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## An Evidence-Based Practice Handbook for the Reduction of Perioperative Pressure Injuries: An Implementation Guide

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**An Evidence-Based Practice Handbook for the Reduction of Perioperative Pressure  
Injuries: An Implementation Guide**

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This Manuscript Partially Fulfills the Requirements for the  
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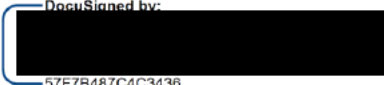
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### **Abstract**

The Association of Perioperative Nurses (AORN) Prevention of Perioperative Pressure Injury Tool Kit is a comprehensive set of evidence-based practices that can reduce the development of pressure injuries (PI) (AORN, 2022). A bundled set of prevention strategies is positively associated with reducing the development of injury or ulceration and improved patient outcomes. To effectively implement this Prevention of Perioperative Pressure Injury Tool Kit, there are evidenced strategic practices to support change readiness, including engaging stakeholders around the reasons for the change, gaining leadership support, assembling an interprofessional implementation team, providing compelling information that highlights the need for the change, and identifying necessary resources. The implementation plan outlined in this guide systematically explains how organizations can prepare, implement, and evaluate the use of the AORN Prevention of Perioperative Pressure Injury Tool Kit and the key considerations that should be explored with implementing a practice.

## **An Evidence-Based Practice Handbook for the Reduction of Perioperative Pressure Injury: An Implementation Guide**

One of the biggest challenges in clinical practice and frequent complications of hospitalizations are pressure injuries (PI) (Blenman & Marks-Maran, 2017). A PI is described as localized damage to the skin or underlying soft tissue that usually occurs over a bony prominence (The Joint Commission, 2016). Pressure injuries can result from prolonged pressure with or without shearing and compression forces (The Joint Commission, 2016). Patients who acquire in-hospital PIs endure immense pain, complications, and suffering from the condition. Many adverse health outcomes are associated with PIs; these often result in extended hospital stays, decreased physical functioning, stress, future readmissions, multiple surgical interventions, and, at worst, death (Armstrong & Bortz, 2001; Goudas & Bruni, 2019). As many as 60,000 deaths occur annually from extensive harm and complications related to hospital-acquired pressure injuries (HAPI) (Padula & Delarmente, 2019).

Unfortunately, the surgical environment exposes individuals to various factors that make them incredibly susceptible to developing a PI. Surgical positioning, the operating room table, devices, anesthesia-induced immobility, the length of surgery, and the inability to feel pain increase a surgical patient's chance of developing a PI (Goudas & Bruni, 2019). The Association of Perioperative Registered Nurses (AORN), Agency for Healthcare Research and Quality (AHRQ), Institute for Healthcare Improvement (IHI), and National Pressure Ulcer Advisory Panel (NPIAP) are just a few out of the many professional organizations and governmental agencies that profoundly agree on the necessity of a multi-component PI prevention initiative to protect patients, reduce harm and reduce healthcare costs (Association of Perioperative Registered Nurses, 2021; Agency for Healthcare Research and Quality, 2021; European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, & Pan Pacific Pressure Injury Alliance, 2019; Institute for Healthcare Improvement, 2022). This evidence-based best practice handbook for reducing perioperative PIs has dual purposes. First,

it will review the evidence supporting the use of the AORN Prevention of Perioperative Pressure Injury Tool Kit. Secondly, this paper will examine the strategies supporting change readiness and management.

### **Significance of the Practice Problem**

Each year, an estimated 234 million surgical procedures are performed worldwide across the globe (Weiser et al., 2008). In 2014, the European Pressure Ulcer Advisory Panel (EPUAP), the Pan Pacific Pressure Injury Alliance (PPPIA), and the National Pressure Ulcer Advisory Panel (NPUAP) reported that 45 percent of hospital-acquired pressure ulcers were surgery-related (PPPIA, 2014). However, because PIs from the operating room can appear anywhere from 48 to 72 hours after surgery, the incidence of a PI following surgery is most often under-reported and frequently determined to be a missed event (Goudas & Bruni, 2019).

Unfortunately, PIs continue to be a costly challenge for US patients and care organizations. Under the Hospital Value-Based Purchasing Program and the Centers for Medicare and Medicaid Services criteria for preventable conditions, PIs are not reimbursed; therefore, hospitals pay for the incidence of new PIs (Blenman & Marks-Maran, 2017). According to Spruce (2017), approximately 2.5 million patients develop HAPIs. Each injury led to non-reimbursed healthcare costs ranging from \$500 to \$70,000 (Blenman & Marks-Maran, 2017; Chen et al., 2012). Poor patient outcomes that result in high costs should be addressed by instituting evidence-based measures to prevent PIs.

Care organizations with a surgical population must be diligent in executing exemplary prevention efforts to halt the complex problem of PIs. The National Pressure Injury Advisory Panel, the Agency for Healthcare Research and Quality (AHRQ), and the Association of Perioperative Registered Nurses (AORN) recommend a series of bundled interventions which includes an assessment of risk factors as a critical component of PI prevention (AHRQ, 2021; AORN, 2022; PPPIA, 2014). Further, they suggest each organization should implement an evidence-based prevention program specifically designed for patients entering the perioperative

environment, following guidelines and best practices that help enhance implementation and compliance with the perioperative care team (AHRQ, 2021; AORN, 2022; PPIA, 2014).

Healthcare organizations that do not meet this standard of care cause poor patient outcomes and compromise the quality of care for their surgical population.

Despite overwhelming evidence, many healthcare organizations do not have a perioperative PI prevention program that includes tracking methods for perioperative PIs. Of concern are the current clinical practice gaps, which consists of an absence of a multi-pronged prevention approach such as a risk assessment, a hand-off communication, a patient repositioning plan, and most importantly, the use of an interprofessional team to evaluate practices, identify measures, and progress towards desired outcomes (AORN, 2022; AORN 2001). Failure to utilize a comprehensive prevention approach and monitor perioperative related PIs creates an obscure care environment in which performance is unknown to be improving, staying the same, or worsening. This contradicts the most fundamental principle of quality management, which is tracking and measuring performance (AHRQ, 2021). Aside from the essential quality and safety obligations, healthcare organizations hold an ethical and legal responsibility to evaluate the degree to which their health services increase or decrease the likelihood of desired health outcomes as outlined by the Triple Aim framework and provide the standard of care (IHI, 2019). Substandard care poses a significant legal risk for organizations, resulting in legal action if harm or injury to the patient occurs (Lockhart, 2002). When the standard of care is not met, everyone suffers a loss.

### **Purpose of the Program**

This evidence-based practice handbook and implementation guide will outline a structured approach to implementing an evidence-based process to reduce perioperative PIs. Utilizing the AHRQ's framework for Improving Quality of Care as a framework, this project will feature how to create a culture of change, assess change readiness, incite change motivation,

enlist change support, and effectively manage change, all of which are critical prerequisites to implementing an evidence-based practice change (AHRQ, 2021).

### **Setting and Population**

Facilities that would benefit from utilizing this handbook would be those that do not have a formal, comprehensive PI prevention program. These facilities would have an adult surgical population where care is delivered in a perioperative setting. The perioperative care setting would include a pre-operative unit, a surgical operating room, and a post-anesthesia recovery unit. Their perioperative environment would consist of pre-operative nurses, intraoperative nurses, post-anesthesia or recovery nurses, and patient care assistants.

### **Key Solution**

Healthcare facilities for which this handbook and implementation guide are intended have no formal process, PI prevention program, or methods for monitoring PI performance. Therefore, their objective entails implementing the AORN (2022) Prevention of Perioperative Pressure Injury Tool Kit, utilizing a comprehensive PI prevention and management approach. Comprehensive PI programs such as the AORNs Prevention of Perioperative Pressure Injury Tool Kit use evidenced-based nursing interventions that are confirmed to decrease the development of PIs and organizational strategies that integrate these interventions into the daily routine care (Soban et al., 2017). In addition, the use of evidence-based best practices and guides for assessing organizational change readiness and the ability to manage change will help further support how healthcare facilities can meet the standard of care and improve patient outcomes.

### **Program Problem Statement**

The PICO question that will guide this pressure injury reduction program is: in healthcare organizations with an adult surgical population [P], how does the utilization of the AORN Prevention of Perioperative Pressure Injury Tool Kit [I], compared to their current state [C], impact the development of perioperative pressure injuries [O]?



The outcomes organizations must measure should they implement this AORN Prevention of Perioperative Pressure Injury Tool Kit includes the incidence and prevalence of patients who have developed a PI during the perioperative period or within 72 hours of being in the perioperative care unit. The objectives of this evidence-based practice handbook and implementation guide for the reduction of perioperative PIs are outlined using the SMART format (specific, measurable, attainable, realistic, and timed) and are as follows:

- *Specific:* Prepare the organization to implement the AORN Prevention of Perioperative Pressure Injury Tool Kit.
- *Measurable:* Identify and enlist 95% of critical stakeholders, forming an interprofessional team that is educated to the standards of care and the importance of why change is needed. Reduce the incidence and prevalence of developing a perioperative PI.
- *Attainable:* To successfully achieve this practice improvement, the Agency for Healthcare Research and Quality's *Toolkit for Improving Quality of Care* will help guide the assembly of the interprofessional implementation team, assess their readiness for change, and manage the change effectively (AHRQ, 2021).
- *Relevant:* This handbook supports improved patient outcomes by protecting patients from preventable harm and reducing the cost associated with HAPI (Sullivan & Schoelles, 2013).
- *Timed:* Change takes time, and it requires stakeholders to tactfully build and sustain momentum. Therefore, pre-implementation planning and initiating the change should move at a consistent pace for a suggested duration of 8 weeks; however, this can vary depending upon the organization.

The long-term objectives include:

- Preventing the development of PIs in surgical patients (AORN, 2022).

- Adherence with the AORN Prevention of Perioperative Pressure Injury Tool Kit interventions.
- Sustainment of prevention practices into the daily care of surgical patients
- Reduce the incidence and prevalence of PIs

### **Utility of Implementation Plan**

Two vital prerequisites in implementing change are realizing the need for change and planning for change (Erwin, 2009). To successfully implement this practice change, the organization must prepare its employees in advance, equipping them with the primary purpose and objectives (Indriastuti & Fachrunnisa, 2021). Employees who are ready for change demonstrate high adaptability, positive attitudes, and a desire to be involved with implementation (Indriastuti & Fachrunnisa, 2021). Implementation will impact all perioperative services and rely heavily on interprofessional collaboration as a PI prevention program involves multiple workflows. Therefore, devoting time to assess change readiness will largely influence the overall success and uptake.

This implementation guide is helpful to organizations that wish to adopt the AORN Prevention of Perioperative Pressure Injury Tool Kit and assess their infrastructure's readiness and implementation ability. Objectively evaluating and monitoring the setting in which the change is set will help identify opportunities and barriers that may derail the implementation process. For example, hospital leadership's support, required training, and available resources must be evaluated and implemented to achieve a successful change. In addition, common barriers such as change fatigue must be addressed by providing a compelling case for why this change is necessary. Utilization of this implementation guide will help transform implementation plans into actionable tactics that move a change forward and closer toward the desired outcome.

### **Analytical Framework**

The AHRQ's framework for this implementation guide will help guide the assembly of the interprofessional implementation team, assess readiness and prepare for organizational change (AHRQ, 2021). In addition, it aims to support the efforts of healthcare organizations in need of implementing evidence-based PI prevention practices (AHRQ, 2021). At the heart of the AHRQ framework are six major questions for organizations to consider as they enlist members of the implementation team and strategize their efforts to put new prevention practices into motion (AHRQ, 2021):

1. Are we ready for a change?
2. How will change be managed?
3. What evidence-based best practices are we missing and need to use?
4. How will these best practices be implemented?
5. How will we measure or evaluate these practices?
6. How will we sustain these prevention practices?

Notably, the AHRQ framework encompasses all the essential preparatory and management components before and after the change is initiated (AHRQ, 2021).

Lastly, the Johns Hopkins Evidence-Based Practice for Nurses and Healthcare Professionals Model is integrated as it emphasizes the necessity of constructive and collaborative involvement in addressing health care challenges and meeting the complex needs of patients (Dang et al., 2022). In addition, with the interprofessional team being accountable for implementation, this model supports building consensus and guiding nursing knowledge and conformity (Dang et al., 2022).

### **Evidence Search Strategy**

#### **Pressure Injury Prevention Programs**

A two-part literature search strategy was conducted to identify peer-reviewed academic articles published in PubMed, CINAHL Complete, and OVID Emcare databases. The first

literature search identified studies that evaluated the impact of bundled care interventions implemented to reduce to development of PIs. These studies were published between 2012 and 2022. Search terms used alone or combined with Boolean operators included prevention, control, perioperative, pressure ulcer, care bundle, and toolkit. PubMed and CINAHL Complete search results were filtered using the randomized control trial and systematic review selections. In OVID Emcare, the "include related search terms" filter was used to broaden the search, and the "five stars" filter was selected to support relevancy. All studies were English and conducted on human subjects aged 18 years and older.

An independent screening of all abstracts was conducted that excluded non-original research non-research-based studies that were performed outside of an inpatient hospital setting. In addition, studies with no clear description of the multi-component interventions utilized were excluded, and studies that focused on a single prevention intervention instead of a multi-component prevention program. Studies with missing data, a mixed-methods design, or qualitative methods were also excluded.

### **Organizational Readiness**

The second literature search was conducted through PubMed and CINAHL Complete and identified studies that evaluated organizational readiness for change and related psychosocial factors. These studies were published between 2012 and 2022 in the United States. Search terms used alone or in combination included organizational readiness for change, implementation, research, organizational change, psychosocial factors, and work environment. The following words were used with Boolean operators for CINAHL Complete and PubMed; (organizational readiness for change) (implementation research) (organizational change) (psychosocial factors) (work environment). The "apply equivalent subjects" function in CINAHL Complete was used to broaden the search. Search results were filtered using the "academic journal, English, and United States" functions. Under the subject major heading filter, "organizational change and change management" was selected. The "meta-analysis,

systematic review, and randomized control trial" filters were chosen in the PubMed database. The excluded studies were non-original and non-research-based studies conducted using other activities that did not address the PICO question.

## **Search Results**

### **Pressure Injury Prevention Programs**

The final number of research articles evaluating the impact of a PI prevention program that evaluated a series of bundled interventions was five (figure 1). The five included studies focused on adult hospitalized patients and assessed the effectiveness of multi-component PI prevention programs on reducing the development, incidence, or prevalence of a HAPI. Using the Johns Hopkins Evidence Level and Quality Guide and the Strength of Recommendation Taxonomy or SORT tool, four Level I systematic reviews emerged and one Level I randomized control trial research study (Appendix A).

### **Organizational Readiness**

The second literature search focused on assessing organizational readiness for change resulted in five primary research studies. These studies were appraised for their design and relevancy, in which three Level I systematic reviews and two Level II, B quality studies were selected (Figure 2). Ten primary research studies were included (Appendix B, C).

## **Critical Appraisal of the Evidence with Themes**

### **Pressure Injury Prevention Programs**

Five studies related to utilizing a multi-component prevention bundle were thoroughly reviewed, appraised, and synthesized to develop an overall understanding of the information related to the study question. The first literature search that focused on implementing multi-component initiatives for PI prevention generated four Level I systematic reviews that received an A for quality and a Level I randomized control trial that demonstrated consistent generalized results (Dang & Dearholt, 2017). Unanimously, each study agreed PIs is a complex clinical challenge associated with substantial health and financial burdens to patients and care facilities

(Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). Each study also evaluated PI prevention strategies and program components to determine its effectiveness in decreasing PI occurrence (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). In addition, the Level I randomized control trial emphasized the importance of individualized prevention plans and found active patient participation as a reliable factor in reducing risks (Chaboyer et al., 2016). The remaining four systematic reviews critically appraised program components and found that prophylactic dressings, support surfaces, repositioning, preventative skin care, system reminders, and staff education are essential elements of a multi-component prevention approach (Gaspar et al., 2019; Lin et al., 2020; Sullivan, & Schoelles, 2013; Tayyib & Coyer, 2016). Each study found that single interventions in isolation are ineffective in decreasing PI occurrence (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). Each study demonstrated consistent adherence to evidence-based clinical practice guidelines for PI prevention (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). Synthesized from the evidence were two major themes. First, using a care bundle is positively associated with reducing injury or ulceration (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). Next, different prevention strategies, when implemented collectively (risk assessment, skin barrier products, prophylactic dressings, repositioning, support surfaces, skin champions, staff education, patient involvement, etc.), will yield improved results and positive patient outcomes (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan, & Schoelles, 2013; Tayyib & Coyer, 2016).

### **Organizational Readiness**

The second literature search related to organizational readiness for change generated three Level I, Quality A and B, systematic reviews, and two Level II, B Quality research studies. The evidence generated supported various elements of driving organizational change,

assessing organizational readiness using instruments, and the critical factors that affect change adoption (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020). Readiness for change is how employees accept and integrate a planned change into their standard routine (Mrayyan, 2020). The organization's readiness of its employees directly reflects employees' commitment to change and the efficacy of carrying it out (Mrayyan, 2020). Three Level I systematic reviews critically analyzed how organizations can assess and operationalize readiness by utilizing readiness instruments that focus on contextual factors and characteristics specific to the organization (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021). Evaluating organizational readiness through a formal assessment should examine the domains such as implementation climate, structural characteristics, networks and communication, culture, institutional resources, and motivation (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021). Although one systematic review specifically addressed change readiness regarding telemedicine services, it thoughtfully demonstrates the same strategic practices for preparing for change (Gagnon et al., 2014). Collectively, this body of evidence agreed on the necessity of utilizing an assessment to address the organization's characteristics, needs, and expectations of stakeholders and the overall objectives of the change (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021).

The remaining two Level II, B quality research studies further supported the importance of assessing organizational readiness for change with an additional focus towards the overall work environment and its correlation to preparedness. These studies outlined the strategic practices and ideal work environments that support change readiness and concluded how a positive work environment is associated with hospitals' readiness for change (Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020). Throughout this body of evidence, a highlighted theme was the properties associated with successfully implementing change, including leadership support, an interprofessional team approach, a clear understanding of the objective, and mutually agreed-upon methods (Mohamed-Hussein & Abou-Hashish, 2016;

Mrayyan, 2020). To support organizational change, all healthcare organizations should focus on teamwork, encourage nurse participation on all organizational committees, and support nurses' involvement in decision-making (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020). Factors that can negatively impact include competing demands and increased workload imposed on frontline staff (Mohamed-Hussein & Abou-Hashish, 2016). To facilitate the integration of change, leadership should initiate interventions such as continuing education courses, an increased focus on teamwork and open communication, and shared decision-making to enhance organizational readiness for change (Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020). In all, for organizations to move towards a state of readiness, they must incorporate a robust readiness for implementation assessment, considering the associated change management processes and practices, that can positively influence the uptake of change (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020).

### **Recommendation Statement**

Based on a rigorous review of the evidence, it is recommended healthcare facilities utilize a structured approach towards implementing the AORN Prevention of Perioperative Pressure Injury Tool Kit that first starts with using readiness instruments that focus on contextual factors and characteristics specific to the organization (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021). Bundled interventions are the most effective best practices for PI prevention (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). In addition, implementing a multi-component prevention program is evidenced to reduce the occurrence of PIs and improve patient outcomes (Chaboyer et al., 2016; Gaspar et al., 2019; Lin et al., 2020; Sullivan & Schoelles, 2013; Tayyib & Coyer, 2016). The adoption success of evidence-based clinical practices will require the use of a formal assessment instrument that helps define an organization's readiness for change. These assessment tools help prepare stakeholders to implement and sustain PI prevention



tactics that meet the standard of care (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020). This approach aligns with the AHRQ's framework for Improving Quality of Care framework, highlighting the importance of exploring readiness to help identify action steps that improve organizational readiness and increase implementation success (Berlowitz et al., 2014).

### **Implementation Plan**

The implementation plan outlined in this guide is supported and driven by the evidence and will systematically explain how organizations can prepare and implement the AORN Prevention of Perioperative Pressure Injury Tool Kit and the key considerations that should be explored with change readiness. Each section will explore six key subject areas that should be explored when implementing the AORN Prevention of Perioperative Pressure Injury Tool Kit based on the AHRQs framework.

### **Are We Ready for Change?**

The efforts to reduce the development of PIs can span across multiple levels, disciplines, and workflows (Berlowitz et al., 2014). Given the overall complexity of implementing a change that affects various stakeholders, the evidence suggests assessing readiness by first engaging stakeholders around the reasons for the difference. Miake-Lye et al. (2021) describe the capacity of stakeholders to assimilate the value and understanding of new knowledge as the absorptive capacity for change. Therefore, stakeholders have to be receptive to the rationale behind the change and why their organization or unit needs this AORN Prevention of Perioperative Pressure Injury Tool Kit (Miake-Lye et al., 2021). Providing key or baseline PI statistics on the global, national, local, and organizational level will help stakeholders recognize the value and relevancy of the change (Berlowitz et al., 2014; Kho et al., 2020).

Gaining leadership and management support is the most critical component of developing consensus and assessing for change readiness (Kho et al., 2020). Determining their interests and how their engagement will be sustained will impact the overall success of the

change (Kho et al., 2020). A questionnaire survey is recommended to assess stakeholder attitudes, motivation, and interests in the change (Berlowitz et al., 2014). This will help inform how much effort must be exhausted in achieving buy-in (Berlowitz et al., 2014). The Clinical Staff Attitudes Toward Pressure Ulcer Prevention Survey (Appendix C) is a validated instrument that provides a quantitative measurement of health professionals' attitudes toward a change (Moore, 2004). To help determine the level of leadership support, The Leadership Support Assessment (Appendix D) developed by Boston University can examine areas where support is needed and inform leadership on the necessity of the change (Berlowitz et al., 2014). The use of readiness surveys such as these serves as the initial step towards assessing for change readiness helping stakeholders understand why change is needed and the rationale for a PI prevention program (Berlowitz et al., 2014; Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020).

### ***Is the Need for Change Compelling?***

Providing baseline PI statistics and making a case of why PI prevention is essential, the case must also be compelling in a way that moves behavior from complacency to action (Berlowitz et al., 2014). Establishing urgency is a vital component of the change management process because it creates the picture behind the need for change. Identifying and collaborating with stakeholders who have responsibility or oversight on PIs, such as wound care nurses, can help develop the case for why PI prevention is necessary. A stakeholder analysis tool (Appendix E) will help define the different stakeholder groups and discover what elements they care about most (Berlowitz et al., 2014). Ultimately this supports the development of a plan to communicate the reasons for the change while also appealing to the interests of stakeholders, all of which help reduce any potential risks that could negatively impact implementation (Gagnon et al., 2014; Kho et al., 2020; Miake-Lye et al., 2021; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020).

### ***Senior Leadership Support***

When it comes to change readiness and implementation success, the support and buy-in of top management are key (Mrayyan, 2020). Buy-in from senior leadership will help strengthen the urgency and efforts behind the change and PI prevention (Berlowitz et al., 2014). A leadership support assessment should be conducted to identify potential opportunities or risks with leadership and evaluate their response and support of the change (Berlowitz et al., 2014). They play a crucial role in managing organizational change through timing, training, and resources (Berlowitz et al., 2014). Their involvement ultimately influences employees' attitudes towards organizational change and how well the changes are integrated (Mrayyan, 2020). Once leadership buy-in has been obtained, meetings with leadership and clinical staff should take place to address concerns and gain acceptance (Kho et al., 2016; Mrayyan, 2020).

### **How Will This Change Be Managed?**

Essential in any project that requires a redesign of practice is identifying solid advocates from various disciplines who can influence change, encourage collaboration, and align the improvement initiative to existing goals (Berlowitz et al., 2014; IHI, 2019; AORN, 2022). After assessing and establishing the readiness for change, the organization must consider assembling an interprofessional team to help manage the change (Berlowitz et al., 2014). In their systematic review, Kho et al. (2020) recognized the amount of work required to undertake change and the importance of guiding a change coalition through partnerships. Implementation teams with a strong network of communications and access to any needed resources are evidenced to be a significant contributor to successful implementation (Berlowitz et al., 2014; Gagnon et al., 2014; Kho et al., 2020; Mohamed-Hussein & Abou-Hashish, 2016; Mrayyan, 2020; Sullivan & Schoelles, 2013). Pressure injury prevention champions and advocates should be identified using instruments such as The Interprofessional Professionalism Assessment Instrument (IPA) (Frost et al., 2018). Tool such as the IPA can be used to assess team member collaboration and communication skills by evaluating individual team member's behavior and

professionalism (Frost et al., 2018). Tools that help evaluate processes that promote effective teaming and team building skills such as actively listening, being honest, demonstrating respect and compassion, and being open and flexible are crucial to guiding the improvement efforts (Harris et al., 2018). Team members could include wound care nurses, physicians, operating room nurses, anesthesiologists, clinical managers, skin committee members, perianesthesia nurses, and health care personnel who play an active role in prevention through direct patient care and are responsible for adhering to the bundle interventions.

Once the implementation team has been assembled, the scope of their work should be clearly defined along with the roles and responsibilities of each member (Berlowitz et al., 2014). Roles and responsibilities should then be communicated to senior leaders along with the preferred feedback exchange mechanism that supports frequent communication (Berlowitz et al., 2014; Sullivan & Schoelles, 2013). Senior leadership should ensure the team has the resources and tools necessary to successfully implement the practice change (Berlowitz et al., 2014). The implementation team should devote much time to the specific practice change and any redesign of everyday work (Berlowitz et al., 2014). The implementation team should also establish a routine meeting structure that provides them with the necessary time to plan and develop implementation methods and a timeline of tasks that need to be completed (Berlowitz et al., 2014).

### **What Practices Are We Missing and Need to Use?**

Next, the implementation team should focus on understanding the current state of practice and what processes need to be changed, modified, reintroduced, or initiated in comparison to the bundled activities of the AORN Prevention of Perioperative Pressure Injury Tool Kit. The AORN Prevention of Perioperative Pressure Injury Tool Kit includes the following bundled components; pre-operative skin and risk assessment, an intra-operative skin assessment and intervention(s), a post-operative skin assessment, and a hand-off communication between the intra-operative nurse and the post-operative nurse (AORN, 2022).

The implementation team will address gaps between evidence and clinical practice, working to support using the AORN Prevention of periOperative Pressure Injury Tool Kit in its completeness. The following will review each of these bundle practices that make up a Perioperative Pressure Injury Prevention Program.

### ***Pre-operative Skin and Risk Assessment***

Identifying at-risk patients is the first best practice in PI prevention as it informs care management decisions and is necessary to cascading the appropriate measures to prevent PIs (AORN, 2022; Park et al., 2019; Meehan et al., 2019). The risk assessment and complete skin assessment are primary strategies known to reduce the incidence of PIs for surgical patients (Martinez et al., 2019). The AORN suggests using a risk assessment such as the Scott Triggers Tool™ (Appendix F), which incorporates evidence-based predictors of perioperative PIs such as age, body mass index, and estimated surgery length to evaluate the patient's risk level (AORN, 2022; Scott, 2017). Fundamental parameters that should be consistently included in the skin assessment include temperature, turgor, color, moisture, and skin integrity (AORN, 2022). The AORN Prevention of Perioperative Pressure Injury Tool Kit incorporates a variety of educational materials (Appendix L) that can be used to support the staff member training on components such as how to perform a comprehensive skin assessment (AORN, 2022).

### ***Intra-operative Skin Assessment and Interventions***

The primary purpose of the intra-operative skin assessment is to perform another visual inspection of the patient's skin while positioning the patient on the operating room table (AORN, 2022). Surgical positioning, the operating room table, devices, anesthesia-induced immobility, the length of surgery, and the inability to feel pain increase a surgical patient's chance of developing a PI (Goudas & Bruni, 2019). Performing an intra-operative "skin scan" helps reduce the risk of PI development (AORN, 2001). It also informs the interventions that should be used to minimize injury (AORN, 2001). The intra-operative prevention interventions include the selection of appropriate surfaces that support pressure redistribution, such as the Pink Pad,

a shape-conforming foam that reduces friction (Greenberg, 2013). Intra-operative interventions should also include using safe patient handling devices to move the patient to and from the operating table (AORN, 2022). Clinical support surfaces such as gel pad overlays should be readily available and utilized to help distribute pressure evenly and decrease the potential for injury (AORN, 2001). Its use helps protect vulnerable bony prominences that bear weight or pressure, such as the hips, buttocks, heels, and elbows (AORN, 2022). After the procedure is completed, an intraoperative "skin scan" or assessment should be conducted to determine if any new alterations in skin integrity occurred and documented (AORN, 2001).

### ***Hand-off Communication***

The hand-off communication process exists to support a continuation of patient care and safety practices that supports the continuum of care (Martinez et al., 2019). As another critical component of the AORN Prevention of Perioperative Pressure Injury Tool Kit, the nurse-to-nurse hand-off communication allows for the transfer of patient-specific information with essential details on the level of risk, preventative strategies, and plan of care (AORN, 2022; Manias et al., 2016). The AORN Prevention of Perioperative Pressure Injury Tool Kit reiterates the importance of standardized hand-off communications and their influence on the early detection of PI development, patient discomfort or pain, and improved patient outcomes (AORN, 2021). This communication process should occur between each phase of care among the pre-operative nurse, intra-operative nurse, and post-operative nurse, again sharing the risk assessment and measures prevention measures taken (AORN, 2022).

### ***Post-operative Skin Assessment***

Lastly, the recovery nurse's post-operative full skin inspection following surgery is vital to continuing preventative PI interventions, especially among patients identified pre-operatively as at-risk for PI development (Webster et al., 2015). In their study sample, Martinez et al. (2019) found that the participants classified as being high risk increased exponentially from their admission to 48 hours post-operatively after conducting the post-operative skin assessment.

Improvements to reducing the development of perioperative PIs require real-time interventions and evaluation of patient-specific processes that determine if a new injury has developed and the efficacy of the preventative measures itself (Martinez et al., 2019). A nursing intervention adherence checklist (Appendix G) can be designed to help support and measure adherence to these components.

### **How Will We Implement?**

The implementation team can create a checklist of identified resources needed to launch the practices or survey the stakeholder groups for any needs (Berlowitz et al., 2014). A resource needs assessment (Appendix H) can help determine what is required to accomplish the task or implement the change. Most commonly, the primary resource required is staff education and training. Providing training and education is central to successful adoption and will depend on the components of the AORN Prevention of Perioperative Pressure Injury Tool Kit that will be implemented (Kho et al., 2020). For example, if the pre-operative risk assessment tool is a critical aspect missing from the current care standards of the organization, education and training should focus on the importance of an early evaluation.

### ***Education***

Education on the complications associated with PIs and the importance of reducing harm through early detection should be reviewed. Staff should be trained on conducting a complete skin and risk assessment following the AORN's guidelines which highlight areas most susceptible to PIs and educated on how their efforts contribute to reducing incidence and prevalence. Educational content should also incorporate materials found within the AORN Prevention of Perioperative Pressure Injury Tool Kit (Appendix L). First, review the basics of patient positioning with staff that goes through the fundamentals of proper patient positioning in the operating room (AORN, 2022). Proper patient positioning is a critical component of minimizing the risk of developing PIs by relieving pressure on areas at risk. Building upon this education, staff should learn which anatomical areas are the most vulnerable to developing a PI,

identifying and assessing the body's most sensitive parts (AORN, 2022). Next, how to perform a complete skin and risk assessment should be incorporated into the educational content. Both skin and risk assessments are essential to predicting the development of injury and informing the preventative measures that need to be taken (AORN, 2022). Finally, a resource needs assessment can be used to outline what supplies and educational materials are required and what protocols or processes need to be developed to execute (AHRQ, 2014). Plans for ongoing training and regular compliance checks should also be developed for sustainment initiatives.

Staff education must consist of assessing and documenting tissue damage caused by pressure and/or shearing forces, which is the first step in calculating incidence and prevalence (Berlowitz et al., 2014). In addition, a skin assessment on every patient must take place (Berlowitz et al., 2014).

### **How Will We Measure These Practices?**

It is important to measure and track PI performance, indicating whether the organization's prevention efforts enhance or diminish care. Reflecting on the timeline and goals, a pre-implementation and post-implementation evaluation should occur, examining outcomes specific to PIs. In addition, pre-implementation baseline data on the incidence and prevalence of perioperative PIs should be obtained, reviewed, and disseminated to stakeholders to understand the effects of their efforts. First, establish a baseline of the organization's performance and current PI rates. The organization can then research national PI benchmarks starting with the U.S. Centers for Medicare & Medicaid and the National Database of Nursing Quality Indicators™ Centers, which provide hospital-acquired pressure ulcer data. Once gathered, this information will allow for an initial comparison and determination of the organization's current performance.

After data and national benchmarks have been collected, the organization will implement the AORN Prevention of Perioperative Pressure Injury Toolkit to put the new practices into operation. Key indicators to measure are PI incidence and prevalence. Pressure injury



incidence measures the number or percentage of patients who have developed a new injury in the perioperative setting (Berlowitz et al., 2014). Pressure injury prevalence examines the number of PIs at a given period and takes the number of patients with a PI divided by the total number of patients (Berlowitz et al., 2014). The incidence and prevalence data should be monitored and calculated monthly (Berlowitz et al., 2014). A quantitative data analysis of the rates should include the percentage of patients who developed a PI compared to national benchmark data and previous baseline data (Berlowitz et al., 2014). A pre-post comparison design using a Chi-squared test can determine if the AORN Prevention of Perioperative Pressure Injury Tool Kit helped reduce the number of developed PIs.

Measuring adherence to the AORN Prevention of Perioperative Pressure Injury Tool Kit interventions is essential as it directly impacts the relationship between the interventions and the outcomes. A process measure focused on adherence can help nurses fully complete the AORN Prevention of Perioperative Pressure Injury Tool Kit. A created checklist or process observation tool can be used to manually record the completed interventions if these components are not embedded in the electronic health record. A Chi-squared test can also help analyze any associations between the AORN Prevention of Perioperative Pressure Injury Tool Kit adherence and incidence rates and test whether incidence rates during the pre-intervention period differed from the post-intervention period.

An analysis of the evaluation table (Appendix K) can be used and shared with staff to communicate helpful information on the impact of the AORN Prevention of Perioperative Pressure Injury Tool Kit and how the results compare to benchmark or baseline data. A balanced scorecard performance management tool can also be developed to track implementation adherence and monitor progress (Berlowitz et al., 2014). This tool can also report data, sharing it with key stakeholders such as senior leadership and project participants. Quality tools such as Pareto charts and control charts can be used to analyze data related to the frequency of PIs and also display the data showing how performance has changed over

time (ASQ, n.d.). Organizations should prioritize incorporating these performance management tools and information as an essential sustainability practice.

### **How Do We Sustain These Practices?**

The organization should devote much attention and energy to the sustainment of change. Conducting a quarterly review of incidence and prevalence rates, incorporating competency education annually and consistent updates to staff are a few sustainability practices (Sullivan & Schoelles, 2013). In addition, the use of skin committees can help establish and support accountabilities for sustaining prevention efforts on an ongoing basis (Berlowitz et al., 2014). Also critical to sustainability is recognizing and reinforcing desired results (Berlowitz et al., 2014). Celebrating and rewarding small successes is another change management practice to keep staff motivated and engaged with sustaining the practice change (Berlowitz et al., 2014).

### **Dissemination Plan for the Organization**

It is critical to utilize an education outreach approach with frontline nurses and clinicians, increasing information sharing and spreading the intervention and project results. Plans for dissemination and translating the results of the AORN Prevention of Perioperative Pressure Injury Tool Kit should be presented and shared with all the stakeholders. Individuals responsible for implementation should receive regular weekly updates on the data collected and performance feedback. Once the data is captured and measured, and any patterns, trends, or defects have been identified, that information should be shared amongst committee or quality improvement teams, wound care nurses, perioperative staff, and leadership. A presentation of the results and the program's overall impact should be formally shared with all stakeholders, which is essential to influencing nursing practice and the uptake and sustainment of change.

### **Implementation Timeline**

Given the sequence of events discussed, the implementation plan will need to be customized or tailored to meet and address the organization's unique circumstances. The proposed implementation timeline (Appendix I) considers the pre-implementation planning

phase, assembly of an interprofessional team, the training and education of staff, and implementation of the change itself. To tactfully build and sustain momentum for change, the underlying objective and vision must be communicated and broadly understood. Below is the chronological order of events that include the defined goals the organization should meet before moving to the next phase.

1. *Why this change is needed* – To prevent apathy or resistance, identify and communicate specific reasons for the change.
2. *Stakeholders understand why the change is necessary* - The goal is to assimilate value and understanding by providing a compelling case for why this change is needed.
3. *Is there a sense of urgency* - Assess attitudes and current motivation to gauge how much effort needs to be placed on achieving buy-in. The goal is to develop a plan to communicate the reasons for the change while appealing to stakeholders' interests and reducing potential adverse risks.
4. *Is there senior leadership support* - Identify any potential opportunities or risks with leadership and evaluate their response and support of the change. Because leaders play a crucial role in supporting the change initiative, their buy-in must be obtained.
5. *Who will own implementation efforts* – Assign roles and assemble an implementation team to take ownership of the subsequent planning steps.
6. *Identify resources* – Determine what supplies are needed, what protocols or processes need to be developed, and what education should be provided that supports implementation.
7. *Managing the change* – Determine which best practices of the AORN Prevention of Perioperative Pressure Injury Tool Kit must be adopted. Assign roles and responsibilities that establish accountabilities for preventative efforts.

### **Dissemination Plan for this Implementation Guide**

The dissemination of this evidence-based practice handbook will be conducted at a care organization located in the midwestern United States on an organizational and system level. Plans for dissemination also include the Minnesota Hospital Association's Pressure Injury Committee. This implementation guide will be archived at the University of Saint Augustine for Health Sciences Library Scholarship and Open Access Repository (SOAR) as a student capstone.

### **Conclusion**

With over 200 million surgeries performed worldwide, the perioperative setting is a unique environment that places individuals at an increased risk due to various extrinsic factors. This evidence-based best practice toolkit for reducing perioperative pressure injuries reviews the evidence supporting using the multi-pronged AORN Prevention of Perioperative Pressure Injury Tool Kit. In addition, this paper examined how organizations can successfully execute the AORN Prevention of Perioperative Pressure Injury Tool Kit through a sequenced series of organizational readiness steps. The organizational readiness components of this paper utilize the AHRQ's *framework for Improving Quality of Care* as a framework that supports the assembly of an interprofessional implementation team and readiness factors that should be addressed to prepare the organization for change (AHRQ, 2021). The John Hopkins Nursing Evidence-Based Practice Model and The Institute for Healthcare Improvement's Model for Improvement are additional frameworks that outline how healthcare organizations can successfully improve the quality and safety of patient care by first evaluating these pre-implementation components. The implementation plan outlined in this guide systematically explains how organizations can prepare to implement the AORN Prevention of Perioperative Pressure Injury Tool Kit and the key considerations that should be explored with change readiness.

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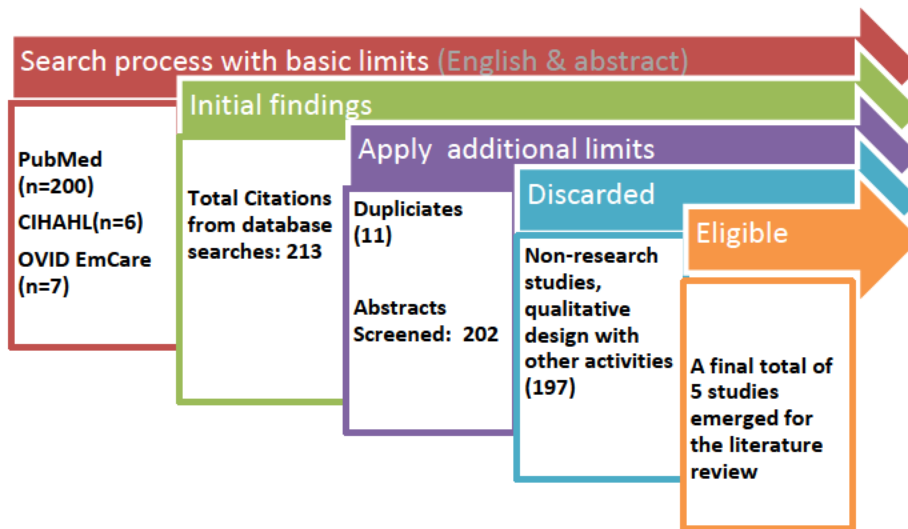
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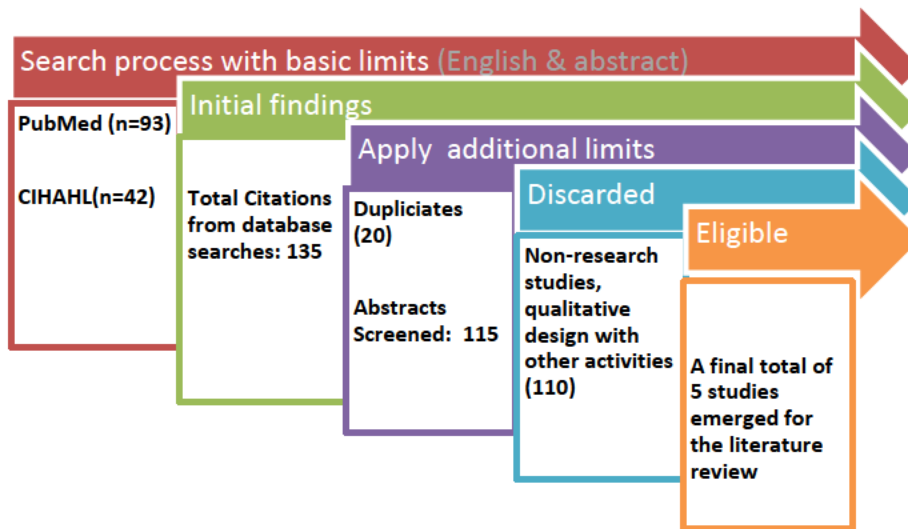
### Figure 1 Literature Search Strategy

*Prevention of Perioperative Pressure Injury Tool Kit*



### Figure 2 Literature Search Strategy

*Organizational Readiness*



**Appendix A**

**Summary of Primary Research Evidence**

Citations	Design, Level  Quality Grade	Sample  Sample size	Intervention  Comparison  (Definitions should include any specific research tools used along with reliability & validity)	Outcome Definition	Usefulness Results Key Findings
<b>Citations Supporting the Use of Multi-Component Prevention Strategies</b>					
<b>Chaboyer et al., 2016</b>	RCT  Level: I Quality: A	n=1598 pts  18+ yrs  8 tertiary >200 beds Australia	randomized to either a PU prevention care bundle or standard care  bundle based on clinical practice guidelines, multi-component, 3 messages to patients (1. keep moving; 2. look after your skin; 3. eat healthy diet)  Training aids for patients (DVD, brochure, poster)	incidence HAPU (both the cluster & individual participant level)  measured by daily skin inspection  4 randomized groups/799 patients per group  intraclass correlation coefficient 0.035.  hazard ratio for new PU developed (PU prevention care bundle relative to standard care) was 0.58 (95% CI: 0.25, 1.33; <i>p</i> = 0.198)  difference was not statistically significant	PU prevention care bundle associated with reduction of ulceration

			intervention group received standard care		
<b>Citations for Change Readiness</b>					
<b>Mohamed et al., 2016</b>	Observational cross-sectional research design  Level II Quality B	3 healthcare organizations  n = 532 (nurses & physicians)  n=502 respondents (94.4%)  nurses = 257 of 275 (93.4%)  physicians = 245 of 257 (95.3%).  Hospital A = 57 nurses, 45 physicians  Hospital B = 110 nurses, 105 physicians	Work Environment Scale-Form to measure organizational work environment (90 items grouped into 10 subscales)  Continuous QI Climate Survey to assess perspectives of hospitals' readiness for QI (25 items grouped into 5 subscales)  5 months	Mixed linear model as multivariate analysis to identify factors predicting hospitals' readiness for QI.  Descriptive statistics as frequencies & % used to describe categorical data variables  Scale data expressed by the mean & standard deviation.  Pearson correlation coefficient analysis (r) used to test relationship between study variables.  Significance 0.05  Positive correlation between work environment & the readiness for QI nurses (r = 0.29, P < .001) physicians (r = 0.35, P < .001)  Nurses' mean scores on peer cohesion in work, supervisor support, & work pressure associated with hospitals' readiness for QI level ( $\beta = .164, P = .011$ ; $\beta = .223, P = .001$ ; and $\beta = .273, P < .001$ , respectively) Physician positive associations with hospitals' readiness for QI ( $\beta = .164, P < .001$ ; $\beta = .256, P < .001$ ; $\beta = .272, P < .001$ ; and $\beta = .227, P < .001$ )	success of hospitals' readiness for QI is dependent on supervisor support and use of innovative management strategies to lead practices related to QI.  work environment is positively associated with hospitals' readiness for QI

		Hospital C = 90 nurses, 95 physicians			
<b>Mrayyan, 2020</b>	Quantitative research design  Level II Quality B	n = 153 nurses  Male 50, 32.7%  Female 103, 67.3%  1month	assess organizational [hospital] readiness for change as perceived by nurses  Grossman's and Valiga's scale, 13 items rated on a 5-point Likert scale— 1 = don't know 2 = strongly disagree 3 = disagree, 4 = agree 5 = strongly agree	SPSS significance level of 0.05  average mean of organizational readiness for change 3.5 (SD = 0.485), which indicated that the organization were ready for change  (a) CNO leads department SD = 0.687 (b) support career advancement SD = 0.843 (c) supports collaboration & multidisciplinary team SD = 0.848 (d) markets its centers of excellence SD = 1.28 (e) QI approach to improve patient care SD = 1.34 (f) forums for discussing SD = 0.925	Hospitals ready for change associated with CNO leading department, organizational support of s continuing education & career advancement, collaboration & multidisciplinary team approaches organization marketed its centers of excellence to community, QI used to improve patient care, organization provided forums for discussing changes.
<p><b>Legend:</b>                  RCT, Randomized control trial; QI, quality improvement; %, percentage; yrs, years; pts, patients; PU, pressure ulcer; PI, pressure injury; HAPU, hospital acquired pressure ulcer; CNO, chief nursing officer, SPSS, statistical package for the social sciences; SD , standard deviation.</p>					

Appendix B

Summary of Systematic Reviews (SR)

Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
<b>Citations Supporting the Use of Multi-Component Prevention Strategies</b>						
<b>Tayyib &amp; Coyer, 2016</b>	Level I Quality: A	What is the effectiveness of implementing single PU prevention strategies to reduce the incidence & prevalence of HAPUs compared to different PU prevention strategies, standard or usual care, or no strategies in the adult critical care environment?	included quantitative experimental studies, RCT's, non-RCT's, quasi-experimental, before & after, & comparative studies w/adult participants 18 years + managed in the CU or CCU	Data extraction tool from JBI-MAStARI, specific details about the strategies, populations, study methods & outcomes  Quantitative data be pooled in statistical meta-analysis  OR with 95% confidence interval	overall effect size across studies was 0.12 (95% CI: 0.05-0.29; p <.00001), the result indicating that HAPU incidence of sacral area decreased after the application of the dressing  statistically significant effect of a silicone foam dressing strategy in reducing HAPUs incidence (effect size = 4.62; 95% CI: 0.05-0.29; p < .00001, effect size = 4.50; 95% CI: 0.05-0.31; p = .00001, respectively)  effectiveness of nutrition, skincare regimen, positioning & repositioning schedule, support surfaces, & education in preventing HAPUs development	risk & skin assessments to identify the patient at risk and guide the implementation of appropriate strategies  different prevention strategies were implemented (high-protein diet, polarized light, different education) yielded improved results in preventing PU development
		3 step search strategy using CINAHL, Medline, Cochrane Central Register of Controlled Trials, Web of Science, Embase, Scopus, & Mednar.  Search for unpublished studies included New	Studies w/primary outcome measures: HAPU incidence & prevalence, PU severity, time to occurrence, & number of PUs			



Citation	Quality Grade	Question Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/ Implications
		York Academy of Medicine Library Gray Literature Report, Google, NICE, AHRQ, National Guideline Clearing House, CDC & Dissertation & Thesis Abstracts International	per patients. Secondary outcome measure any adverse effect caused by use of preventive strategy			
<b>Lin et al., 2020</b>	Level I Quality B	<p>What are the components of PIP programs used for the adult ICU population? (2) how are PIP programs for the adult ICU population implemented? and (3) what are the effectiveness of PIP programs?</p> <p>PubMed, EMBASE, Ovid MEDLINE, EBSCOhost CINAHL, &amp; Cochrane</p>	<p>21 peer reviewed papers (12 QI projects &amp; 9 research papers from 8 studies) included</p> <p>conducted in adult ICU; published in English or Chinese; reported a multi-component intervention; reported on the implementation strategies used to implement the</p>	<p>Quality appraisal using Quality Improvement Minimum Quality Criteria Set &amp; Mixed Methods Appraisal Tool</p> <p>implementation strategies grouped into 6 classifications: dissemination strategies, implementation process strategies, integration strategies, capacity building</p>	<p>PIP programs w/ 2–11 components commonly implemented (clarification of staff roles, introducing new roles, repositioning, staff &amp; patient education, support surfaces use, PI risk assessment, skin assessment, nutrition needs assessment, documentation, multidisciplinary team involvement, mobilization)</p> <p>implementation strategies used were education, audit &amp; feedback, &amp; standardizing documentation</p>	<p>multi-component PI prevention programs has positive outcomes</p> <p>components in the programs are beneficial</p> <p>care bundles were more effective than single component interventions</p> <p>PI risk assessment was used in 60% studies, use of a skin barrier product, repositioning, &amp; support surface</p>

Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
			program; and reported on program outcomes	strategies, sustainability strategies, and scale up strategies	5/8 research studies & one QI project reported decrease in PI prevalence, &/or increase in compliance to pressure injury prevention protocols & strategies	commonly used consistent with the recommendations from international CPG
<b>Gaspar et al., 2019</b>	Level I Quality A	PubMed, Web of science, and EBSCO (CINAHL; MEDLINE; Nursing & Allied Health; Cochrane Central Register of Controlled Trials; Library, Information Science & Technology Abstracts  January 2009 - December 2018  quantitative, original research studies  26 articles included	26 studies included: support surfaces, multiple intervention programs, repositioning and early mobilization, risk-assessment tools, prophylactic dressings, education, skincare, & reminder system to prevent Pus  Study quality assessed using 19-item	Quality of studies (were a high quality ≥75% according to the EBL appraisal check list	Multifactorial & comprehensive programs help to reduce PUs in hospitalized patients: teamwork approaches, education of health care staff, nutritional assessment, risk-assessment tools, visual skin assessment, support surfaces, offloading heels, repositioning mainly with use of sliders, disposable soaker pads to manage moisture & incontinence, skin care, medical devices related to PU assessment, prophylactic dressings, smartphone applications, patient & family involvement, & semi-weekly WOC nurse rounds	Multiple intervention programs and care bundles are a set of EB interventions that when performed together had a better & positive impact on patient outcomes, when compared with individual interventions  Multiple interventions also increase staff knowledge, pts & family involvement, supporting clinical decision-making, & improving health outcomes.

Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
			Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines			Teamwork is an important part to successfully prevent
<b>Sullivan, &amp; Schoelles, 2013</b>	Level I Quality A	CINAHL, Cochrane Library, EMBASE, MEDLINE, PreMEDLINE 2000- September 2012 keywords r/t PU prevention efforts, barriers, settings.  English-language literature	Inclusion: 26 studies considered multi-component PU preventive measures EB clinical decision tools combined with training and education), adult populations, reported PU rates 6 months after implementation	Statistically significant reductions in PU rates were reported in 11 (42%) of 26 studies (median reduction, 82% [range 67% to 100%]). Of the 13 studies with improvements not reaching statistical significance, 5 reported improvements in both pressure ulcer rates and process-of-care measures	most organizations educated/trained staff (96%), developed/revised their protocols for assessment and documentation of wounds (96%), performed quality audits and provided feedback to staff (81%), adopted the Braden Scale for Predicting Pressure Sore Risk (61%), and redesigned documentation processes and reporting (58%)  Implementation of a multi-component strategy by Walsh and colleagues (2009) reduced PU	Implementation of multi-component initiatives because a patient safety strategy designed to address multiple factors is believed to be more effective than single-component initiatives in preventing this condition  A review of the use of multi-component strategies in 26 US studies, 11 studies demonstrated statistical significance only

Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
					<p>prevalence (12.8% to 0.6%), increased focused communication among patient caregivers, &amp; improved clinician behavior &amp; clinical processes once other improvements were recognized</p>	<p>three were randomized trials</p> <p>multidisciplinary teams with skin champions being described as key team members.</p> <p>leadership support</p> <p>unique tools used for audit and feedback, education and training, &amp; streamlining products and processes</p> <p>barriers to implementation included unmotivated staff, staff turnover, staff &amp; physician resistance, inconsistent documentation, difficulties in exporting data, &amp;</p>

Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
						miscommunication between electronic systems, Staff disruption & uninvolved in planning  Sustainment: Conducting quarterly prevalence studies, requiring registered nurses & licensed practical nurses to demonstrate competency annually, providing monthly updates via intranet to staff of product changes
<b>Citations for Change Readiness</b>						
<b>Miake-Lye et al., 2021</b>	Level I Quality A	How have investigators operationalized the concept of ORC?  2012 - 2017	nclusion: assessment used, list of individual items, available for each full-text publication,	Name of assessment used, total number of items in assessment, assessments, study setting,	Readiness for implementation mapped to most individual items of any construct  97 items r/t subconstruct: leadership engagement	Most assessments need to be customized or tailored prior  Readiness instruments focus

Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
		<p>Terms: readiness, change, health, or social services</p> <p>6databases: Web of Science, Sociological Abstracts, PubMed, PsycINFO, Embase, and CINAHL</p>	<p>relevant to healthcare delivery settings, measure ORC</p> <p>Publications included (27)</p> <p>From the 29 of organizational readiness assessment uses, 1370 individual assessment items were included in the tem bank.</p>	<p>study sample, type of ntervention</p>	<p>represented in 46 tems/access to knowledge &amp; information about ntervention represented by 13 items/64 items in the readiness for mplementation judged to be indicators of organizational change/leadership engagement, or access to knowledge and information</p>	<p>on contextual factors within the organization &amp; characteristics of individuals</p> <p>specificity of most assessment items suggests a need to tailor items to the specific scenario</p> <p>Readiness assessments must bridge the gap between measuring a theoretical construct &amp; factors of importance towards mplementation</p>
<b>Kho et al., 2020</b>	Level I Quality A	<p>How CM practices been applied to telemedicine service implementation? CINAHL, PubMed, ISI Web of Science &amp; 4 specialist telehealth journals</p>	<p>English language &amp; peer-reviewed</p> <p>48 articles, 16 CM practices r/t strategic/operational aspects of</p>	<p>Extracted data to nform research aims using NVivo 12, qualitative data analysis software</p> <p>Articles imported nto NVivo</p>	<p>5 strategic practices of preparatory phase of the CM process: establish plans, gain leadership &amp; management support &amp; commitment, identify champions, engage partners &amp; stakeholders,</p>	<p>Recognizing work &amp; tasks required to undertake change</p> <p>Use dedicated coordinator with CM skills &amp; knowledge to facilitate &amp; mplement change</p>

Citation	Quality Grade	Question Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/ Implications
		January 2008 and June 2019	<p>telemedicine implementations</p> <p>Inclusion: examined health care services using CTs/described evaluation of studies and/or implemented telemedicine services/ referred to use of CM strategies during the implementation &amp; adoption of services</p> <p>Excluded: Lit reviews, SR, conceptual papers, discussion pieces</p>	<p>Analysis: neglected CM practices &amp; gaps</p> <p>(1) identify applied CM practices (2) frequency of the CM practices reported (3) CM practice framework specific for telemedicine implementations (4) gaps in the current CM approach</p>	<p>develop and articulate clear, simple vision</p> <p>Operational practices: Conduct needs assessment, assess compatibility of telemedicine equipment, assign coordinating roles, ensure adequate resources</p> <p>Managing change strategic practices: Communicate changes &amp; understanding of telemedicine, gain stakeholder trust, acceptance &amp; buy-in, engage partners, facilitate ownership, monitor change &amp; maintain flexibility, provide training &amp; education, develop new work processes, protocols</p>	Training is a CM activity
<b>Gagnon et al., 2014</b>	Level I Quality A	How ORC measurement instruments could	English, Finnish, French, Portuguese,	Psychometric standards validity & reliability	26 instruments measuring ORC	Little improvement in the development of ORC

Citation	Quality Grade	Question Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/ Implications
		<p>apply to knowledge translation in health care.</p> <p>Mixed method on ORC measurement instruments</p> <p>Pubmed, Embase, CINAHL, PsychINFO, Web of Sciences, Business Source Premier, ABI/Inform, Sociological Abstracts</p> <p>keywords: Readiness, Commitment &amp; Change, Organization &amp; Administration, Health &amp; Social Services</p> <p>39 publications describing 26 ORC measures</p> <p>108 studies w excluded did not refer specifically to OR</p>	<p>Spanish or Swedish</p> <p>Articles developed ORC measures &amp; assessed ORC</p> <p>Selected instruments based on conceptual models/frameworks of ORC relevant to KT in healthcare sector at the organizational Level</p> <p>Published before November 1, 2012</p> <p>Excluded: no reference to organizational readiness</p>	<p>descriptive &amp; psychometric properties of organizational readiness instruments</p> <p>identified 26 instruments - described in 39 publications</p>	<p>18 (69%) measurement instruments partly complied w/ both validity &amp; reliability standards</p> <p>3 additional demonstrate reliability &amp; validity : Organizational change questionnaire, Team Climate Inventory, psychometrically sound survey instrument have undergone an assessment of reliability</p>	<p>measurement instruments that could be applied to KT</p>
<b>Legend:</b>						



Citation	Quality Grade	Question Search Strategy	Inclusion/Exclusion Criteria	Data Extraction & Analysis	Key Findings	Usefulness/Recommendation/Implications
PU, pressure ulcer; PI, pressure injury; HAPU, hospital acquired pressure ulcer; NICE, National Institute for Health and Care Excellence; AHRQ, Agency for Healthcare Research and Quality; CDC, Centers for Disease Control and Prevention; RCT, Randomized control trial; ICU, intensive care unit; CCU, cardiac care unit; OR, odds ratio; PIP, pressure injury prevention; CPG, clinical practice guidelines; EB, evidence-based; WOC, Wound Ostomy Continence; ORC, organizational readiness for change; CM, change management; KT; knowledge translation.						

**Appendix C**

**Clinical Staff Attitudes Toward Pressure Injury Prevention**

<b>Clinical Staff Attitudes Toward Pressure Injury Prevention</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>All patients are at risk of developing pressure injuries</b>					
<b>Pressure injury prevention is time consuming for me</b>					
<b>Patients tend not to get as many pressure injuries now days.</b>					
<b>I do not need to concern myself with pressure injury prevention at my job.</b>					
<b>Pressure injury treatment is greater priority than its prevention.</b>					
<b>Most pressure injuries can be avoided.</b>					
<b>Continuous assessment of patient will give an accurate account of their pressure injury risk.</b>					
<b>I am less interested in pressure injury prevention than other aspects of care.</b>					
<b>My clinical judgment is better than any pressure injury risk assessment tool available to me</b>					
<b>In comparison with other areas of care, pressure injury prevention is a low priority for me.</b>					
<b>Pressure injury risk assessment should be regularly carried out on all patients during their stay in hospital.</b>					

Adapted from “Nurses Attitude and Perceived Barriers to Pressure Ulcer Prevention” by W. Etafa, Z. Argaw, E. Gemechu, B. Melese. 2018, *BMC Nursing* 17(14) p. 5

**Appendix D**

**Leadership Support Assessment**

<b>Leadership Support Assessment</b>	<b>YES</b>	<b>NO</b>
<b>Patient safety is clearly articulated in the organization's strategic plan.</b>		
<b>Senior leadership has an individual leading patient safety.</b>		
<b>This facility has a shared leadership model.</b>		
<b>There is a dedicated budget for patient safety initiatives.</b>		
<b>The budget has funds allocated for the education and training of staff members on patient safety efforts.</b>		
<b>At this facility, pressure injury prevention is a priority.</b>		
<b>This facility has implemented a pressure injury prevention policy.</b>		
<b>Current pressure injury prevention goals are being addressed.</b>		
<b>There are visible roles models/champions for pressure injury prevention</b>		

Adapted from "Assessing Leadership Support", by Boston University, n.d., <https://www.bu.edu/research/support/research-leadership/>

**Appendix E**  
**Stakeholder Assessment**

<b>Stakeholder Group</b>	<b>Interest</b>	<b>Involvement</b>	<b>Perceived Attitudes &amp; Risks</b>	<b>Next Steps</b>
<i>Example: pre-operative nurses</i>	<i>Generally interested in prevention measures and understands the importance.</i>	<i>Will initiate implementation of the AORN Prevention of Perioperative Pressure Injury Tool Kit by identifying surgical patients at risk &amp; completing initial skin assessment.</i>	<i>May not want to make changes to existing admission intake workflow.</i>	<i>Engage and collaborate on the redesign of workflow seeking their input.</i>

Adapted from "Stakeholder Analysis Assessment" by Project Agency, n.d., <https://www.businessballs.com/project%20management%20templates.pdf>

### Appendix F

### Scott Triggers™ Tool



Review patient record and complete data in left column. Place a check in the right column if the answer is YES. If two or more YES answers are present, this may indicate an increase risk of perioperative pressure ulcers. Use Perioperative Pressure Injury Prevention Plan (PPIPP) of care.

SCOTT TRIGGERS*	Does it meet these qualifications?	If YES, please check here.
Age_____	Age 62 or Older	
Serum Albumin _____ g/L or BMI	Albumin level <3.5 g/L or BMI <19 or >40	
ASA score (circle) 1 2 3 4 5	ASA score 3 or greater	
Estimated surgery time in hours/minutes_____	Surgery time over 3 hours or 180 minutes**	
<p>Two or more YESES = HIGH RISK SURGICAL PATIENT</p> <p>Assessment Comments:</p>		

\* Scott Triggers® is a set of evidence-based factors (named for nurse/program founder Susan Scott) identified as predictors of highest risk for pressure injury development in the study (e.g., age 62 or older, Albumin level below 3.5 and ASA score 3 or greater). Scott, SM. Progress and Challenges in Perioperative Pressure Ulcer Prevention. JWOCN. 2015;42(5):480-5

\*\* Surgery time is calculated from the time into the Operating Room until the time out of the Operating Room.

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### Appendix F (continued)

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Name of Company / Medical Center **United Hospital, part of Allina Health**  
 Contact Name **Krystal Dopson, peri anesthesia patient care manager**  
 Address **333 Smith Ave N**  
 State, Zip **Minnsota 55016**  
 Country **United States**  
 Email and website **krystal.dopson@allina.com/www.allinahealth.org**  
 Phone **651-241-5747**

I am writing to ask your permission to utilize the Scott Triggers copyrighted tool (attached) for the following: (check all that apply)

reprint  photocopy  Publication (No charge)

Digitize and incorporate into medical record. (Annual Fee applies for EMR integration up to 5 locations in the same company). If more than 5 contact Susan Scott.

**\$1,000 annual fee** payable to Susan M. Scott includes copyrighted tool integration into EMR such as EPIC, Cerner, MEDITECH, McKESSON, Allscripts, eClinicalWorks, NextGen, Athenahealth Healthland, Medsphere, QuadraMed, Sigmund, or others. Included in the annual fee is the Scott Triggers ® Solution resources and one hour of complimentary consulting time per Skype or other media for the purpose of strategic planning.

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**Appendix G**

***Nursing Interventions Adherence Checklist***

Date:

Provider/Surgeon:

Procedure:

Patient Label or Medical Record Number:

<b>YES / NO</b>	Complete pre-operative skin assessment
<b>YES / NO</b>	Complete pre-operative risk assessment
<b>YES / NO</b>	Communicate assessment details to intra-operative nurse
<b>YES / NO</b>	Select and implement preventative measures
<b>YES / NO</b>	Conduct skin scan
<b>YES / NO</b>	Communicate assessment details to post anesthesia nurse
<b>YES / NO</b>	Complete post-operative skin assessment

**Appendix H**

**Resource Needs Assessment**

<b>Resource</b>	<b>Needed: YES / NO</b>	<b>Notes</b>
<b>Staff Education and Training</b>		
<b>Champions</b>		
<b>Information Technology</b>		
<b>Printing Copying</b>		
<b>Supplies</b>		
<b>EHR Upgrade</b>		





**Appendix J**

**Organizational Readiness Assessment**

<b>Why is change needed?</b> <ul style="list-style-type: none"> <li>• The facility has identified specific reasons for change</li> </ul>	Yes / No
<b>Members of the organization understand why change is needed.</b> <ul style="list-style-type: none"> <li>• Staff attitudes and interests have been assessed</li> <li>• Results have been analyzed and reveal why buy-in needs to be obtained</li> </ul>	Yes / No
<b>Is the need for change compelling?</b> <ul style="list-style-type: none"> <li>• Participants have a sense of urgency</li> <li>• Efforts to build a sense of urgency are underway</li> </ul>	Yes / No
<b>Is there leadership support for this program?</b> <ul style="list-style-type: none"> <li>• Leadership support has been assessed</li> <li>• If necessary, efforts to gain support are underway</li> </ul>	Yes / No
<b>Who will take ownership of this effort?</b> <ul style="list-style-type: none"> <li>• A leader or team has been identified</li> <li>• A leader or a team is involved in subsequent planning steps</li> </ul>	Yes / No
<b>What kinds of resources are needed?</b> <ul style="list-style-type: none"> <li>• A list of resources has been developed</li> </ul>	Yes / No

Adapted from “Tools and Resources” by Agency for Healthcare Research and Quality, 2014, <https://www.ahrq.gov/patient-safety/settings/hospital/resource/pressureulcer/tool/pu7.html>



## Appendix L

### AORN Prevention of Perioperative Pressure Injury Tool Kit

These educational materials can be used to train and guide staff members on the components of the AORN Prevention of Perioperative Pressure Injury Tool Kit.

- [The Basics of Patient Positioning](#) Understand the fundamentals of proper patient positioning in the operating room that facilitates surgical site access and reduces the risk of pressure injury.
- [Performing a Comprehensive Skin Assessment](#) Understand the fundamentals of performing a comprehensive skin assessment that helps identify issues with skin integrity and protect the patient from harm.
- [Pressure Points](#) Understand what anatomical areas are the most vulnerable to developing a pressure injury.
- [Pre-operative Risk Assessment The Scott Triggers™ Solution](#) Understand how to identify and determine a patients level of risk by completing this risk assessment.