Pressure injury risk assessment and prevention strategies in operating room patients – findings from a study tour of novel practices in American hospitals

Authors

Lauren Goudas
MN, BN
Nurse consultant
Clinical nurse, Royal Adelaide Hospital

Steven Bruni
MClinPract, BN
Clinical nurse, Royal Adelaide Hospital

Introduction

Hospital-acquired pressure injuries (HAPIs) lead to complications such as increased pain, increased bed days, re-admissions, multiple surgical interventions, possible disfigurement, decreased quality of life, increased health care cost and mortality[1-5]. However, HAPIs are preventable and financial penalties have been imposed in some parts of the world as a strategy for ensuring hospitals comply with standards of practice to prevent them from occurring[1]. In the United States of America, the Centers for Medicare and Medicaid Services developed guidelines that deny reimbursement for care required due to HAPIs across hospitals in the United States of America[2]. In the Australian context, pressure injury has been identified as a hospital-acquired complication with the potential to affect an organisation's revenue[6]. In Queensland, public hospitals attract significant penalties for failing to prevent pressure injuries with fines ranging from $30 000 and $50 000 for Stage 3 and Stage 4 HAPIs, respectively[1].

Research indicates that pressure injuries from the operating room (OR) can appear from 48 to 72 hours after surgery, thus the incidence of pressure injury following surgery is likely to be under-reported[7–10]. It can therefore be difficult to gain a true representation of pressure injury development in the OR. Facilities in the USA are now attributing pressure injuries that appear 72 hours after surgery to the care the patient received in the OR[11].

There are several factors specific to the OR which increase the risk for pressure injury development such as poor positioning, major trauma/surgery, pharmacological side-effects, impaired regulation of body temperature, extracorporeal circulation, reduced perfusion, ineffective communication of patient risk, operations over three hours in length and the patient being immobile and unable to feel pain[2,7,12–17]. Importantly, for every 30 minutes past a four-hour procedure the risk of pressure injury development increases by approximately 33 per cent[11].

Some Australian health services recommend the use of guidelines for preventing HAPIs and include administering the Braden Scale when there is 'more than four hours of complete immobility such as during surgery'[17]. However, research indicates that the Braden Scale has poor predictive validity for critically ill patients[18]. Additionally, in their article, Byers, Carta and Mayrovitz[19] explain that using the Braden Scale following induction of a general anaesthetic would be futile, identifying all patients as 'at risk' without much variability[19]. In this case, staff will be unlikely to implement extraordinary interventions during this phase. Furthermore, the Braden Scale does not require a skin inspection to be undertaken[20]. This leads to an ineffective assessment of the pressure injury risk for OR patients.

Project background

Being awarded a 2017–2018 South Australian premier's nursing and midwifery scholarship allowed the authors to undertake a study tour to the USA to investigate pressure injury risk assessment and prevention strategies used there and to see what could be adapted to use in Australia.

The purpose of the study tour was to investigate how several key hospitals in the USA are using new tools to assess perioperative patients for pressure injury risk. Additionally, we aimed to explore what preventative interventions are being used for patients identified as being at risk of developing a pressure injury and to discover how these practices have been implemented.

The USA was chosen as a leader in HAPI prevention largely due to their implementation of two assessment tools, the Munro Pressure Ulcer Risk

Assessment Scale For Perioperative Patients (Munro scale) and Scott triggers which have been repeatedly validated and used across numerous hospitals in the USA. Both tools specifically assess for pressure injury risk in the perioperative population, allowing the surgical team to appropriately plan and effectively communicate interventions to prevent pressure injuries. At this stage there is little evidence comparing these new tools to the Braden or other widely used scales; however, this can be attributed to the relative infancy of these tools. Both tools are part of the Perioperative Pressure Injury Toolkit produced by the Association of PeriOperative Registered Nurses (AORN)[21].

We visited seven hospitals across four states in the USA and met world renowned researchers and leaders in the field of pressure injury prevention as well as individuals who are affiliated with AORN and the National Pressure Ulcer Advisory Panel (NPUAP).

Project findings

The Munro scale

In California we visited Providence Saint John's Health Center, Santa Monica, and were hosted by Cassendra Munro, MSN, RN, CNOR. Cassendra is the Magnet and professional practice manager and the founder of the Munro scale.

The Munro scale encompasses assessment of patient risk, with a risk level scored for each phase of surgery (pre-, intra- and post-operative)[22]. The Munro scale has undergone three rounds of Delphi research and is currently implemented in seven sites across the USA. It is currently undergoing revision and the next version is due soon.

Preoperatively the Munro Scale assesses mobility, nutritional state, BMI, recent weight loss, age and co-morbidities. Intra-operatively it assesses physical status, ASA score, anaesthesia, body temperature, hypotension, moisture, surface/motion and position. In the Post Anaesthesia Care Unit the Munro scale assesses the length of procedure and blood loss. The total of the cumulative scores deems a patient low, moderate or high risk. One of the standout benefits of the Munro scale is its cumulative nature that facilitates communication and handover between the preoperative, intra-operative and post-operative departments and through to the inpatient wards. It requires nurses to say who they have handed over the information to, which was quite interesting, and requires signatures of who completed the assessment and who is receiving the patient.

Additionally, the mnemonic of CMUNRO SCALE® can be used to heighten awareness and is a great transition to the Munro assessment tool. The CMUNRO SCALE® mnemonic was developed for nurses to become accustomed to the perioperative risk factors evaluated by the Munro scale. The difference between the CMUNRO SCALE® mnemonic and the Munro scale assessment tool is that the latter has calculations for a level of risk which results in a cumulative score and is predictive in nature. Cassendra demonstrated that the mnemonic could be put on a lanyard by nurses for quick and easy access. Cassendra stated that she believes the use of the mnemonic heightens awareness of contributors to pressure injury, increasing prevention and management, increases wound consults, increases communication and improves skin assessments. Cassendra reiterated to us the importance of 'closing the loop' so enhancing and facilitating communication and feedback across all departments.

	Preoperative
C	Co-morbidities current status
M	Mobility
U	Under age of 60
N	Nutrition
R	Recent weight loss
O	Over weight (BMI)
	Intra-operative
S	Systolic BP
	Surface
C	Core temperature
A	ASA
	Anesthesia type
L	Laying position
	Laying moisture
	Post-operative
	LOS periop
E	EBL

Summary of the CMUNRO SCALE

Scott Triggers tool

In Memphis, Tennessee we were hosted by Susan Scott, BSN, RN, WOC, and visited Methodist University Hospital, St Jude Children's Research Hospital, Memphis VA Medical Center, Le Bonheur Children's Hospital and University of Tennessee Health Science Center. Susan is the safety quality improvement educator at the University of Tennessee (Medicine) and the founder of Scott Triggers.

The Scott Triggers tool evaluates four evidence-based predictors of perioperative pressure injuries. The tool is used preoperatively to assess for a patient's risk of pressure injury.

Aerial view of St Jude Children's Research Hospital, Memphis, Tennessee (foreground right)

It asks four questions which require a yes or no answer. This tool takes into account a patient's age (>62 years), serum albumin level or BMI (albumin level < 3.5g/l or BMI < 19 or > 40), ASA score (>3) and estimated surgery time (surgery greater than three hours). Two or more 'yes' answers constitute a high risk patient and a set of evidence-based interventions in the form of an OR skin bundle or perioperative toolkit should be implemented. For example, practices such as relieve, reduce and redistribute are promoted as well as interventions such as offloading the heels.

Scott Triggers® has been validated in over 7000 surgical patients in Houston, USA (Susan Scott, pers. comm. email 8 July 2016) In one study, the incidence of pressure injuries decreased from 3.37 per cent to 0.89 per cent and the facility reduced costs by US$1 364 000 for a one-year period by using the Scott Triggers Tool (Susan Scott, pers. comm. NPUAP conference 2 November 2016).

At the Methodist University Hospital in Memphis a 'START Procedural Briefing Confirmation Card' is used pre-, intra- and post-operatively. START is an acronym for S=Supplies/equipment; T=Track history, allergies and patient notes; A=Assess fire and skin risk; R=Medication; and T=Time out and tell the facts (fire score, skin risk and allergies stated). The preoperative nurse completes a Braden assessment for a patient and documents the score on START. If a Braden score is below 16 a 'yes' box is ticked, indicating a pressure injury risk is present.

The circulating nurse in the OR then answers yes or no to the following questions:

- Is surgery anticipated to be over two hours?
- Is the patient's ASA score three or higher?

If either of the above are answered with yes, the patient is considered at high risk for pressure injury. This START card brings pressure injury to the forefront of perioperative nurses' minds. Interestingly, the START card assesses a patient's fire risk. A notable benefit of START is it encourages communication and collaboration among team members

SCOTT TRIGGERS®

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**	

Two or more YESES = HIGH RISK SURGICAL PATIENT

Assessment Comments:

** 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.*

along the perioperative journey, ultimately improving continuity of patient care.

A few other key points we discovered were that at St Jude Children's Research Hospital the anaesthetist generally moves the patient's head every hour or so as well as using gel or foam head rings for the paediatric population. A lot of the hospitals also used disposable OR sheets to help wick away moisture during surgery. Circulators would prep with a chloraprep swabstick to minimise pooling of fluids.

Information sharing

In Indiana we were hosted by Eskenazi Health's Director infection prevention, Debra Fawcett, PhD, RN. At Eskenazi Health, we were fortunate enough to meet with members of the Indianapolis Coalition for Patient Safety. The coalition provides a forum for Indianapolis hospitals to share information about 'best practices' and work together to solve patient safety issues. This was a fine example of various organisations and professionals coming together for the ultimate goal of patient safety.

Other important points we learnt is that off-loading the heels is important but there are still questions about what to off-load the heels with as you do not want to use something which will 'bottom out' or simply relocate the same pressure to a different area on the leg. Also, if using prophylactic dressings, e.g. to the sacrum, frequent skin inspections must still take place. Several wound care ostomy nurses explained these dressings do not prevent pressure injuries but may decrease friction or shear.

While at Eskenazi Health we learnt that if a patient developed a hospital acquired PI, a root cause analysis would be conducted. If the patient had recent surgery, the occurrence of the PI would be forwarded to the OR leadership team as a learning opportunity. This certainly helped to close the loop and to discover if the pressure injury was correlated with the surgical position or devices used throughout surgery. It was beneficial to see how communication enabled a great culture of improving patient safety in a non-punitive way. An emphasis on communication was evident at every hospital we visited.

Memphis VA Medical Centre, Memphis, Tennessee

Electronic documentation

In Boston, Massachusetts, we visited Beth Israel Deaconess Medical Centre and were hosted by Clinical manager perioperative education, Charlotte Guglielmi, MA, BSN, RN, CNOR.

In Boston pressure injury risk had been incorporated into electronic documentation, which appeared efficient and effective. There were two graphics of a patient shown from the front and the back. Nurses could easily click on the point where they applied padding or noted a problem and then make a note to indicate appropriately. Jeff, the registered nurse who we were buddied with said, 'this made life easy because nurses didn't have to go through lots of lists of words but could just see where you want to make a note, click and type'. It became apparent that a recurrent theme at all facilities was that a lot of HAPIs were device-related from items such as endotracheal tubes and intravenous access devices. This reiterated the importance of the fundamentals of care and highlighted the importance of education for all staff who take part in positioning the patient in the OR.

Another key point discussed was ensuring a comprehensive skin assessment pre- and post-procedure and that that findings from these are written down. In Boston they had a saying, 'if it isn't written down, you own it'. This suggests that if a PI does occur, OR staff must be able to defend their actions toward its prevention or it will be assumed to have started in the OR. All the hospitals we visited performed skin checks pre- and post-operatively

and some facilities used 'four eyes' meaning two nurses perform the skin assessment together.

Discussion

By undertaking this study tour to the USA, we equipped ourselves with the knowledge and experience to implement a pressure injury risk assessment tool for surgical patients. While some risk factors cannot be modified, such as the length of a procedure, the risk of a PI developing can be reduced by ensuring care provided is based on best-evidence practices and risk is communicated to subsequent care givers.

The opportunity to see new developments in the field of pressure injury risk assessment and prevention in the USA has enabled us to increase our knowledge exponentially and also benchmark our current practices. We believe, based on what we have learnt from our study tour, that we can create a perioperative pressure injury toolkit containing pertinent evidence-based recommendations for pressure injury prevention. Such a toolkit has potential for transferability across other clinical settings that provide surgical care. We foresee many benefits of an assessment tool and toolkit including reduction in delayed discharges, fewer bed days lost and decreased cost associated with pressure injuries as well as increased positive outcomes for patients, families and the wider community.

However, before implementing a new pressure injury risk assessment tool in the OR we would need to do some groundwork including gap analysis. Careful consideration of the needs of our health network will indicate which risk assessment tool should be implemented. This would follow the release of the revised and latest version of the Munro scale.

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