with a simulation space for demonstration of skills in the video.

The length of video was intentionally limited to two minutes to maximize engagement of the learner in the skill tutorial. This time-limited video strategy is rooted in evidence-based approaches to media delivery that acknowledges lengthy videos can overwhelm the cognitive load of viewers and reduce the effectiveness of learning (Brame, 2016). Focusing on 'bite-sized' delivery of knowledge specific to a skill, procedure, or process that can be relayed quickly may be especially helpful in busy, chaotic emergency situations that often accompany the requirement for nurses to perform high-competency skillsets.

The media was recorded on a high-quality cellphone camera and edited on a video editing software program called Camtasia®. A personal/private clinical knowledge-focused channel on the YouTube® social media site was chosen as the platform to house the sharable version of the video for several reasons. YouTube is already endorsed and used within the HA, so would not

create a conflict or ethical concern in that regard. There are also privacy safeguards which allowed the video to be posted as 'unlisted' within the platform, making it only visible/accessible to those provided with the link. Once the video was filmed and edited, it was uploaded to the YouTube® channel and a free online QR code generator (Howtostartanllc.com, n.d.) was used to translate the online links from the videos on YouTube® to a scannable resource. As the scope of the project does not include posting the video-linked QR code on equipment in care areas, it was only generated for conceptualization purposes.

Subject Matter Expert Content Review and Video Revisions

In Steps 4, 5, and 6 of the evaluative methodology, the project design incorporates feedback from SMEs to enhance the accuracy and reliability of the video content. Six SMEs in chest drainage practices were initially recruited from within the HA to review the draft video and provide feedback. Four responded within the allotted time frame of five days. The SME survey consisted of 12 questions addressing alignment of content with HA and manufacturer guidelines, clarity of steps, video format, self-efficacy, use of QR codes, and potential to increase competencies. The questions were a mix of binary (yes/no) format, paired with an opportunity for open ended responses (see Appendix F: Subject Matter Expert Content Review Survey Email).

Data analysis of the survey results used a simple quantitative analysis for the binary response questions, while a thematic analysis was used for open-ended questions. Their responses indicated unanimous agreement on the effectiveness and clarity of the video, as well as its potential to enhance self-efficacy and nursing competency (see Figure 1).

Several insights were provided on potential areas for improvement. In response to Question 1, addressing alignment of content with HA and manufacturer guidelines, one respondent highlighted a unit-specific practice for securement of the device, but also indicated

that there were not any formal recommendations to require that practice. Another respondent suggested adding in additional safety equipment information, specifically toothless Kelly clamps.

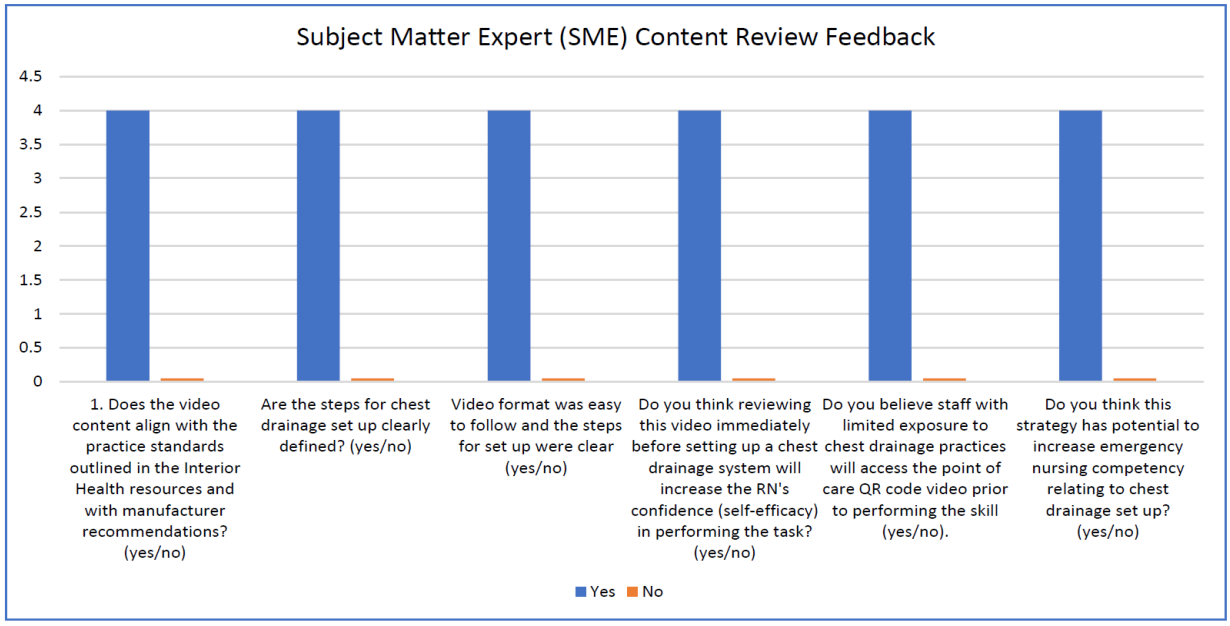

Figure 1: Subject Matter Expert (SME) Content Review Feedback (N=4)

Under Question 2, regarding clarity of steps, one respondent suggested that visual prompts could be used to highlight each step, while another proposed including the descriptors “aseptic technique” and "ordered" suction within the resource. There were no suggestions for improvement concerning video format or improved self-efficacy under Questions 3 or 4, but three of the respondents indicated that the RN would be better prepared in setting up the chest drainage unit after watching the video and two highlighted that the video was a practical, easy-to-follow, and a useful tool that could be paused and followed along for reference during actual setup of the chest drainage system. Under Question 5, where likelihood of QR code access was discussed, one responder identified a barrier for senior staff who are challenged in using technology. Finally, Question 6 probed if the video had potential to increase nursing competency related to chest drainage set up and there were no suggestions for improvement, however one SME responder suggested that the video could help prevent ‘skill fade’.

In summary, the SME respondents found the video guide beneficial in improving nursing competence and self-efficacy when caring for patients requiring chest drainage. The results indicated potential areas for improving the video, including adding in language highlighting need for “aseptic technique” and “ordered” suction, and adding reminders about safety equipment at the bedside, specifically toothless clamps.

The SME recommendations were integrated into the final video product which was then uploaded to YouTube® for distribution during the post survey process (see Appendix G: Pleur-Evac Video Transcript and Clinical Practice Bytes: Quick Review on How to Set Up a Pleur-Evac (Dry Suction) for Chest Drainage)

Post-Survey

Steps 7 and 8 of the evaluation methodology involved the development of the frontline staff post-survey questions. The process for vetting survey and email questions for ethical and content consideration as well as the distribution process and audience remained the same as with the priority assessment survey (see Appendix H: Post-Survey Email). The respondents were given a period of seven days to complete the survey and 21 frontline ED nurses responded within that timeframe. The survey consisted of nine questions addressing clarity of steps, video format, self-efficacy, use of QR codes, and interest in similar resources (See Appendix I: Post-Survey Questions). As with the SME survey, the survey questions were a mix of binary (yes/no) format paired with an opportunity for open ended responses. The post-survey questions were developed intentionally to partially mirror the SME questions and objectives so that they could be compared and contrasted. A simple quantitative analysis was conducted for binary response questions, while thematic analysis was used for open-ended questions.

Analysis of the yes/no questions revealed similar results from the SME survey where almost all respondents agreed that the video was clear, the format easy to use, that it held potential to enhance their self-efficacy in chest drainage set up, and that they would likely access the video via QR code if it was place on or near chest tube supplies (see Figure 2).

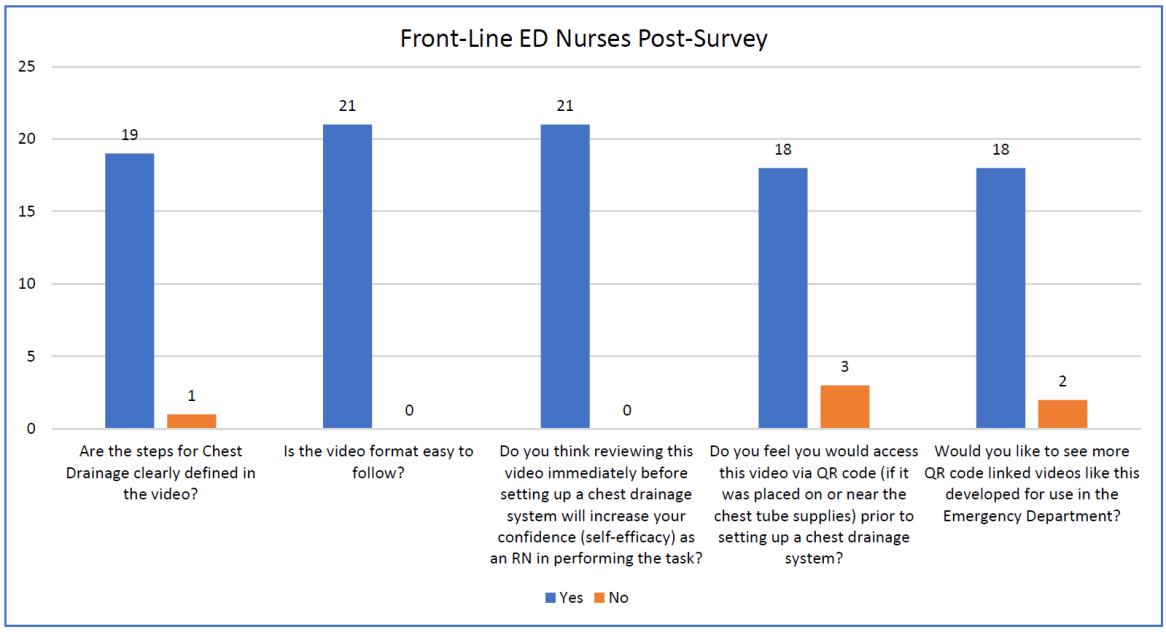

Figure 2: Post-Survey Results (N=21)

Of the 21 respondents, 19 (90.5%) believed that the steps for chest drainage were clearly defined in the video. One respondent did not answer, and one suggested a lack of clarity about adjusting suction levels. In terms of suggestions for increased clarity, two respondents proposed an increased emphasis on visible connection points and correct wrapping technique for taping connections, which was demonstrated in video, but not discussed in length due to time limitations. One respondent mentioned adding “clamping patient's chest tube prior to disconnection”, which was out of the scope of the video criteria for “chest drainage set-up”.

In terms of the video format, all respondents agreed that the video format was easy to follow, indicating the effectiveness of the current video design. One respondent positively highlighted the video's quick pace. All respondents also agreed that reviewing the video

immediately before setting up a chest drainage system would enhance their self-efficacy. This suggests the video JIT strategy serves as a helpful tool for increasing confidence among ED RNs. The quick, precise format, well-highlighted key points, and utility immediately prior to performing the skill were cited as benefits of the video. A few respondents suggested additional information such as dealing with air leaks, dressings, and more in-depth correct taping methods would be helpful, although outside the scope of the intended video content. Most of the respondents (86%) reported they would use a QR code to access the video tutorial. Of the 3 "no" respondents, two indicated that they felt the resource was valuable, but their reason for saying 'no' was related to their own sufficient experience and competence with the skill. The 3rd cited a preference for using a "PC". Respondents otherwise highlighted the efficiency, quick access, and convenience of QR codes, especially as an alternative to searching online. A significant majority of respondents (90.5%) expressed interest in seeing more QR code-linked videos for use in the ED.

Discussion

The results of the surveys indicate that the chest drainage video was considered clear, easy-to-follow, and effective at increasing self-efficacy for frontline ED nurses, with near identical results demonstrated between SME and frontline nurse surveys. SME and frontline nurse respondents also both indicated that the QR code video would likely be accessed by ED nurses, particularly those with inexperience or infrequent exposure to chest drainage set up. Overall, the project survey results indicate that the QR code linked video can serve as an effective educational tool to improve competence and skills in ED nurses for chest drainage practices. The integration of SME feedback, as well as the use of technology like QR codes, also provides a model for the development of similar educational resources in the future.

SECTION 4: REFLECTION

The process of reflection bridges the gap between theoretical understanding and practical application, underlining the association between cognition and action. It has been acknowledged as essential to nursing practice as it spurs the growth of individual beliefs and proficiencies (Tashiro et al., 2013). In the context of this project aimed at improving nursing practice, reflection offers an opportunity for critical thinking and deeper analysis of the development process, major lessons learned, and future implications for nursing practice and research.

Project Development Process

The concept for the project evolved slowly over the last few years as I explored existing methods to address high-competency, low-volume skillsets in rural emergency nursing. Through my nursing work as a Clinical Practice Educator over the last 15 years, I was acutely aware of the challenges facing rural nursing and the difficulties with existing strategies. I felt a novel approach might be warranted to address the problem.

I became increasingly interested in how social media platforms such as TikTok and YouTube were able to captivate audiences with incredibly short videos (30 seconds to three minutes) where the presenters would often effectively teach a basic skill or concept in that timeframe. I observed that these brief, 'bite-sized' videos were becoming increasingly popular, particularly with younger generations. I even noticed my own preferences trending towards consuming information in that way, and I wondered about applicability to the competency maintenance practice problem in rural emergency nursing. Evidence in the literature review supported video use as a JIT strategy, but using short videos alone didn't address the barriers to nurses accessing the information quickly and easily. Traditional methods of accessing the information, such as logging on to a computer and/or reading through a lengthy policy,

procedure, or guideline – although important for foundational knowledge – are time consuming and difficult for nurses to do in a time-sensitive situation where a quick refresher is needed.

The increasingly ubiquitous QR code application in many facets of society helped me to form the idea of applying it at point-of-care to address the issue of timely access to information. I did learn through the literature review process that QR codes were already being used to link guidelines and other resources in several tertiary centre emergencies, but not necessarily to quick social media-style videos. I felt this approach held a lot of potential to improve access to evidence-based information.

In terms of the project itself, as with most change, the development process was a non-linear venture with several changes of direction along the way. The PDSA cycle model was incredibly helpful in focusing the work as a continuous improvement process, rather than a rigidly structured set of steps. As such, changes in the plan were viewed as opportunities for bettering the project, rather than as setbacks.

When the project was initially proposed, the intent was for multiple videos to be developed and trialed in real time, at point-of-care in rural emergency departments. As the project development progressed, it became clear this approach was not only a huge undertaking, mired with potential for ethical complexities and logistical challenges, but it would also be difficult to gather feedback due to the very nature of the project targeting "low-volume" skillsets and procedures in rural EDs. This realization prompted a shift in focus for the goals and outcomes of the project to align more with evaluation of the video content and stakeholder perceptions of the effectiveness of the video and strategy as a concept, rather than real-time outcomes in patient care situations.

Another shift in the project development process happened while the project was being implemented, where a lack of clear evaluative methodology caused confusion over the process

for SME review of the video content. Initially SME feedback was intended to be part of the video build process, not involving a formal survey. It became clear through discussions with the project instructor that SME feedback would be better integrated and inform the data collection of the project if outlined as a separate step and process in the evaluation strategy. This ultimately resulted in capacity to compare and contrast the SME and frontline ED nurse post-survey results, further validating the project outcomes.

A final deviation from the original evaluation plan involved a simplification of what was originally termed the 'pre-survey'. The survey had contained questions asking participants to rate their comfort/self-efficacy on a zero to ten (0-10) scale in performing a number of specific high-competency, low-volume skillsets. Discussions with the project instructor raised concerns regarding vulnerability of responders and ethics of the line of questioning. In contemplating this potential ethical rub, a decision was made to simplify and shift the 'pre-survey' to only request topic prioritization from the respondents, which ultimately better aligned with the PDSA cycle strategy for the project.

Overall, the project process was successfully implemented and served to accomplish the intended goals and outcomes involving improved self-efficacy, competency, and capacity to provide safe patient care when rural ED nurses perform a high-risk, infrequent skill.

Lessons Learned

One of the learnings from the project survey data was that contrasting stakeholder perspectives can be powerful when assessing potential for success and demonstrating effectiveness of a strategy. In this project mirroring the survey questions for both SME and frontline ED nurses helped reveal an alignment of perspectives between the two groups and added validity to the goals and outcomes demonstrated.

In a leadership and educator role in my non-student life, I often make siloed decisions on how to best approach rolling out or implementing a new guideline or practice. I have many years of experience as an RN and Educator and follow a change model that typically helps me to successfully implement change, but there is always room for improvement. It is not always feasible to gain fulsome stakeholder feedback for initiatives, but larger and more complex change initiatives will likely benefit from the additional steps of stakeholder engagement to help ensure successful outcomes.

On a personal level, one of my primary lessons learned throughout this process is that it is very difficult to separate professional and student roles, particularly for a project that crosses the boundaries of both worlds. I had to be mindful with each step that I remained within my student boundaries, particularly with communication channels. The project process was a good exercise in stepping outside my comfort zone, leading the initiative from the lens of a student rather than an educator. I had to approach what I thought I knew from a different perspective and set of rules. It felt uncomfortable, but I understand that is a place from where strong personal growth can occur.

Implications for Nursing Practice/Future Research

When I have discussed this project work with nursing colleagues from different care environments including inpatient medical/surgical, perinatal, perioperative, pediatric, and critical care in rural, regional, and tertiary level centres and even community care, there has been unanimous consensus that this approach holds immense promise to help address high-competency, low-volume skillsets in all nursing care settings. Some of the challenges in non-rural settings may be different, but issues such as the Experience-Complexity gap, the changes in generational learning preferences, and lack of mentorship due to increasingly novice nursing

workforce impact all care areas in the healthcare systems of developed countries such as Canada and the US (Advisory Board, 2019).

One key future research initiative that could expand on the work of this project would be to see how the reported improved self-efficacy of the QR video translates into actual nursing practice in a simulation environment. This would evaluate how the QR code video strategy impacts skill performance and would be an important next step to further validate the effectiveness of the strategy to impact competence at a frontline point-of-care level.

Conclusion

In rural critical care and emergency nursing in developed countries there are many infrequent procedures and skills requiring high levels of competency to perform safely (Decker & Hine, 2015; Gibson & McDermott, 2014). A lack of resources including access to experienced nurse mentors and educators, coupled with the current trend towards an increasingly novice nursing workforce and aging population with escalating care complexity needs, further exacerbates the problem.

A JIT strategy employing a QR code-linked video to address the high-competency, low-volume skillset of chest drainage setup is an effective approach to support rural ED nursing practice. The approach provides crucial guidance to rural ED nurses in a convenient, easy-to-follow, and relevant format that enhances competence through improved self-efficacy. Feedback collected during the project was overall positive, but also provided useful insights to further improve the video resources and inform future projects and applications of this strategy.

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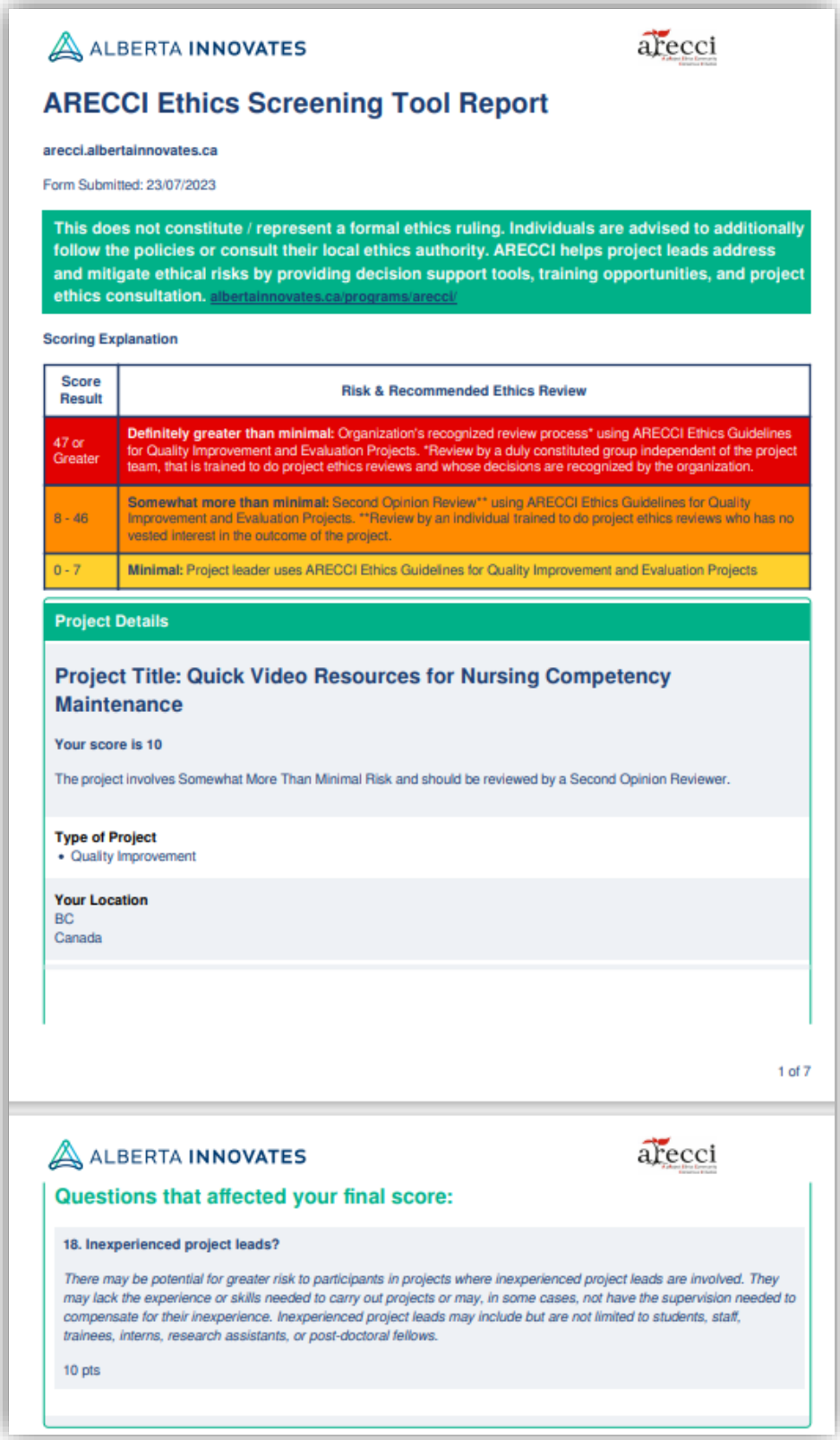
APPENDIX A: ARECCI ETHICS SCREENING



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ARECCI Ethics Screening Tool Report

arecci.albertainnovates.ca

Form Submitted: 23/07/2023

This does not constitute / represent a formal ethics ruling. Individuals are advised to additionally follow the policies or consult their local ethics authority. ARECCI helps project leads address and mitigate ethical risks by providing decision support tools, training opportunities, and project ethics consultation. albertainnovates.ca/programs/arecci/

Scoring Explanation

Score Result	Risk & Recommended Ethics Review
47 or Greater	**Definitely greater than minimal:** Organization's recognized review process* using ARECCI Ethics Guidelines for Quality Improvement and Evaluation Projects. *Review by a duly constituted group independent of the project team, that is trained to do project ethics reviews and whose decisions are recognized by the organization.
8 - 46	**Somewhat more than minimal:** Second Opinion Review** using ARECCI Ethics Guidelines for Quality Improvement and Evaluation Projects. **Review by an individual trained to do project ethics reviews who has no vested interest in the outcome of the project.
0 - 7	**Minimal:** Project leader uses ARECCI Ethics Guidelines for Quality Improvement and Evaluation Projects

Project Details

Project Title: Quick Video Resources for Nursing Competency Maintenance

Your score is 10

The project involves Somewhat More Than Minimal Risk and should be reviewed by a Second Opinion Reviewer.

Type of Project
- Quality Improvement

Your Location
BC
Canada

1 of 7

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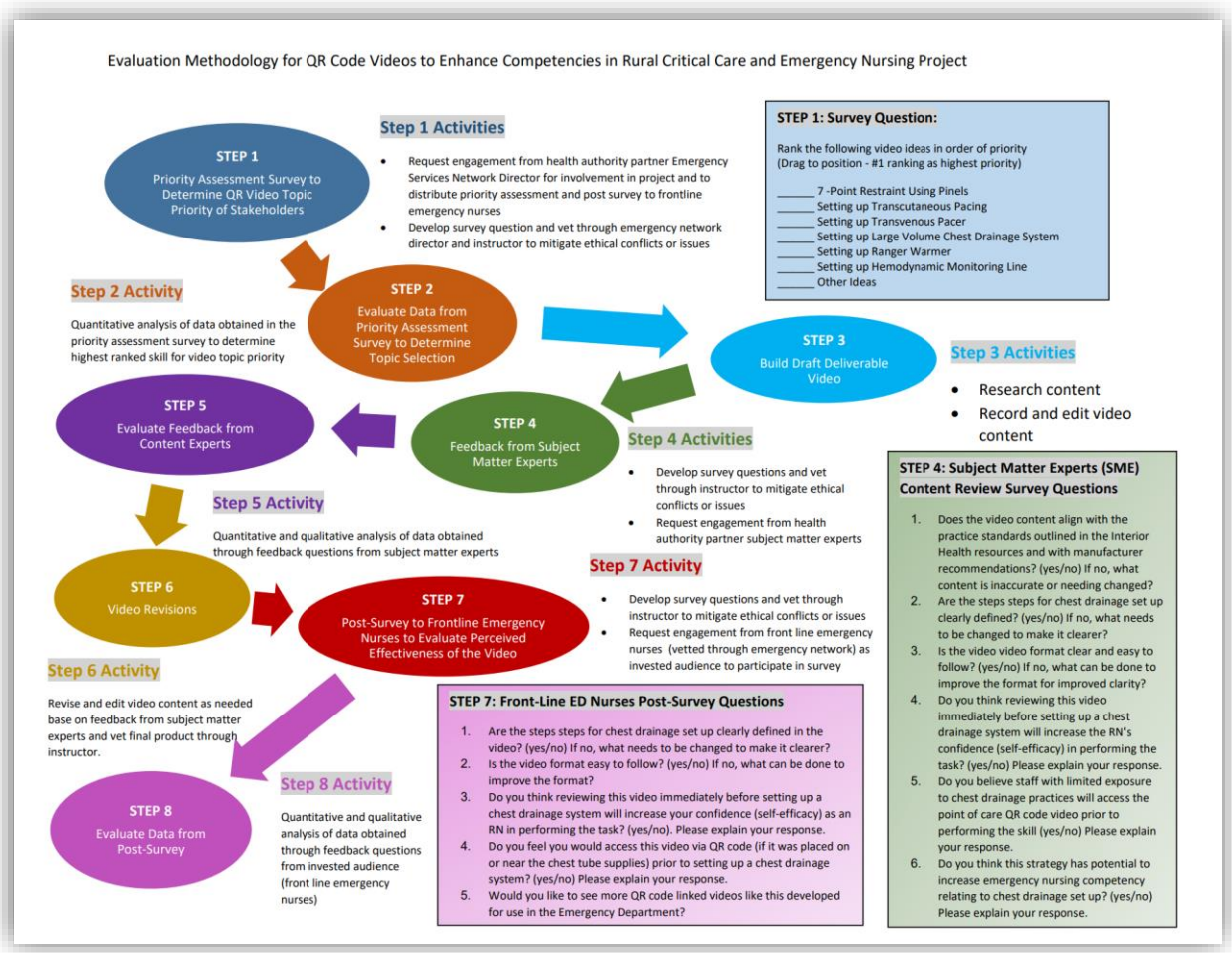
Questions that affected your final score:

18. Inexperienced project leads?

There may be potential for greater risk to participants in projects where inexperienced project leads are involved. They may lack the experience or skills needed to carry out projects or may, in some cases, not have the supervision needed to compensate for their inexperience. Inexperienced project leads may include but are not limited to students, staff, trainees, interns, research assistants, or post-doctoral fellows.

10 pts

APPENDIX B: EVALUATION METHODOLOGY FOR QR CODE VIDEO PROJECT



APPENDIX C: PRIORITY ASSESSMENT SURVEY

University of Lethbridge

Hello Emergency Nurses

My name is Renee DeCosse and I'm a Master of Nursing Student at the University of Lethbridge.

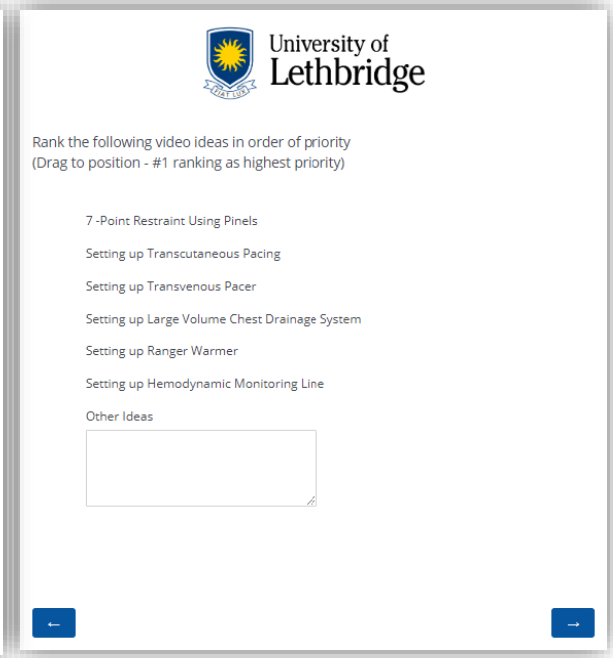
As part of my master's degree final project, I am developing a brief (less than 2 minute) QR code linked video to address a high-competency, low-volume (infrequent) emergency nursing skillset such as pacing, 7-point restraints, setting up chest drainage and hemodynamic monitoring. The idea for this project is to create a resource where you would be able to scan a QR code with your phone at point-of-care and access a short video to refresh your competencies immediately prior to performing the skill.

This is a completely voluntary and anonymous survey intended to help direct my topic selection based on your priorities. The data collected will be used only for that purpose.

Thank you for your time. This survey will take approximately 30 seconds to complete. If you do not wish to participate in this survey, simply exit the internet browser.

Renee DeCosse, RN, BScN, ENC(C)
Masters of Nursing Candidate, University of Lethbridge

→



University of Lethbridge

Rank the following video ideas in order of priority
(Drag to position - #1 ranking as highest priority)

7 -Point Restraint Using Pinels

Setting up Transcutaneous Pacing

Setting up Transvenous Pacer

Setting up Large Volume Chest Drainage System

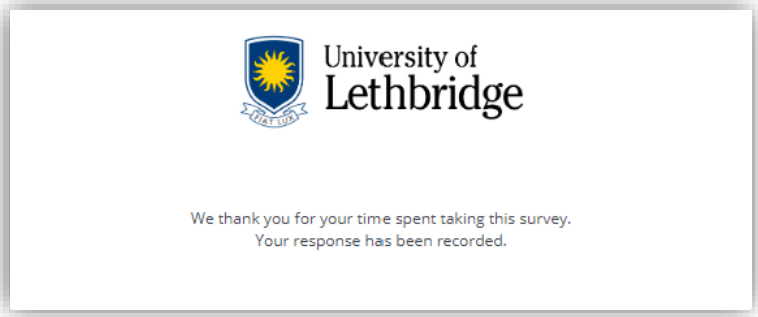
Setting up Ranger Warmer

Setting up Hemodynamic Monitoring Line

Other Ideas

←

→



University of Lethbridge

We thank you for your time spent taking this survey.
Your response has been recorded.

APPENDIX D: PRIORITY ASSESSMENT SURVEY EMAIL

Hello Emergency Nurses

My name is Renee DeCosse and I'm a Master of Nursing Student at the University of Lethbridge.

As part of my master's degree final project, I am developing a brief (less than 2 minute) QR code linked video to address a high-competency, low-volume (infrequent) emergency nursing skillset such as pacing, 7-point restraints, setting up chest drainage and hemodynamic monitoring.

The idea for this project is to create a resource where you would be able to scan a QR code with your phone at point-of-care and access a short video to refresh your competencies immediately prior to performing the skill.

This is a completely voluntary and anonymous survey intended to help direct my topic selection based on your priorities. The data collected will be used only for that purpose. **If you do not wish to participate, simply delete this email.**

If you would like to volunteer to participate in this **30 second survey**, please click on the box below **before June 10th, 2023 at 0800 MST.**

SURVEY – QR Code Video Topic Selection
What is your Priority?

SCAN ME

Once the QR Code linked video has been developed it will be shared out and you will have an opportunity to review and provide feedback via a second survey. This will also be voluntary and filling out this pre-survey does not oblige you to complete the second survey or participate further in any capacity.

Thank you in advance for your time and please feel free to reach out with any questions,

Renee DeCosse, RN, BScN, ENC(C)
Master of Nursing Candidate, University of Lethbridge
renee.decosse@uleth.ca

APPENDIX E: PRIORITY ASSESSMENT SURVEY RESULTS

Q2 - Rank the following video ideas in order of priority
(Drag to position - #1 ranking as highest priority)

Field	1	2	3	4	5	6	7	Total
7 -Point Restraint Using Pinels	7	4	5	6	4	7	0	33
Setting up Transcutaneous Pacing	4	7	6	3	10	3	0	33
Setting up Transvenous Pacer	7	6	5	5	5	5	0	33
Setting up Large Volume Chest Drainage System	7	9	4	8	3	2	0	33
Setting up Ranger Warmer	3	4	7	6	4	9	0	33
Setting up Hemodynamic Monitoring Line	5	3	6	5	7	7	0	33
Other Ideas	0	0	0	0	0	0	33	33

Note: N=33

APPENDIX F: SUBJECT MATTER EXPERT CONTENT REVIEW SURVEY EMAIL

My name is Renee DeCosse and I'm a Master of Nursing Student at the University of Lethbridge.
As part of my master's degree final project, I have developed a brief (less than 2 minute) QR code linked video to address the high-competency, low-volume (infrequent) emergency nursing skillset of Chest Drainage System Set Up (specifically Pleur-Evac).

The intention of this video is a quick refresher for staff who may not perform this skill often to improve understanding and enhance confidence (self-efficacy) in performing the skill. It is meant to be a quick resource, available to staff via QR code to scan with their phone at point of care (i.e. posted on chest tube insertion kits) immediately prior to performing the skill.

As subject matter experts (SME) in your respective fields of emergency, critical care and/or thoracic nursing, I would like to invite you to be content reviewers of this DRAFT video. The intent of the SME content review is to validate and improve the quality/presentation/flow of information of the video content, potential to improve point of care practice and perceived use by staff. The data collected will be used only for that purpose.
The review should take no more than 30 minutes to complete and can be sent back to me directly via email (do not reply all) **before June 30th, 2023 at 1200MST** if possible. If not possible, please email me to make alternate arrangements.

To complete the SME content review, consult the following resources:

Interior Health - Elsevier Clinical Skills: Chest Tube: Close Drainage Systems - CE
Interior Health - Elsevier Clinical Skills: Chest Tube: Closed Drainage System Management - CE
Interior Health - Chest Tube: Securing Connections Quick Reference
Pleur-Evac Instructions for Use

SME Content Review Questions:

1. Does the video content align with the practice standards outlined in the Interior Health resources and with manufacturer recommendations? (yes/no)
    a. If no, what content is inaccurate or needing changed?
2. Are the steps for chest drainage set up clearly defined? (yes/no)
    a. If no, what needs to be changed to make it clearer?
3. Is the video format clear and easy to follow (yes/no)
    a. If no, what can be done to improve the format for improved clarity?

a. Do you think reviewing this video immediately before setting up a chest drainage system will increase the RN's confidence (self-efficacy) in performing the task? (yes/no)
    a. Please explain your response.

6. Do you believe staff with limited exposure to chest drainage practices will access the point of care QR code video prior to performing the skill (yes/no).
    a. Please explain your response.

6. Do you think this strategy has potential to increase emergency nursing competency relating to chest drainage set up? (yes/no)
    a. Please explain your response.

Participation is voluntary and your email feedback submitted will not be anonymous. All SME review responses will be combined, and results will be presented as an aggregate thus no names or personal identifiers will be shared.

Do not share this video link or email. Clicking the link to access the video implies consent to participate in this Master of Nursing project as a SME reviewer. If you do not consent to participate, exit, and delete this email. Please respond to this email if you have any questions or concerns.

Link to video: Pleur-Evac Quick Setup

Thank you for your time and expertise.

Renee DeCosse
Master of Nursing Candidate
University of Lethbridge

APPENDIX G: PLEUR-EVAC VIDEO TRANSCRIPT

Title: How to Set Up a Pleur-Evac (Dry Suction) for Chest Drainage

Author: Renée DeCosse

Date: June 25, 2023

00:00:00

Hello and welcome to clinical practice bites. This is your quick review on how to set up a Pleur-Evac for chest drainage.

00:00:07

Now the first thing you're going to want to do is get that drainage unit out of all of that packaging. And once you do, you're going to find a water container on the top of it.

00:00:16

You're going to take that out, take the cap off and you're going to go ahead and find the suction port.

00:00:21

And that's where you're going to squirt the entire contents of the sterile water into the Pleur-Evac and it's going to fill up the water seal chamber up to the 2-centimeter line.

00:00:35

If you're using the floor stand, you can simply turn it to click it into place,

00:00:40

Or if you're intending on hanging it from the bed, there are hooks on the either side of the unit to be able to do that, but you do want to make sure that you locate it below the patient.

00:00:51

Next, using aseptic technique, you're going to want to make sure that the chest tube connection is as tight as possible.

00:0057

and then you're going to want to further secure that tube using waterproof tape.

00:01:04

Once that's all done, you can assess the patency of your chest tube and drainage system by observing tidling with each inspiration in the column above the water seal chamber.

00:01:12

And if your patient continues to have an air leak, you will notice intermittent bubbling in the water seal chamber.

00:01:19

If suction is ordered, simply attach your suction tubing to that same port where you added the sterile fluid

00:01:25

and then turn up the suction regulator on the wall until there is sufficient suction to have that indicator cube float in the window.

00:01:34

You can adjust the ordered suction level by just simply turning this dial on the front of the unit.

00:01:42

And a couple of final tips, make sure your tubing is up on the bed so you don't end up with dependent loops.

00:01:47

And always keep a pair of toothless clamps at the bedside as part of your safety equipment

[End]

APPENDIX H: POST-SURVEY EMAIL

Hello Emergency Room Nurses

My name is Renee DeCosse and I'm a Master of Nursing Student at the University of Lethbridge.

As part of my master's degree final project, I have developed a brief (less than 2 minute) QR code linked video to address the high-competency, low-volume (infrequent) emergency nursing skillset of **Chest Drainage System Set Up** (specifically Pleur-Evac).

The intention of this video is a quick refresher for staff, who may not perform this skill often, to improve understanding and enhance confidence (self-efficacy) in performing the skill. It is meant to be a quick resource, available to staff via QR code to scan with their phone at point of care (i.e. posted on chest tube insertion kits) immediately prior to performing the skill.

You are receiving this survey, as a font-line Emergency Nurse, to provide feedback on the quality, presentation & flow of information on the **Chest Drainage System Set Up** video and the perceived usefulness for this type of tool in the ED practice setting. Your feedback will be used to improve the quality of the video and to determine the utility of viewing the video before performing infrequent skills. The data collected will be used only for that purpose. This is a completely voluntary and anonymous survey. **If you do not wish to participate, please delete this email.**

If you would like to volunteer to participate in this **2 to 3 minute survey**, please click on the box below **before July 11th, 2023 @ 1200.**

****The video link is contained within the survey****

QR Code Video for Chest Drainage System Set Up
CLICK HERE FOR SURVEY

Thank you in advance for your time and please feel free to reach out with any questions,

Renee DeCosse, RN, BScN, ENC(C)
Master of Nursing Candidate, University of Lethbridge
Renee.decosse@uleth.ca

APPENDIX I: POST-SURVEY

Hello Emergency Room Nurses

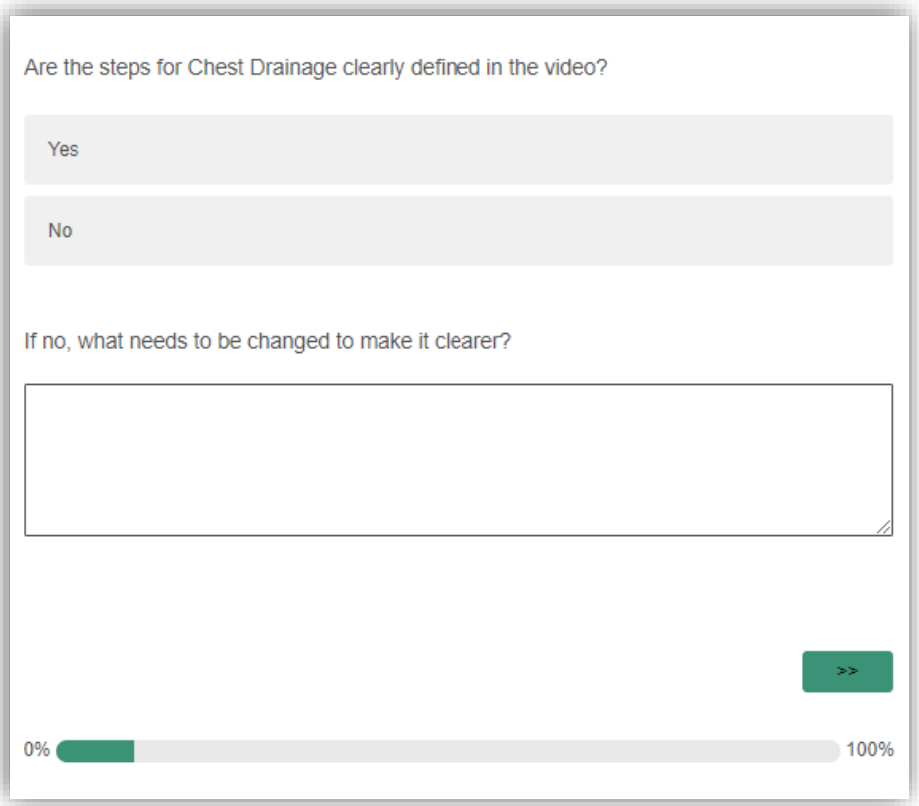
My name is Renee DeCosse and I'm a Master of Nursing Student at the University of Lethbridge.

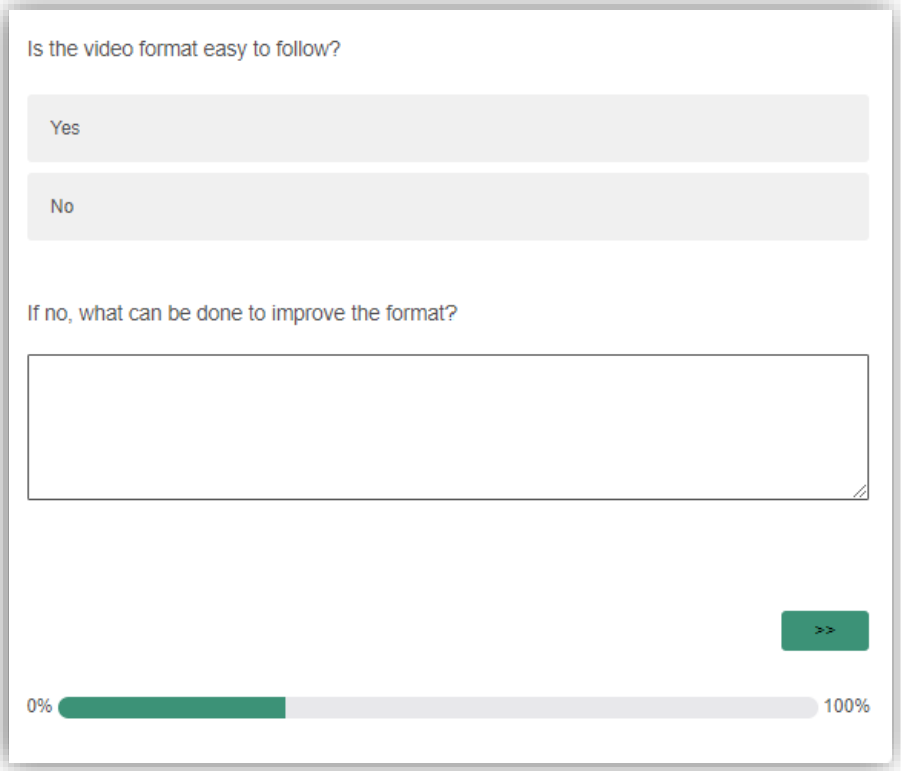
As part of my master's degree final project, I have developed a brief (less than 2 minute) QR code linked video to address the high-competency, low-volume (infrequent) emergency nursing skillset of **Chest Drainage System Set Up** (specifically Pleur-Evac).

The intention of this video is a quick refresher for staff, who may not perform this skill often, to improve understanding and enhance confidence (self-efficacy) in performing the skill. It is meant to be a quick resource, available to staff via QR code to scan with their phone at point of care (i.e. posted on chest tube insertion kits) immediately prior to performing the skill.

You are receiving this survey, as a font-line emergency nurse, to provide feedback on the quality, presentation & flow of information on the **Chest Drainage System Set Up** video and the perceived usefulness for this type of tool in the ED practice setting. Your feedback will be used to improve the quality of the video and to determine the utility of viewing the video before performing infrequent skills. The data collected will be used only for that purpose. This is a completely voluntary and anonymous survey.
If you do not wish to participate, simply close your internet browser.

To participate in this survey, **begin by scanning the QR code below with your phone to view the video** (or simply click on the image), then return to this survey to answer the questions


Are the steps for Chest Drainage clearly defined in the video?
Yes
No
If no, what needs to be changed to make it clearer?
>>
0%
100%


Is the video format easy to follow?
Yes
No
If no, what can be done to improve the format?
>>
0%
100%

Do you think reviewing this video immediately before setting up a chest drainage system will increase your confidence (self-efficacy) as an RN in performing the task?

Yes

No

Please explain your response

>>

0% 100%

Do you feel you would access this video via QR code (if it was placed on or near the chest tube supplies) prior to setting up a chest drainage system?

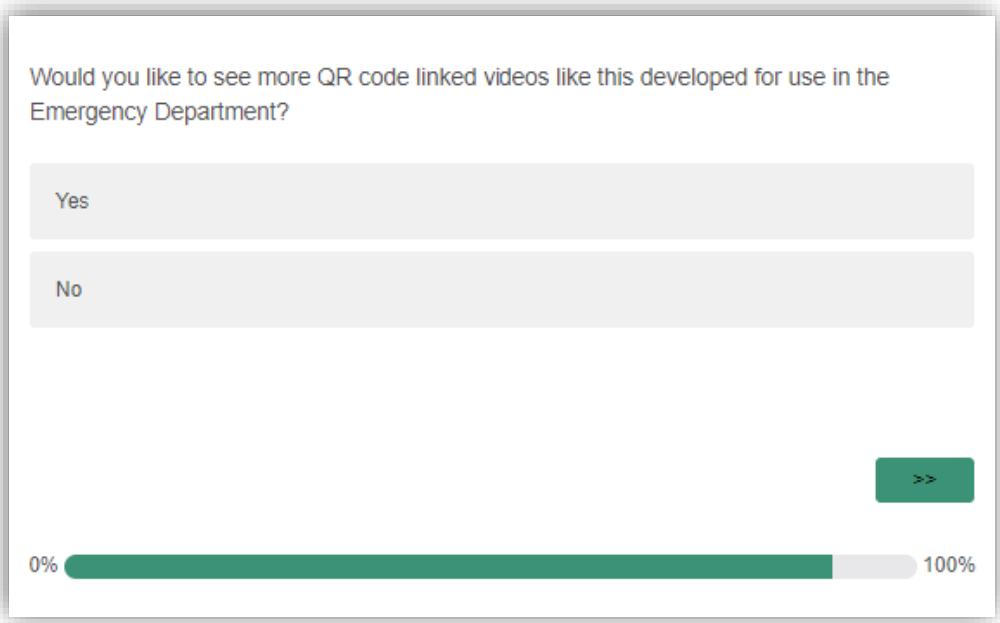
Yes

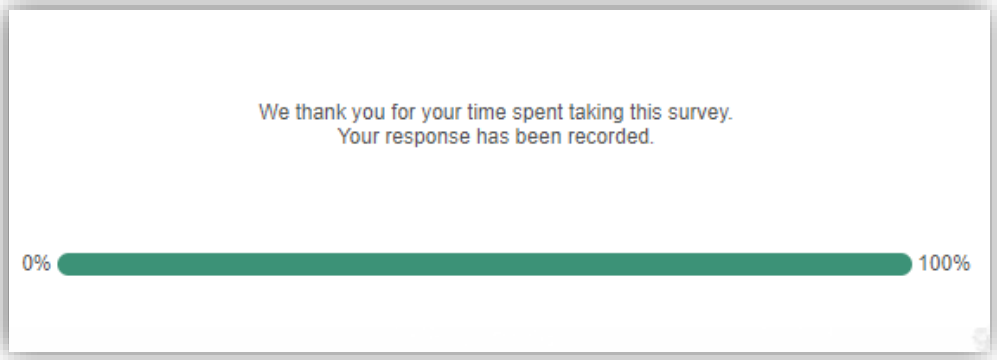
No

Please explain your response.

>>

0% 100%


Would you like to see more QR code linked videos like this developed for use in the Emergency Department?
Yes
No
>>
0%
100%


We thank you for your time spent taking this survey.
Your response has been recorded.
0%
100%