

Introduction of pressure injury preventive measures and improvement initiatives for patients undergoing prolonged surgery at a government hospital in the United Arab Emirates

ABSTRACT

Objectives

- Initiate and implement an appropriate risk assessment tool to identify high-risk prolonged surgery patients at risk of developing pressure injuries (PIs).
- Initiate education and training regarding PI prevention and management in the operating theatre (OT).
- Establish resource individuals in the OT.
- Enable early identification of high-risk patients and implementation of preventative measures.

Methods A retrospective data analysis was conducted from Safety Intelligence (SI) 2016–2017 gathering baseline information of all skin injuries, particularly PIs reported in the OT. Upon completion of a needs analysis, a continuous quality improvement and learning model, Plan-Do-Check-Act (PDCA), was initiated. Comparative data from Quarter 1 (Q1) 2016 to Quarter 4 (Q4) 2018 pre- and post-implementation were analysed.

Results Within a period of 9 months from April to December 2018, 99 patients were referred to the wound care team, with an average operation time of 7 hours. Two cases of PI were reported in Q2 and Q4 2018. The contributing factors discovered upon review of the root cause analysis were related to poor nutrition, extended immobilisation, prolonged surgery time (more than 17 hours), presence of multiple comorbidities e.g. chronic renal failure, diabetes, hypoalbuminaemia and haemodynamic instability. Improvement outcomes were achieved by adhering to the new system and practices.

Conclusion Preventing PIs are part of patient safety and quality of care which needs collaborative and proactive teams with a sense of responsibility and accountability.

Keywords hospital-acquired pressure injury, prolonged surgery, pressure injury, risk assessment, preventive measures

For referencing Abdi A et al. Introduction of pressure injury preventive measures and improvement initiatives for patients undergoing prolonged surgery at a government hospital in the United Arab Emirates. WCET® Journal 2020;40(3):24-36.

DOI <https://doi.org/10.33235/wcet.40.3.24-36>

Asha Ali Abdi

RN, BSN, MSc Healthcare Management, IIWCC
Mafraq Hospital, Abu Dhabi, UAE
Email ashaaliabdi22@gmail.com

Ashwaq Ali*

RN, Diploma, IIWCC
Mafraq Hospital, Abu Dhabi, UAE
Email ashwaqalinuu@gmail.com

Fatima El-Ahmed

RN, BSN, IIWCC
Mafraq Hospital, Abu Dhabi, UAE
Email fatimekasem2018@gmail.com

* *Corresponding author*

INTRODUCTION

Hospital-acquired pressure injuries (HAPIs) are one of the major challenges encountered by any healthcare facility, particularly in the critical care setting¹. This significant problem highlights the increasing incidence of morbidity and mortality, including lengthening of hospital stays, and contributes a substantial financial burden to any healthcare system¹. As defined by the National Pressure Ulcer Advisory Panel (NPUAP)², a PI is “a localized damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device due to intense and/or prolonged pressure or pressure in combination with shear”. Evidence shows that 95% of these PIs are preventable, and reduction of these is considered an eminent priority for any healthcare organisation¹.

One of the high-risk clinical areas of PI development for an ambulatory patient is in the operating theatre (OT). It was emphasised that patients undergoing an operation which lasts for more than 3 hours are at high risk of PI occurrence³. In addition, any injuries over a bony prominence in the body that developed within 72 hours after prolonged and direct pressure during and/or after any surgical procedure are considered a PI incident. Furthermore, a medical device-related PI is a “Pressure injury that results from the use of devices designed and applied for diagnostic or therapeutic purposes. The resultant pressure injury generally closely conforms to the pattern or shape of the device”³. If this pattern of injury occurs during the surgical procedure, it is considered a PI as well⁴. Studies reveal that the incidence and prevalence rates of HAPIs secondary to prolonged surgical procedures range from 5–53.4% and 9–21% respectively⁴.

This incidence rate is likely related to the intraoperative fixed position, type of anaesthesia, length of surgery, and patient factors such as age, gender, and history of diseases such as diabetes and heart failure⁵. The risk of skin damage is much higher in surgical patients than in non-surgical patients due to being immobile during the procedures and lacking awareness of pressure sensation during anaesthesia⁶. Also, anaesthesia decreases autonomic nervous system function which, in turn, enlarges vessels and decreases tissue perfusion, especially over bony prominences; this increases with longer surgery time and the use of general anaesthesia⁷.

At the same time, there is no validated risk assessment measures for surgical patients which has been formally established⁸. Several instruments are available to screen patients at high risk. However, according to an analysis of the predictive validity of the Braden Scale applied to surgical patients, the absence of risk factors related to surgery in this scale – i.e. surgery time or the position of the patient – makes its predictive validity to be low^{6–8}. Other instruments include the Munro Pressure Ulcer Risk Assessment Scale for Perioperative Patients – Adults (the Munro Scale) and the Scott Triggers tool. The Munro Scale includes 15 items to comprehensively assess the risk factors for PIs during the pre-, intra- and postoperative phases^{9–10}. The Scott Triggers tool includes four items of age, serum albumin level, estimated surgery time, and the American Society of Anesthesiologists (ASA) score¹¹.

One component of electronic health records (EHRs) is the pre-anaesthesia evaluation of the condition of a surgical patient written by the anaesthesiologist which is used to formulate an effective anaesthetic plan. This evaluation typically includes the type of surgery, serum albumin level and ASA score, which are also items on the Scott Triggers tool. Other data in the pre-anaesthesia evaluation are type of anaesthesia, laboratory test results such as haemoglobin and creatinine levels, and comorbidities such as hypertension and diabetes which are important to establish the profile, or model of risk factors, for predicting the development of PIs in surgical patients.

Although researchers have scrutinised individual prevention methods – e.g. repositioning, type of OT mattress used – the

effectiveness of implementing a multidimensional approach has not been extensively evaluated⁸. Hence, it is essential for an institution to prevent and reduce the incidence of HAPIs, especially in the OT, and be able to provide safe and effective quality of care that is comparable to local and international benchmarks. Proper padding and pressure-relieving devices should be utilised. A support surface is required to redistribute pressure. The use of foam pads has not been as effective as protective devices, as they easily compress under heavy body areas and result in ‘bottoming out’.

Wound Care Service: an identified need

The Wound Care Service (WCS) at our medical city was initiated in early 2017 by two nurses. In 2018, three additional nurses joined the team to address and further enhance wound management delivered in the inpatient clinical areas. As mandated by SEHA – the Abu Dhabi Health Services Company, the owner/operator of all public hospitals and clinics across the United Arab Emirates, UAE – and the Department of Health (DOH), PI prevention and management are the primary goal of our team. Specific guidelines and key performance indicators (KPIs) known as *Jawda* (the Arabic word for quality) were published to serve as a guide in data collection and monitoring processes¹².

In the first quarter (Q1) of 2018, three HAPI cases were reported after undergoing oral and maxillofacial (OMF) surgeries which lasted from 8–14 hours. This led to an in-depth inter-professional team investigation and initiation of root cause analysis (RCA) to determine contributing factors of these incidences. A retrospective data analysis was conducted from our institutional incident reporting system, Safety Intelligence (SI), between 2016 and 2017 to gather baseline information of all skin injuries – including rashes, irritation, ecchymosis, lacerations, burns, abrasions, skin tears – and PIs reported in the OT.

In 2016, there were 21 reported cases of impaired skin integrity, of which 13 were reported PI cases, while 11 incidents of skin injury, two of which were PIs, were logged in the SI reporting system in 2017 (Figure 1). Furthermore, from 2016 to Q1 of 2018, a total of 18 PI incidents were reported in the OT (Figure 2).

In conjunction with the extensive effort towards patient safety and quality of care at our institution, this quality improvement initiative was chosen to increase PI risk awareness, particularly in the OT. We aimed to identify common contributing factors and evaluate current practice and procedures in coordination with members of the inter-professional OT team – OT nurse leaders/staff/ surgeons – and higher hospital management with representation from nursing, quality and education departments.

Quality improvement goals and objectives

The goal was to reduce the incidence of PIs secondary to prolonged surgery. The following objectives were formulated in order to address the rising HAPI incidence secondary to prolonged surgeries in the OT. Specifically, this study aimed to:

- Identify factors contributing to the development of PIs in the perioperative phase of the surgical population.
- Implement PI preventive measures through:
 - Early identification of high-risk patients and adoption of specific and appropriate risk assessment tools.
 - Initiation of in-service education and training to all OT staff regarding PI prevention and management.
 - Formulation of guidelines and policies related to PI prevention and management specific to perioperative patients.
- Empowerment of OT staff who will serve as resource individuals, and monitoring improvements/progress related to PI incidences.

PROJECT METHODS

Planning and implementation

After completion of a needs analysis, the Plan-Do-Check-Act (PDCA) methodology was applied. This four-step quality improvement and management process is typically used for continuous advancement of people and systems within an

Figure 1. OT SI report 2016 versus 2017

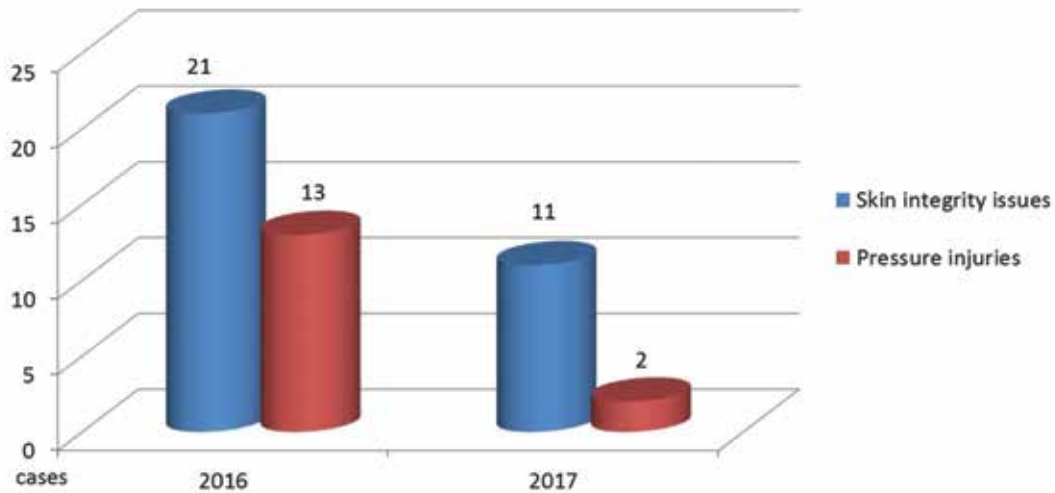


Figure 2. PI incident as raw data reported in SI – Q1 2016 to Q1 2018 in the OT

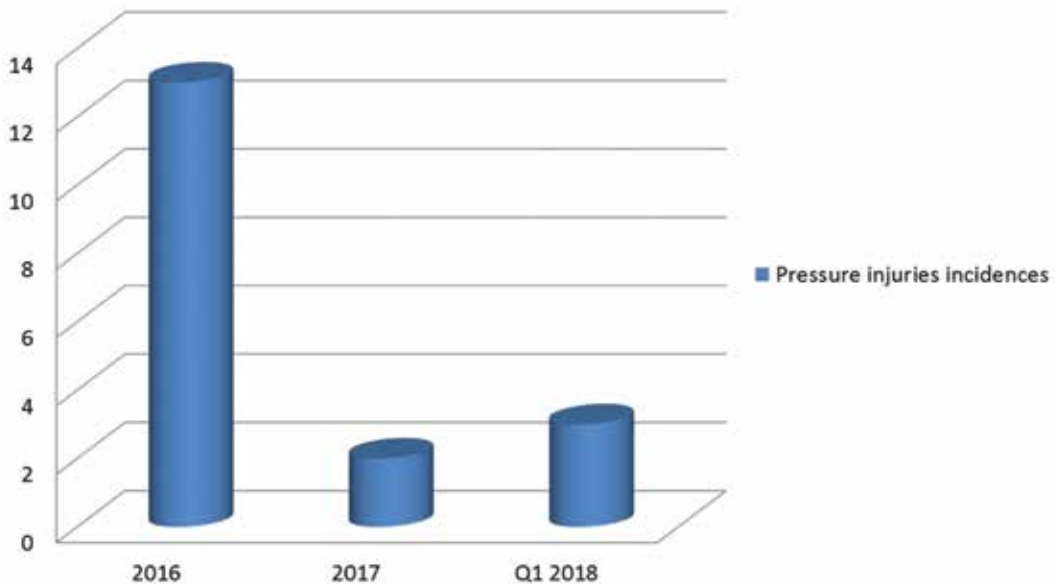
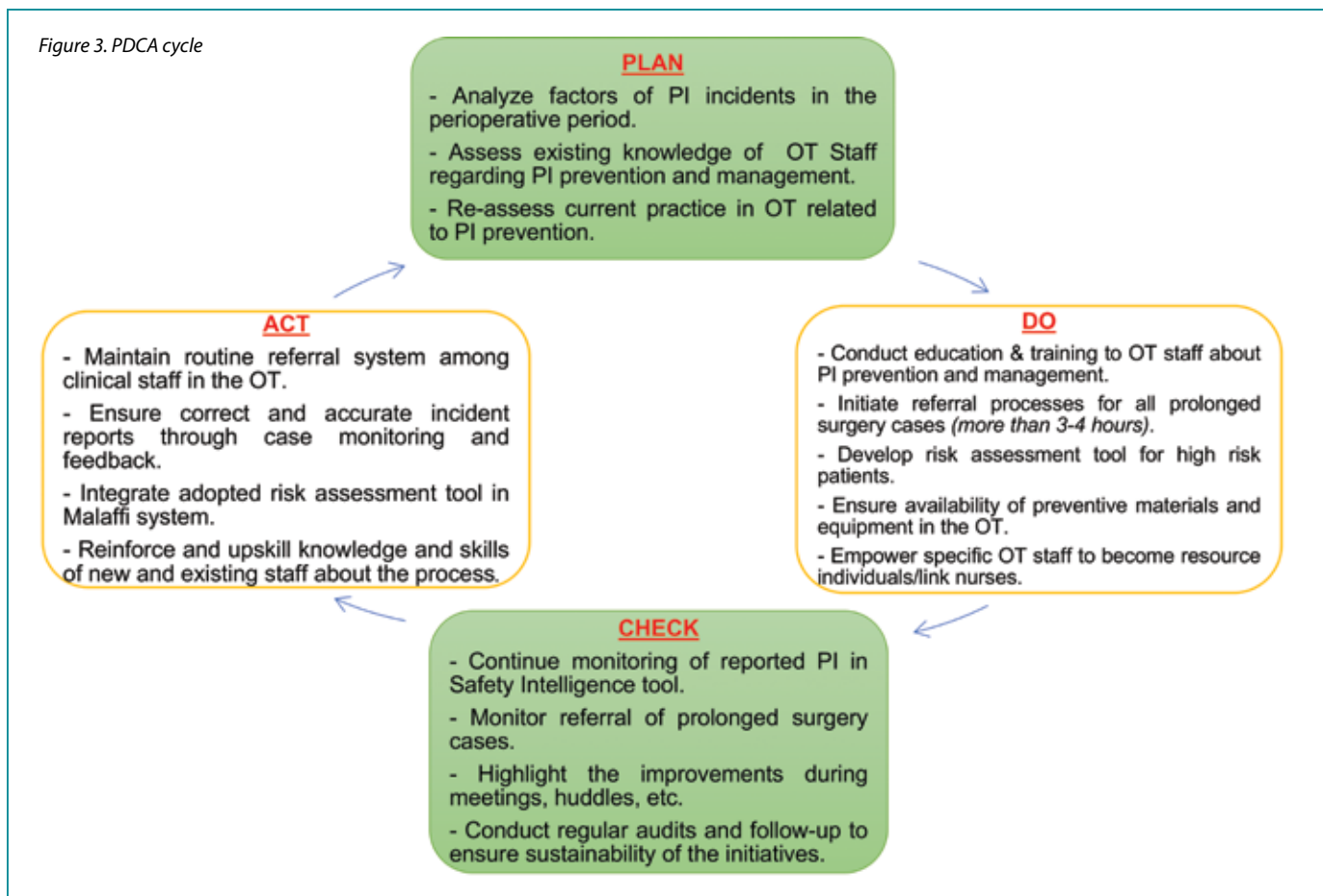


Figure 3. PDCA cycle



organisation¹³⁻¹⁵. PDCA is a successive cycle which starts off small to test potential effects on processes, then gradually leads to larger and more targeted changes¹³. This framework has been utilised in most of SEHA as a quality program for continuous quality improvement activities (Figure 3).

Resources

Human resources: several department meetings and consultations with hospital stakeholders were conducted to identify their respective roles and responsibilities for improving the process of preventing PI incidents for all prolonged surgery cases (Figure 4).

Devices/tool utilised: during the incidence review and data collection period, the approved online incidence reporting tool – the UHC Safety Intelligence (UHC-SI), a real-time, web-based event reporting system – was utilised¹⁶ (Figure 5).

Implementation process

PI prevention is vital and is often neglected in the perioperative setting⁵. A questionnaire was conducted for OT staff to identify the main gaps. Results of RCA from Q1 2018 SI incidences revealed alarming deficits in terms of staff knowledge (PI risk assessment, staging and prevention), system/process (lack of guidelines, risk assessment tool, documentation and resources), appropriate OT table surface, and preventive dressings.

The best practice framework developed by Nelson et al.¹⁷ was adopted in the implementation stage of Q1 to achieve the required outcomes in the prevention of HAPIs. This best practice framework was further utilised as a model for Q1 interventions that targets the process of development in four areas – leadership, staff, information, and information technology (IT) – to support the clinician in the process of changing the old practice and adopting best practice of PI prevention and general performance improvement¹⁷.

Perioperative nurses should be educated about the risk factors of PI development and safety measures that can be implemented to prevent this injury from occurring¹⁸. An appropriate and validated risk assessment tool should be utilised by perioperative nurses to identify patients who are at high risk for developing a PI¹⁸⁻¹⁹. All perioperative team members are responsible for the safe positioning of surgical patients. Circulating nurses coordinate the positioning of patients during intraoperative periods of care at our hospital¹⁸⁻²⁰.

In order to respond to gaps identified, our team focused on establishing awareness through assessments of staff knowledge of PI prevention and management²¹⁻²⁵. A patient trace was conducted in one of the elective cases undergoing OMF surgery. This allowed us to follow and understand the processes in the pre-, intra- and postoperative care provided to

all surgical patients. In addition, accurate assessment, referral in the electronic documentation platform Malaffi – an Abu Dhabi innovative and unified health information exchange platform that facilitates a more patient-centric approach to healthcare provision – and efficient incident reporting were reinforced during the morning huddle, staff meetings and

mandatory training. Coordination with the Nursing Education Department (NED) involved the clinical resource nurse (CRN) and application specialist investigating and formulating a risk assessment tool specific to the OT that could be incorporated in Malaffi. Detailed implementation processes were laid out as follows:

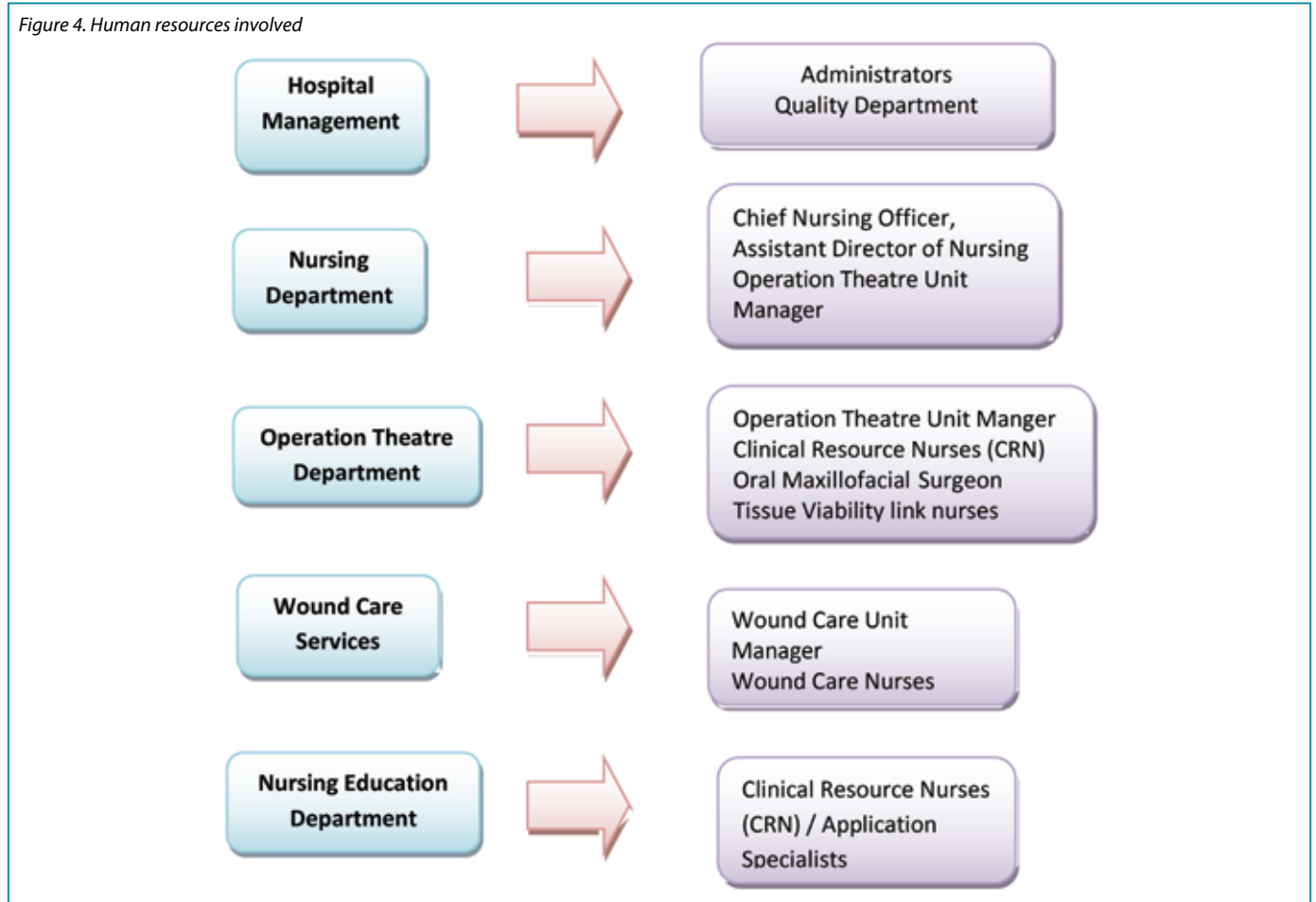
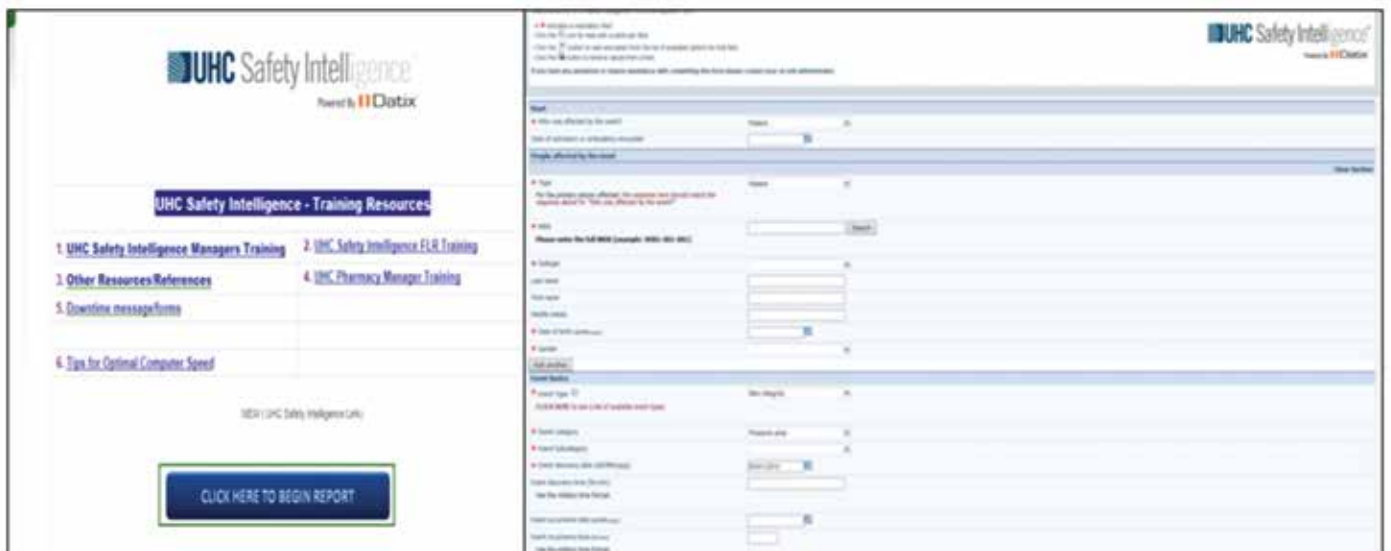


Figure 5. The UHC-SI tool



Knowledge assessment and mandatory PI education

Initial evaluations of PI knowledge among OT staff were completed using the Pieper Pressure Injury Knowledge Assessment Survey²²⁻²³. Discrepancies in terms of the concepts of PI prevention – use of rings/doughnuts, massaging bony prominences areas – and inaccurate staging were observed²⁴. These gaps were addressed during the two mandatory education sessions conducted in the months of April and May 2018. An additional communication huddle guide was prepared emphasising the Surface/Skin assessment, Keep moving, Incontinence and Nutrition management (SKIN bundle), and the use of preventative dressings was communicated during daily pre-meetings.

Patient tracer and process evaluation

Prior to implementation, the actual process of the perioperative journey was observed by conducting a patient tracer. One patient under OMF who was electively admitted and booked for more than 10 hours of surgery was followed initially from the day surgery unit. Observation was continued from the pre-holding area in the OT until the patient reached surgical ICU postoperatively. Major findings included the lack of a standardised PI risk assessment tool, inconsistent implementation of referral system/consultation to the WCS, and inadequate pressure relieving equipment and supplies available in the OT. These findings were incorporated into the major action plan and communicated with the respective departments.

Early identification of high-risk patients and referral process

Clinical staff are requested to refer all patients to the WCS who are at risk of developing a PI – using risk assessment scores – and who are undergoing surgical procedures of more than 3 hours. These patients can be referred at any time or immediately after their surgery via the Malaffi. Through this system, OT staff are encouraged to complete accurate skin assessment/re-assessment prior to, during and after surgery by using a newly developed risk assessment tool with an emphasis on clear documentation which is to be reflected in the electronic documentation, the Surginet – MQM Nurse Assess Skin.

Risk assessment tool and recruitment of unit resources

Performing early risk assessment and appropriate interventions can prevent PI development¹⁸⁻²⁵. Due to the lack of a specific PI risk assessment tool to identify the risk status of patients undergoing prolonged surgery in our institution, the project team – in coordination with the OT CRNs – reviewed the possibility of adopting an existing risk assessment scale relevant to the operative period. Multiple discussions and meetings were held to review any existing PI risk assessment tools for the OT.

It was decided to incorporate the Scott Triggers tool as part of the skin risk assessment tool. The elements of the Scott Triggers¹¹ tool are: age >62; an ASA score >3; albumin <3.5g/dl; and prolonged surgery time >3 hours. The ASA score is a

“global score that assesses the physical status of patients before surgery”¹⁰. The CRNs initiated and submitted a proposal to trial the Scott Trigger tool to the Perioperative Nursing Advisory Council Committee. An aim was to investigate the possibility of integrating the tool in the electronic clinical documentation system Surginet, with a further goal of standardising to all other SEHA business entities (see Appendix 3A & 3B). Upon identification of risk using the Scott Triggers tool, a bundled preventive approach or POP program (Prophylactic/Prevention dressing, Offloading devices/equipment and Position changing) would be initiated by OT staff. Completion of the process included accurate hand over between OT or post-anaesthesia care unit (PACU) staff to the receiving unit, with continued referral to the WCS as necessary. Furthermore, two staff from the OT department were nominated to be active members of the tissue viability link nurses group. These individuals will serve as a resource for information in promoting, reinforcing and monitoring PI preventive practices in the OT.

Introduction of preventive dressings and requisition of OT table mattresses

In addition to existing preventative protocols, the project team extended the use of preventive dressings for identified high-risk individuals in the OT. Although wound dressings are not routinely used to prevent PIs, evidence demonstrates that a non-woven, multilayer, polyurethane foam dressing may reduce the effect of shear forces¹⁸. Process guidelines were initiated in the OT (see Appendix 4) to keep the preventive dressing materials in a designated cabinet in the pre-holding area. Prophylactic dressing application over bony prominences such as the sacrum and trochanters can be applied in the pre-holding area or prior to sedation and positioning in the OT table to prevent the development of PIs (see Appendix 5).

Inadequate access to pressure relieving equipment and devices was one of the major findings during the tracer exercise. As observed, the operating table, with its hard surface, is only cushioned by gel padding and toppers. Pressure relieving and redistributing devices are widely accepted methods of preventing the development of PIs for people considered at risk²⁶. This equipment may be used in a variety of ways in the OT. Custom-made cushions for the OT tables are necessary to provide adequate support during extended surgeries. These issues have been raised with our facilities’ nurse leaders and cordially communicated with the materials management department for the provision of appropriate foam mattress and additional gel paddings.

Data analysis

The data collected from the SI between 2016 and Q1 2018 were used as a benchmark for the OT improvement project. After initiating the various strategies and methodologies, the team recognised there was a gradual improvement in the incident reports received from Q2–Q4 2018. These outcomes were achieved with the commitment and consistency of all departments adhering to the new system and practices, which included:

- Proper hand over and concurrent skin assessment.
- Identification of high-risk patients.
- Implementation of appropriate prevention measures.
- Earlier referral to the WCS.

Barriers identified by the group

Changing clinical practice can be a challenging process. Throughout the process of the improvement project, the team encountered important barriers and implemented activities to address these. These are outlined in detail in Table 1.

Project tools

The tools and processes used for the successful completion of quality improvement initiatives are outlined in the appendices:

- Appendix 1 displays the tool used for assessing OT staff knowledge.
- Appendix 2 (A & B) outlines the referral system to the WCS in the Mafraq Hospital.
- Appendix 3 (A & B) outlines the proposed pre-operative skin risk assessment form.
- Appendix 4 shows the pre-operative skin risk assessment flow chart utilised in the OT.
- Appendix 5 outlines the communication huddle regarding the appropriate use of prophylactic dressings in clinical settings.

EVALUATION AND OUTCOMES

Evaluation of the process

In accordance with the sudden increase of PIs reported in the OT from UHC-SI, the WCS decided to reduce these preventable cases of HAPIs. Both quantitative and qualitative data were

evaluated to determine the impact of implementing system and process changes in our institution.

Qualitative outcomes

Valuable feedback was received from OT staff and nurse leaders following implementation of this quality improvement initiative. The focus was on the efficiency of the prophylactic dressing, the effectiveness of posters on the OT communication board in alerting staff, and the usefulness of education sessions to reinforce knowledge of all OT staff. Moreover, the reduction of PIs in the OT showed great achievement that positively affected the total number of HAPIs.

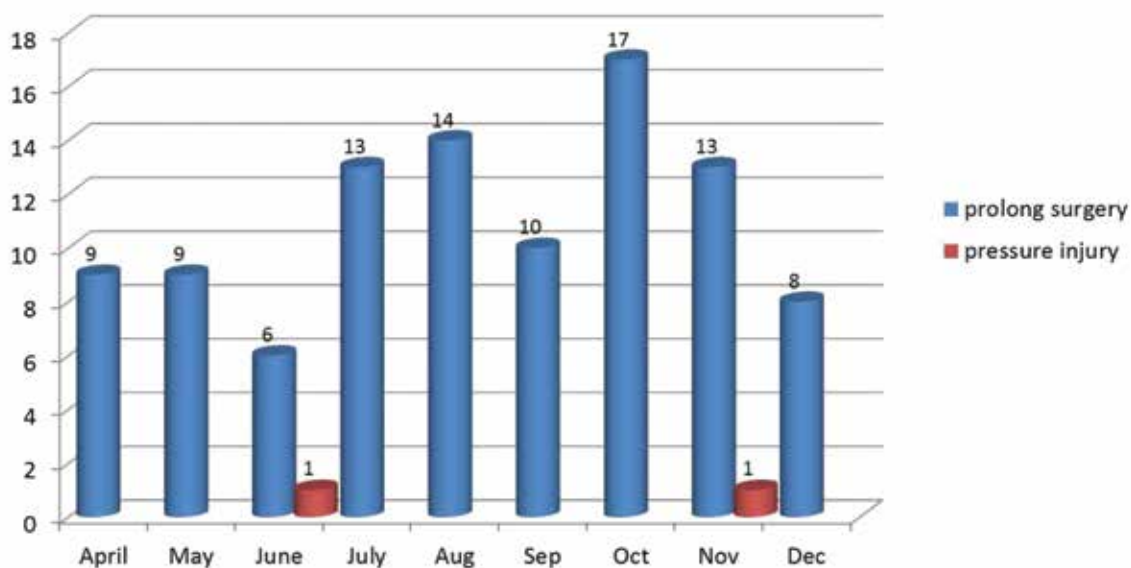
Quantitative outcomes

Quantitative data were gathered through incident reports via the SI unit. In addition, the total number of patients who underwent extended surgery time (>3 hours) were gathered through daily referrals. All data were compared between 2016 to Q1 2018 versus Q2–Q4 2018 data to evaluate the effectiveness of the initiative and to be able to identify significant changes between the two data sets.

After collecting all reported skin integrity incidence data from 2016 to Q1 2018, monthly data of referrals related to prolonged surgery were generated at the beginning of April 2018. An average of 9–11 patients were initially referred monthly to the WCS for follow-up. A total incidence of two cases were reported; one in the month of June 2018 and one in November 2018 which were in addition to the three cases reported from Q1 2018 (Figures 6 & 7).

Within a 9-month period, 99 patients were referred to the WCS. Each of these patients, on average, had spent 7 hours on the operating table. Two cases of PI were reported – in Q2 and Q4

Figure 6. Monthly referrals versus OT PI incidents 2018



2018. The contributing factors discovered through RCA were poor nutrition, immobilisation, prolonged surgery time (more than 17 hours), presence of multiple comorbidities (chronic renal failure, diabetes), hypoalbuminaemia, haemodynamic instability, and inadequate skin assessment.

Reflection on lessons learned and stimulus for future work

On reflection of the initiation, implementation and outcomes of the quality improvement project, it would be important to:

- Ensure the availability and utilisation of a validated perioperative risk assessment tool is incorporated in the clinical documentation system in all public hospital facilities.
- Include more surgeons and allied healthcare staff from other disciplines in the mandatory education sessions related to the prevention of PIs.
- Conduct regular monthly audits for OT staff to evaluate and ensure continuous implementation of strategies related to the prevention of PIs.

CONCLUSION

The goal of any healthcare improvement project is to implement realistic action plans that can lead to measurable outcomes and enrich healthcare services offered to patients. As a team, our aim was to decrease HAPI, which required collaboration and commitment with various stakeholders – higher management, patients and healthcare practitioners – through proper communication of common challenges and pressing needs in the clinical setting. At our organisation, the support of key nurses in the perioperative area resulted in a new perspective and attitude towards PI prevention.

In summary, the prevention of HAPIs entails increasing awareness among stakeholders about the importance of early identification of at-risk patients and initiation of preventive measures. Engagement of an inter-professional approach towards quality improvements will ensure a long-lasting impact to both the patient and healthcare system.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

FUNDING

The authors received no funding for this study.

REFERENCES

1. Graves N, Birrell F, Whitby M. Effect of pressure ulcers on length of hospital stay. *Infect Control Hosp Epidemiol* 2005;26(3):293–297.
2. National Pressure Ulcer Advisory Panel (NPUAP). Pressure injury stages. Available from: <http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-injury-stages/>
3. Pressure ulcers get new terminology and staging definitions, *Nursing*: March 2017 - Volume 47 - Issue 3 - p 68-69 doi: 10.1097/01.NURSE.0000512498.50808.2b.
4. Black J. The operating room. 2015 National Pressure Ulcer Advisory Panel. Available from: <http://www.npuap.org/wp-content/uploads/2015/02/2.-Patients-in-the-OR-J-Black.pdf>
5. Wensing M, Bosch M, Grol R. Developing and selecting interventions for translating knowledge to action. *CMAJ* 2010;182:E85–8.
6. Walton-Geer PS. Prevention of pressure ulcers in the surgical patient. *AORN J* 2009;89(3):538–552.
7. Girouard K, Harrison MB, VanDenKerkof E. The symptom of pain with pressure ulcers: a review of the literature. *OWM* 2008;54:30-40,42.

Figure 7. Quarterly referrals versus OT PI incidents 2018

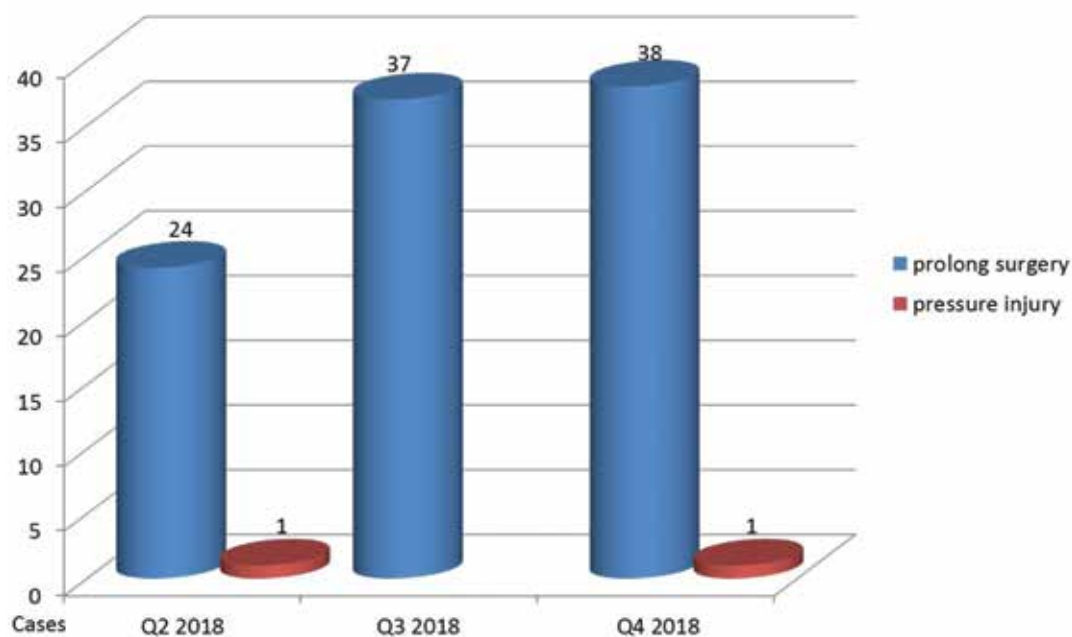


Table 1. Barriers and activities implemented

Barriers	Activity implemented
Unavailability of resource individuals/team in the OT who will monitor the progress of the initiatives	<ul style="list-style-type: none"> Recruited two OT nurses to be part of the tissue viability link nurses Promoted active involvement of NED and CRNs
Resistance to the implementation of preventive measures, e.g. the use of preventive dressings	<ul style="list-style-type: none"> Enhanced staff awareness through training and education Conducted several meetings with the surgeons and OT stakeholders Provided evidence-based articles about the effectiveness of preventive dressings
Unable to track patients who underwent prolonged surgeries; only OMF cases were initially being referred	<ul style="list-style-type: none"> Initiated wound care referral from recovery room before transferring patient to the general wards for all prolonged surgery cases

- He W, Liu P, Chen HL. The Braden Scale cannot be used alone for assessing pressure ulcer risk in surgical patients: a meta-analysis. *Ostomy Wound Manage* 2012;58(2):34–40.
- Hwang HY, Shin YS, Cho HS, Yeo JS. Risk factors of pressure sore in patients undergoing general anaesthesia. *Korean J Anaesthesiol* 2007;53(1):79–84.
- Munro CA. The development of a pressure ulcer risk-assessment scale for perioperative patients. *AORN J* 2010;92(3):272–287.
- Scott SM. Progress and challenges in perioperative pressure ulcer prevention. *J WOCN* 2015;42(5):480–5.
- Department of Health (DOH) / Health Authority of Abu Dhabi (HAAD). HAAD JAWDA quality performance KPI profile. 2015. Available from: <https://www.haad.ae/HAAD/LinkClick.aspx?fileticket=j73CZWI86MU%3D&tabid=1450>
- Chandrakanth K. Plan Do Check Act (PDCA) improving quality through agile accountability. Available from: <https://www.agilealliance.org/wp-content/uploads/2016/01/PDCA.pdf>
- World Health Organization. Bridging the “Know–Do” gap. Meeting on Knowledge Translation in Global Health. 2005 October 10–12; Geneva (Switzerland).
- Kitson A, Staus SD. The knowledge-to-action cycle: identifying the gaps. *CMAJ* 2010;182(2):E73–7.
- Al Mafraq Hospital. Policy Manager: UHC Safety Intelligence Policy. 2012 July. Available from: <http://portal.seha.ae/mafraq/DMS/Quality%20and%20OHS/INCIDENT%20MANAGEMENT%20POLICY.pdf>
- Nelson EC. Success characteristics of high performing microsystems: learning from the best. In Nelson EC, Batalden PB, Godfrey MM, editors. *Quality by design: a clinical microsystems approach*. San Francisco, California: Jossey-Bass; 2007.
- World Union of Wound Healing Societies (WUWHS). Consensus Document. Role of dressings in pressure ulcer prevention. *Wounds Int* 2016;29:9–12. doi:10.13140/RG.2.2.17422.77123
- McKibbin KA, Lokker KA, Lokker C, et al. A cross-sectional study of the number and frequency of terms used to refer to knowledge translation in a body of health literature in 2006: a Tower of Babel? *Implement Sci* 2010;5:16.
- Delmore B, Lebovits S, Suggs B, Rolnitzky L, Ayello EA. Risk factors associated with heel pressure ulcers in hospitalized patients. *J WOCN* 2015;42(3):242–8.
- Straus SE, Tetroe JM, Graham ID. Knowledge translation is the use of knowledge in health care decision making. *J Clin Epidemiol* 2011;64:6–10.
- Delmore B, Ayello EA, Smart H, Sibbald RG. Assessing pressure injury knowledge using the Pieper-Zulkowski pressure ulcer knowledge test. *Adv Skin & Wound Care* 2018;31(9):406–12.
- Grimshaw J, Eccles M, Lavia J, Hill S, Squires J. Knowledge translation of research findings. *Implement Sci* 2012;7:50.
- Agency for Healthcare Research and Quality. Translating Research Into Practice (TRIP) Y II. 2001 [cited 2018 Aug 10]. Available from: <https://archive.ahrq.gov/research/findings/factsheets/translating/tripfac/trip2fac.pdf>.
- Lewis-Byers K, Thayer D. An evaluation of two incontinence skin care protocols in a long-term care setting. *OWM* 2002;48(12):44–51.
- Huang HY, Chen HL, Xu XJ. Pressure-redistribution surfaces for prevention of surgery-related pressure ulcers: a meta-analysis. *OWM* 2013;59(4):36–8.

APPENDIX 1. KNOWLEDGE ASSESSMENT TOOL

PRESSURE INJURY KNOWLEDGE AND ATTITUDE ASSESSMENT TOOL

Date: _____

Designation/Role

Registered Nurse

Practical Nurse

Anaesthesia Technician

Physician Surgeon

Physician Anaesthesia

Others (please specify) _____

Gender

Male

Female

Age

20-30 years old

31-40 years old

41 years & above

Academic Level

Diploma

Bachelor's Degree

Masteral/PhD

Clinical Experience

0-5 years

6-10 years

11-15 years

16 years & above

Have you read recent articles/research about pressure injury prevention and management?

Yes No

Have you attended/participated on any education/mandatory training program related to pressure injury prevention and management?

Yes No



PRESSURE INJURY KNOWLEDGE AND ATTITUDE ASSESSMENT TOOL

Views on Pressure Injury Prevention

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. All patients are at potential risk of developing pressure ulcers/injury					
2. Pressure ulcer/ injury prevention is time consuming for me to carry out					
3. In my opinion, patients tend not to get as many pressure ulcers/ injury nowadays					
4. I do not need to concern myself with pressure ulcer/ injury prevention in my practice					
5. Pressure ulcer/ injury treatment is a greater priority than pressure ulcer prevention					
6. Continuous assessment of patients will give an accurate account of their pressure ulcer/injury risk					
7. Most pressure ulcers/injury can be avoided					
8. I am less interested in pressure ulcer/injury prevention than other aspects of care					
9. My clinical judgment is better than any pressure ulcer/injury risk assessment tool available to me					
10. In comparison with other areas of care, pressure ulcer/injury prevention is a low priority for me					
11. Pressure ulcer/injury risk assessment should be regularly carried out on all patients during their stay in hospital					

Reference: Moore Z, Price P. Nurses' attitudes, behaviors, and perceived barriers towards pressure ulcer prevention. *J Clin Nurs* 2004;13:942-52.

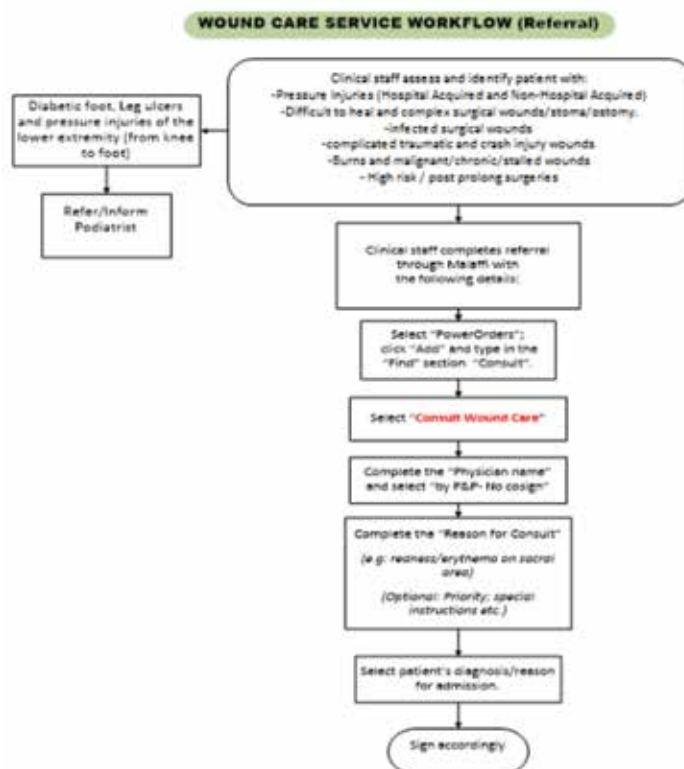
PRESSURE INJURY KNOWLEDGE AND ATTITUDE ASSESSMENT TOOL

Pieper Pressure Ulcer/Injury Knowledge Test

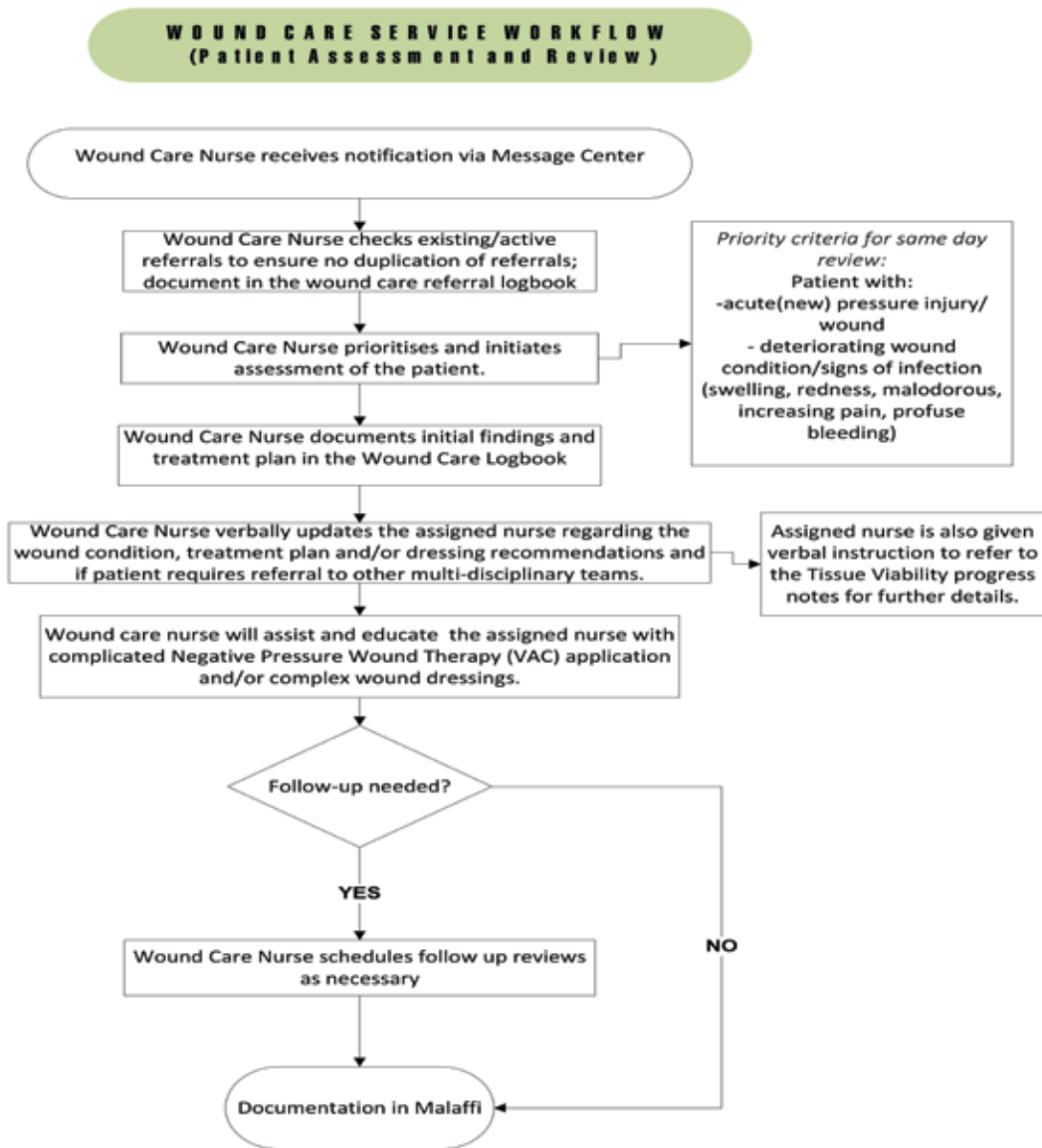
For each question, mark the box for True, False, or Don't Know.

Question	True	False	Don't Know
A person confined to bed should be repositioned based on the individual's risk factors and the support surface's characteristics.			
Dragging the patient up in bed increases friction.			
Small position changes may need to be used for patients who cannot tolerate major shifts in body positioning.			
A pressure redistribution surface manages tissue load and the climate against the skin.			
A Stage 2 pressure injury/ulcer may have slough in its base.			
If necrotic tissue is present and if bone can be seen or palpated, the ulcer is a Stage 4.			
Donut devices/cushions help to prevent pressure injury/ulcers.			
A specialty bed should be used for all patients at high risk for pressure injury/ulcers.			
Foam dressing may be used on areas at risk for shear injury.			
Critical care patients may need slow, gradual turning because of being hemodynamically unstable.			
A blister on the heel is nothing to worry about.			
Staff education alone may reduce the incidence of pressure injury/ulcers.			
Early changes associated with pressure injury/ulcer development may be missed in persons with darker skin tones.			
Bone, tendon, or muscle may be exposed in a Stage 3 pressure injury/ulcer.			
Deep tissue injury is a localized area of purple or maroon discolored intact skin or a blood-filled blister.			
Massage of bony prominences is essential for quality skin care.			
Pressure injury/ulcers can occur around the ears in a person using oxygen by nasal cannula.			
Stage 1 pressure injury/ulcers are intact skin with non-blanchable erythema over a bony prominence.			
When the ulcer base is totally covered by slough, it cannot be staged.			
Selection of a support surface should only consider the person's level of pressure injury/ulcer risk.			
Shear injury is not a concern for a patient using a lateral-rotation bed.			
Nurses should avoid turning a patient onto a reddened area.			
A Stage 4 pressure injury/ulcer never has undermining.			

APPENDIX 2A. WOUND CARE SERVICE REFERRAL WORKFLOW



APPENDIX 2B. WOUND CARE SERVICE PATIENT ASSESSMENT AND WORKFLOW



APPENDIX 3A. OT PRE-OPERATIVE SKIN RISK ASSESSMENT

BEHA

In the Unit Pre-procedure checklist

At Risk
 •Moderate Risk
 •High Risk
 •Very High Risk

} Create a flow from the Braden Scale to Pre procedure Checklist

Step 1:
 The Unit Nurse will assess the patient using the Braden Specific Risk Score.

Step 2:
 In the Pre-procedure checklist the Unit Nurse shall:

In the skin symptom segment:
 •Identify the level of risk (Braden Specific Risk Score)

APPENDIX 3B. PROPOSED MODIFICATION IN PRE-OPERATIVE CHECKLIST WITH ADDITION OF SKIN RISK ASSESSMENT IN MALAFFI



SURGINET suggested flow for Pressure injury prevention

Done by:
CRN OR Malaffi Hospital

80050 www.seha.ae

In the Pre Holding Handover Segment:

The Pre Holding Nurse shall:


- ✓ Document and discuss the overall Pressure Injury Risk Findings.


Overall Pressure Injury Risk Findings	Braden Specific Risk Score	Surgical Skin Risk Assessment Tool
Low Risk	At Risk	Low
Moderate Risk	Moderate / High / Very High Risk	Low
High Risk	All Levels of Risk	High

Pre holding nurse

Complete Surgical Skin Risk Assessment Tool.

Age > 62
ASA Score ≥ 3
Albumin < 3.5 g/dl
Prolonged Surgery Time ≥ 3 hours





In the Intra Op Handover Segment:

In the Intra Op Handover Segment:
The Circulating Nurse shall:

Document the overall Pressure Injury Risk Findings and preventive measures done.

- Low Risk
- Moderate Risk
- High Risk

Create a flow from Intra Op Handover Segment to the Nursing Handover Summary PACU

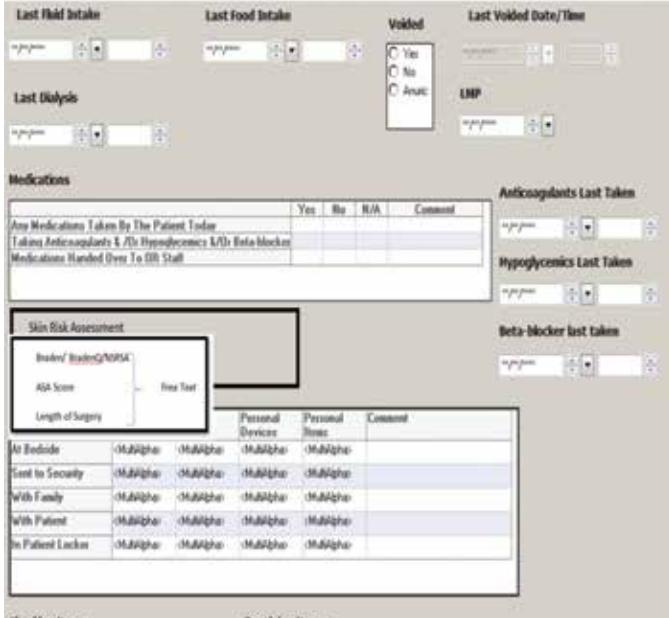
In the Intra Op Sign in Segment:

The Circulating Nurse shall:

- ✓ Discuss the overall Pressure Injury Risk Findings and preventive measures according to the guidelines.

Overall Pressure Injury Risk Findings	Low Risk	Moderate Risk	High Risk
Preventive Measures	Use of gel pads in the areas of increased risk for pressure ulcer development	Use of the following: 1. Gel Pads 2. Sequential Compression Device	Use of the following: 1. Prophylactic Dressing 2. Gel Pads 3. Sequential Compression Device (if necessary) 4. Special Mattress Turning of patient every 2 hours Reassess skin every 2 hours if feasible





The screenshot shows a digital form for the Intra-Operative Sign-in Segment. It includes fields for:


- Last Fluid Intake (with dropdown menu)
- Last Food Intake (with dropdown menu)
- Voided (Yes/No/Asac)
- Last Voided Date/Time
- Last Dialysis (with dropdown menu)
- LMP (Last Menstrual Period)
- Medications table with columns: Any Medications Taken By The Patient Today, Yes, No, N/A, Consent.
- Anticoagulants Last Taken (with dropdown menu)
- Hypoglycemics Last Taken (with dropdown menu)
- Beta-blocker last taken (with dropdown menu)
- Skin Risk Assessment section with a dropdown for Braden/BradenQ/NPMA, a text field for ASA Score, and a text field for Length of Surgery.
- Personal Devices table with columns: Personal Devices, Personal Items, Consent.
- Personal Devices table with rows: At Bedside, Sent to Security, With Family, With Patient, In Patient Locker.

Checking Nurse: _____ Receiving Nurse: _____

APPENDIX 4. PREOPERATIVE SKIN RISK ASSESSMENT FLOW CHART





APPENDIX 5. COMMUNICATION HUDDLE REGARDING THE USE OF PROPHYLACTIC DRESSING



NURSING DEPARTMENT
COMMUNICATION HUDDLE
Prophylactic Dressing Application Guidelines

Products Available:

Product Description:
Mepilex Border dressings (3M/InVivo Health Care) are self-adherent, multilayer foam dressings which include proprietary soft silicone technology (called Safetac).
The dressings are made up of 5 layers. The layer closest to the skin is designed to reduce friction between the skin and the dressing itself.
The Safetac technology is designed to allow the dressing to be easily peeled back and reapplied, thereby enabling multiple inspections of the skin site without needing to fully replace the dressing.
The other 4 layers are virtually designed to cushion, prevent stretch or tear, absorb moisture and allow moisture to evaporate.

Treatment Goal:
Mepilex Border dressings will be used primarily for prevention purposes. It should be utilized in conjunction with existing strategies for preventing pressure injuries (SKINS Bundle). (refer to Policy Manager Pressure Injury Prevention Guidelines)

Intended Patients Use:
Mepilex Border dressings should be used in patients of all ages in all acute care settings who are considered to be at highest risk to develop pressure injury, particularly:

- Patient with Braden score of less than or equal to 12 or totally immobile; with multiple contraptions such as endotracheal tube, on mechanical ventilation, ongoing sedation and intubate support.
- Patient under minimal handling after major trauma and/or critically ill (e.g. with cardiac arrest, head injury)
- High risk patient with previous pressure injury (old wound (scar) over bony prominence areas particularly sacral/trochanter/heel areas).
- Patients who are emaciated (abnormally thin or weak), with fragile or sensitive skin or morbidly obese.
- Patients scheduled for long hours of surgery (more than 4 hours).

Application and Duration of Use:

- Clinical staff to assess the patient for pressure injury risk and refer to Wound Care Service as necessary and/or communicate with Tissue Viability Link Nurse (TVLN) of the unit. (refer to Policy Manager: Wound Care Service Referral Workflow)
- If patient met the criteria, apply Mepilex Border Sacrum (18x18cm) or Mepilex Border (15x15cm) on the sacral area / area of concern. (refer to Mepilex Border Application Guide)
- Inspect skin under dressing daily (more frequent as necessary) by carefully lifting the border edge and repositioning following inspection.
- Change dressing every 3-5 days. Dressing should be changed if rolled, soiled, saturated, displaced or compromised. **Do not cut the foam dressing.**
- If skin condition deteriorates, refer back to Wound Care Service (Nurse). May use other foam dressings (Telle/Allyon foam) as secondary dressing for treatment purposes.

References:
National Institute for Health and Care Excellence (NICE), Mepilex Border dressings for preventing pressure ulcers <https://www.nice.org.uk/advice/mb124/chapter/Clinical-and-technical-evidence>