

Developing an Australian skin risk assessment and management tool for neonates

Broom MM, Burton WA, Ehrlich LM, Dunk AM & Abdel-Latif ME

ABSTRACT

Background: Skin injuries are a common occurrence in neonatal units. Currently there are few tools that meet the specific needs of the neonatal population. To assist nurses in

identifying neonates at risk and improve neonatal skin care, a working group developed a neonatal skin risk assessment and management tool (SRAMT) for their unit.

Setting: University-affiliated tertiary neonatal intensive care unit (NICU).

Design: Single-site prospective longitudinal study (2010–2014).

Method: The study was conducted over three phases: 1) skin injuries incidence study; 2) development of the SRAMT; and 3) post-implementation review of the SRAMT.

Results: The SRAMT lists eight risk categories: gestational age, sensory perception, activity/mobility, moisture, respiratory support, visual examination, blood collection and nutrition and these categories are graded from low (grade 1) to extreme risk (grade 4). The tool also provides assessment and management guidelines. Evaluation of the SRAMT showed a reduction in neonates who acquired skin injuries pre SRAMT from 37/60(61.7%), compared to post 12/30(40%), (OR 0.41 95% CI 0.17–1.02; p-value 0.085).

Conclusion: The study has shown introducing a skin risk assessment tool may reduce the incidence of skin injuries and standardise skin management in the NICU. Future research will be undertaken to validate the SRAMT and assess its suitability across neonatal units.

Keywords: Neonates, skin injuries, risk assessment, pressure injuries, neonatal intensive care unit.

BACKGROUND

There is a growing awareness that immobilised and acutely ill neonates are at risk of medically induced skin injuries within the neonatal intensive care units (NICU)¹. Skin injuries may lead to local or systemic infection, fluid and electrolyte imbalances, and temperature instability². Skin breakdown through various injuries can result in pain, infection, disfigurement, and mortality as well as increased costs, length of stay and risk of litigation².

Premature infants have development anatomic and physiologic differences to adult skin, which often puts them at a higher risk of skin injuries. At birth the skin of an infant is at least 30% thinner than adult skin¹. A premature infant's skin is more fragile and less mature than full-term infant skin

Margaret M Broom*

PhD

Department of Neonatology, Centenary Hospital for Women and Children, Canberra Hospital ACT, Australia

Australian Catholic University, Australia

Department of Neonatology

Centenary Hospital for Women and Children

PO Box 11, Woden, ACT 2606, Australia

Tel +61 2 6174 7565

Email Margaret.Broom@act.gov.au

Wendy A Burton

BA Nursing

Department of Neonatology, Centenary Hospital for Women and Children, Canberra Hospital ACT, Australia

Leanne M Ehrlich

BA Nursing

Department of Neonatology, Centenary Hospital for Women and Children, Canberra Hospital ACT, Australia

Ann Marie Dunk

RN, BHlthSc (Nurs), MNurs (Research)

Tissue Viability Unit, Canberra Hospital

Adjunct Associate Professor, University of Canberra ACT, Australia

Mohamed E Abdel-Latif

FRACP, MRCPCH, AFRACMA, MPaeds, MPH,

MScEpi, MD

Department of Neonatology, Centenary Hospital for Women and Children, Canberra Hospital ACT, Australia

Medical School, College of Medicine, Biology &

Environment, Australian National University, Acton, ACT, Australia

* Corresponding author

as there are only two to three layers of protective stratum corneum and fewer fibrils connecting the skin layers¹.

In addition, there are both intrinsic and extrinsic factors to consider³. Neonatal immobility due to sedation or muscle relaxing agents, impaired tissue perfusion (with cooling or dehydration), surgery, sepsis and malnutrition are some known intrinsic factors³. Extrinsic factors that are commonly cited as placing a neonate at high risk of an injury include medical devices such as continuous positive air pressure (CPAP) equipment, tapes used for line and tube securement (shearing, friction and stripping injuries), cleaning agents (chemical injury) and pressure injuries from monitoring probes and electrodes^{3,4}. Over the past 10 years the gestation and acuity of neonates surviving, but requiring medical support for extended periods, has increased, thus escalating the need for nursing staff to prioritise skin care practices in the NICU environment⁴.

In 2007 Baharestani and Ratcliff highlighted that although there is no agreement on which risk factors contribute to pressure injury development in neonates, there is agreement that prevention lies in early risk identification³. They also identified that there were 10 published paediatric pressure injury risk assessment scales at that time, of which only three had been tested for sensitivity and specificity: Braden Q scale, Glamorgan Scale and Neonatal Skin Risk Assessment Scale (NSRAS)³. International literature reporting injury rates from 47% to 75% with the highest prevalence in children with chronic illness and those supported by medical devices⁷. However, premature infants are at great risk of many other types of skin injuries and all causations should be considered when introducing a risk assessment tool that covers all types of skin injury^{1,2}. Pressure injury risk assessment tools or scales ideally should have high sensitivity and specificity, good predictive value, clear definition of terms, and should be easy to use⁸. Validated tools are difficult to find and are mainly focused on the adult population with some variations having been made to accommodate the paediatric population; however, tools designed for the neonatal population are minimal and none focus on the Australian healthcare context⁸.

Since the prevention and management of pressure injuries is one of the 10 Australian Commission on Safety and Quality in Health Care (ACSQHC) Standards, the profile of skin pressure-related injury has taken a higher profile throughout health services, notably so within the NICUs⁸. Thus, in accordance with ACSQHC recommendations: 1) the use of a risk assessment framework to investigate and reduce the frequency and severity of a variety of skin injuries and 2) regular skin inspection and best practice guidelines, NICUs across Australia are currently undertaking the process to implement a neonatal skin assessment risk tool⁷.

In 2009 the Australian Capital Territory (ACT) Quality Health Service Committee recommended the introduction of a skin risk assessment tool sensitive to the needs of the neonatal

population^{5,6}. A Skin Care Working Group (SCWG) was formed to explore the current literature to find a tool that would be suitable for the unit. A literature review undertaken highlighted three tools for consideration: the Neonatal Skin Condition Scale, Braden Q Scale (BQS) and Neonatal Skin Risk Assessment Scale as described below:

Neonatal Skin Condition Scale

The Neonatal Skin Condition Scale considers dryness, erythema and skin breakdown on a scale of 1–9; the higher the score the greater the risk of infection⁶. Validated for reliability on a large scale, the Neonatal Skin Condition Scale may assist in grading skin condition and risk of infection, but does not consider the intrinsic and extrinsic risks known to cause skin injuries in neonates admitted to an NICU⁶.

Braden Q Scale

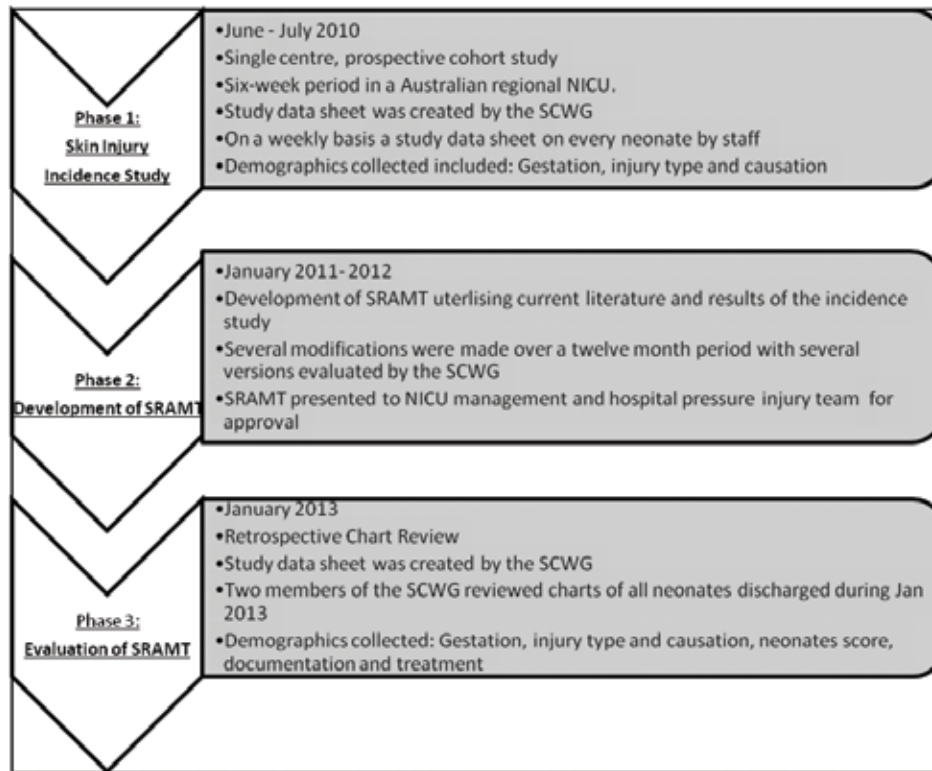
The Braden Q Scale (BQS) is a modified version of the adult Braden Scale tested for sensitivity and specificity in paediatric population from three weeks to eight years of age⁹. Due to the lack of neonatal scales, many NICUs are implementing the BQS. It consists of seven identifiers, with each being graded on a one- to four-point rating scale: mobility, activity, sensory perception, moisture, friction/shear and nutrition and tissue oxygenation/perfusion⁹. Scores range from 7 to 28 with paediatrics scoring <16 at risk of skin breakdown⁹.

Neonatal Skin Risk Assessment Scale

The Neonatal Skin Risk Assessment Scale is a revised version of the adult Braden Scale¹⁰. It has six identifiers, each ranked on a score of one to four: general physical condition (based on gestational age); mental state (responsiveness); mobility (based on anticipated movements); activity (radiant warmer or a crib); nutrition (IV, bottle or breastfeeding); and moisture¹⁰. Scoring each neonate from six (high risk) to 24 (low risk)¹⁰. In 2013 the Neonatal Skin Risk Assessment Scale was updated to include parameters that address the added risks (humidification and completely bed bound) associated with caring for extremely premature neonates in an NICU¹⁰. This scale had only been trialled on 32 neonates raising questions about the validity¹⁰.

After completing an extensive review of the three scales, the SCWG considered implementing the BQS. The SCWG held workshops for nurses at which they were asked to score neonates using the BQS. Nurses attending the workshops reported the BQS was not sensitive to the nuances of the neonatal population in the NICU. Nurses stated the score did not assist them in identifying neonates at high risk or outline strategies to reduce the risk of skin injury. Literature published during the development period of the skin risk assessment and management tool (SRAMT) reported similar findings on the limitations of the BQS's use in the neonatal population^{2,11,12}. An example of this was the 2015 Delphi study undertaken by Vance *et al.* that highlighted the need for a risk assessment tool that focuses

Figure 1: Outline of study methodology



on the iatrogenic and traumatic skin issues significant to neonates¹. Following the assessment of the three available tools by senior nursing staff, the decision was taken to conduct a study that covered the design and testing of a skin risk assessment tool specifically constructed for neonates admitted to the NICU.

This study aimed to assess the incidence of skin injury in the study NICU, develop a SRAMT and review its impact on the incidence of skin injury post implementation.

METHODOLOGY

Study definition

All neonatal skin injuries, whether pressure induced or from iatrogenic causes, will be referred to as a ‘skin injury’ in the study.

STUDY DESIGN

A prospective descriptive cohort study was undertaken in three phases over a four-year period from 2010–2014.

Phase 1: Skin injury incidence study

This was a single-centre, prospective cohort study done over a six-week period between June and July 2010. On a weekly basis during the six-week study period or when a skin injury occurred, a study data form developed by the SCWG was completed on each neonate by the nurse allocated to their

care. Neonates may have been assessed one to six times if they remained inpatients for the duration of the study period. Data collected included: gestational age, birth weight, age at assessment as well as type and causation of injury.

Phase 2: Development of the SRAMT

In 2011–12, during the development of the tool, a literature review was carried out by members of the study team. Searches were undertaken using databases such as MEDLINE, CINHALL, guided by search terms such as: skin tool, pressure injuries, skin integrity, neonates and intensive care. The SRAMT was formulated to assess a neonate’s risk of skin injury via inclusion of eight subscales that considered factors such as: medical devices, intravenous access, blood collection and respiratory equipment based on the result of the literature review and skin injury incidence study results.

During the development of the tool, the SCWG held consultative meetings with senior staff during which mock scenarios of neonates of acuity ranging from intensive care to special care, with different types of technical support and clinical requirements were set up. Senior nursing staff scored each neonate then graded the neonates as low, moderate, high or extreme risk. Several rounds of grading were held until a group consensus was gained, that neonates’ scores reflected their risk of skin injury. It was also suggested a table of preventative and treatment strategies should be attached to the tool to standardise skin care in the NICU.

Table 1: Comparison of pre- and post-study groups

Demographics	Pre (n=60)	Post (n=30)	p-value
Gestational age	34.1 (30.6–38.8)	35 (31.0–39.0)	0.697
Birth weight	2.18 (1.35–2.98)	2.52 (1.63–3.39)	0.167
No neonates with injuries	37 (61.7%)	12 (40.0%)	0.085
Total injuries	54	14	<0.001
Types of injuries			
Bruises	14 (23.3)	5 (8.3)	0.487
Excoriation	12 (20.0)	2 (6.6)	0.105
Pressure	9 (15.0)	1 (3.3)	0.104
Abrasions	9 (15.0)	0	0.021
Extravasations	5 (8.3)	2 (6.6)	0.823
Epidermal stripping	4 (7.0)	4 (13.3)	0.329
Thermal injury	1 (6.6)	0	0.667

NB: Some babies acquired >1 injury during the study period

Phase 3: Post implementation review of the SRAMT

Clinical notes of all neonates (n=30) discharged during one month period in 2013 were reviewed for the completion of the scale, skin injuries, preventative measures or treatment of skin injuries recorded and documented as per guidelines. Using a data collection sheet created by the SCWG, two members of the SCWG independently reviewed each file and conferred on their results to double-check the data. Data collected included: skin injuries, preventative measures, treatment of skin injuries recorded and number of times scale was completion during admission. Data was manually entered into an Excel spreadsheet and exported to SPSS for analysis (Figure 1).

Setting

This study was undertaken in a University-affiliated tertiary NICU in regional Australia. The catchment area of the NICU is approximately 6840 km², encompassing the ACT as well as areas of the adjacent jurisdiction that borders the ACT. The NICU provides intensive and special care for 700 neonates per annum, born between 24 and 44 weeks' gestation.

Participants

All neonates admitted to the NICU during both study periods were included. As skin assessment is part of normal care provided, no neonates needed to be excluded from the study. Parental consent was not required.

Data collection and analysis

Data collected throughout the study was collated and checked by the SCWG. It was manually transcribed to Excel and to SPSS for analysis. Descriptive analysis was

undertaken to assess types and causation of injuries. Chi-squared testing was completed to evaluate statistical significance (p= 0.05).

Ethics approval

The project received Australian Capital Territory Human Research Ethics Committee approval.

RESULTS

Phase 1: Skin injuries incidence study

Sixty neonates (25 to 41 weeks gestation at birth, median 35 weeks) were assessed in the six-week study period. Results showed 37 infants were identified as having one or more skin injuries 61.7% (95% CI: 49.0–72.9). Some babies acquired >1 injury during the study period, with 54 injuries in total (Table 1). Two main causal groups were identified: 1) medical devices: intravenous, blood collection and CPAP equipment (46%); and 2) factors related to routine skin care: dry skin, excoriated buttocks, positioning of the neonate, accounting for 39% of skin injuries.

Phase 2: Development of the SRAMT

The study team developed the SRAMT. The tool is divided into three sections. The first section is a skin risk assessment score which staff use to predict the neonates' risk of skin injury. In the second section, skin assessment guidelines provide staff with a care plan dependent on the neonates' level of risk. The third section outlines strategies to prevent and manage skin injuries, as outlined below:

Section 1: Skin risk assessment score

In the first section, a staff member scores the neonates' skin injury risk using eight risk categories: 1) gestational

Table 2: Skin risk assessment score

Category	Descriptor	Date/time
		Day of life
Current gestational age	Neonate <28 weeks	4
	Neonate >28 weeks and <33 weeks	3
	Neonate >33 weeks and <38 weeks	2
	Neonate >38 weeks	1
Sensory perception	Diminished level of consciousness/muscles relaxed/heavily sedated	4
	Oversensitive to noise, lights and touch/easily agitated/difficult to calm	3
	Easily agitated but calms with comfort measures/few self-calming behaviours	2
	Age-appropriate responses to stimuli, alert, good self-calming behaviours	1
Activity/mobility	Does not make the slightest change in position — full assistance required	4
	Makes occasional slight changes in body or extremity position	3
	Makes frequent changes in body or extremity position, for example, turns head	2
	Makes major and frequent changes in position, moving all extremities, turns head	1
Moisture	Constantly moist due to humidity/urine/wound/stoma	4
	Skin often moist — linen needs to be changed once/8 hours	3
	Skin occasionally moist — needs linen change once/12 hours	2
	Skin usually dry, routine nappy changes and linen once/day	1
Respiratory support	Intubated and ventilated +/- CPAP >7 cm H ₂ O	4
	CPAP > 5 cm H ₂ O	3
	High flow and/or low flow	2
	No respiratory support	1
Skin integrity	Extensive loss of skin integrity/wound/pressure injury	4
	Localised loss of skin integrity/broken area/oedema	3
	Minor skin irritation/redness	2
	Skin integrity intact	1
Blood collection	Many attempts for IV access — cannulation/PICCS/bloods/IA Lines	4
	Venepunctures resulting in large bruise around site of insertion/oedema	3
	Heel pricks >3 in 24-hour period	2
	Blood collection weekly	1
Nutrition	TPN + lipids /IV fluids/NBM/does not tolerate feeds	4
	TPN + lipids /IV fluids/trophic feeds	3
	TPN + lipids with tube feeds increasing and tolerated	2
	Full gastric feeds	1

Table 3: Skin assessment guidelines

Risk score	Category	Assessment and documentation guidelines
≤ 8	Low risk	Continue daily assessment and documentation of skin integrity.
9–16	Moderate risk	Reposition neonate every 6–8 hours. Reassess and document skin integrity 6–8 hourly.
17–24	High risk	Reposition neonate and equipment devices at least every 4–6 hours. Reassess and document every 4–6 hours.
25–32	Extreme risk	Inspect skin at least 2–4 hourly, ensuring equipment/objects are not pressing on the skin. Reassess and document every 4–6 hours.

age; 2) sensory perception; 3) activity/mobility; 4) moisture; 5) respiratory support; 6) visual examination; 7) blood collection; and 8) nutrition. Each risk category is graded from 1 to 4 with a description to assist staff in scoring (1 being the lowest and 4 being the highest score) (Table 2).

Section 2: Skin assessment guidelines

The assessment guidelines in Section 2 aim to standardise the frequency of care and documentation in the NICU. It provides staff with a care plan and the documentation requirements according to the neonates' level of risk (Table 3).

Section 3: Skin management guidelines

Section 3 lists skin injury types, causes and preventative measures to guide skin management. Table 4 provides staff with strategies to reduce the risk of or treat skin injuries. The table was constructed by a member of the SCWG utilising current skin management guidelines. Prior to submission, an update on the literature available revealed a recently published article by Vance *et al.* also included a table with many similarities to the table in our tool¹.

Phase 3: Post-implementation review of the SRAMT

Clinical notes of all neonates (n=30) discharged during a one-month period in 2013 were reviewed by two members of the SCWG, each member independently reviewed each file and conferred on their results to double-check the data. Data collected included: completion of the scale, skin injuries, preventative measures or treatment of skin injuries recorded and documented as per guidelines. The evaluation of the SRAMT showed a reduction in neonates who acquired skin injuries from 37/60 (61.7%) neonates to 12/30 (40%) (Table 1).

In 2014, post evaluation, the SCWG made several adjustments to refine the tool to meet the needs of the neonatal population cared for in the NICU. Our review also

identified the need for several format modifications to make the tool easier to complete and clarify assessment guidelines for staff. The revised SRAMT was reviewed by NICU staff and management. The SRAMT was accepted by the hospital forms committee and is now part of the daily care plan for all neonates admitted to the NICU.

DISCUSSION

We have undertaken a prospective descriptive cohort study to develop an SRAMT for neonates. The study has described three phases: assessing the need for a skin risk assessment tool in the NICU, developing a skin risk and management tool, and then a chart review to assess if implementing the tool has reduced injury frequency. The results of this study also provide further evidence that skin injuries are common in neonates and the main cause is medical devices⁴. Results have also identified the need for a tool that considered not only factors directly related to pressure injuries but includes items to address iatrogenic risks babies are exposed to during an admission to an NICU^{1,4}. Previously it has been suggested (due to there being no well-validated risk assessment scales for the neonatal population) that clinical judgement may be the most efficient method of identifying injury risk rather than a tool. This study has shown implementing a skin risk assessment tool may assist in reducing skin injuries in the NICU^{1,3,9}.

Study results have shown the importance of collecting evidence to assess the need for implementing a new tool or practice in an NICU. Results also highlighted the importance of nurses being encouraged to undertake research to improve clinical care and provide evidence for change¹⁴. This study is an example of improving care based on evidence through nurses participating in research.

Just as the acuity and needs of the neonates requiring care in an NICU has dynamically changed over the past 20 years, so has the causation and management of neonatal

Table 4: Skin management guidelines

Type of injury	Cause of injury	Guidelines and preventative measures
Bruises	Frequent bloods or cannulation	<ul style="list-style-type: none"> Prevent where possible, try not to hold limb too tightly causing a tourniquet Hold site till bleeding stops — DO NOT USE BAND-AIDS
Epidermal stripping	Removal of adhesive tapes used to secure tubes/lines	<ul style="list-style-type: none"> Avoid products that bond to skin Double back tapes or fluff with cotton wool Use sat raps for holding lines in place instead of tapes (especially in neonates <28 weeks) To assist in tape removal, use an alcohol-free product, a wet wipe with Epaderm cream or cavillion barrier wipes, slowly working towards being tape free
Excoriation	Loose, runny, explosive stools, urine, neonatal abstinence syndrome, infections (fungal), medications	<ul style="list-style-type: none"> Frequent nappy changes Follow excoriated buttocks flow chart
Extravasation injuries	<p>Infusion infiltrates vein leading to swelling at cannula site</p> <p>Infusing hypertonic/ionic/acidic or alkaline solutions</p> <p>Peripheral arterial line</p>	<ul style="list-style-type: none"> Minimise risk by having good visibility of the cannula site and surrounding tissue, when securing line Check line/site/pressures hourly Try to infuse these drugs via a central line Inspect arterial line/site frequently Ensure brisk cap refill to all digits Remove line if fingertips are dusky / white in colour
Chemical burns	Use of alcohol-based skin preparation solutions, for example, chlorhexidine, iodine and alcohol swabs	<ul style="list-style-type: none"> Skin preparation for procedures –0.5% chlorhexidine Ensure skin is cleansed straight away with saline to prevent burns DO NOT use alcohol swabs to clean neonates' skin, before venepunctures or cannulation
Thermal burns	<p>Heat from monitoring equipment</p> <p>Cold lights</p> <p>Saturation probes</p>	<ul style="list-style-type: none"> Reset the time and temperature of TCO₂ according to the age/gestation of the neonate Use a guard to avoid direct contact. Minimise the length of time it is used. Correct setting Resite probes 2–4 hourly to prevent burns Mefix underneath probe of neonates <28 week
Pressure injury	<p>Lines, tubing and linen</p> <p>Nasal septum/inner nare trauma/ ear damage</p> <p>Lying prone</p>	<ul style="list-style-type: none"> Avoid the infant lying on tubes or rolls of linen Ensure prongs are nursed off the septum and not causing damage to the inner nares. Ensure ears are not rolled up under hat and the neonate is not lying on one side constantly Cover knees with duoderm to prevent rubbing injuries from being nursed prone

skin injuries. There continue to be gaps in the research undertaken relating to prevention and treatment of neonatal skin injuries⁴. Previously neonatology has focused on life-saving technologies and treatment for neonates but now we are transitioning to the next phase in neonatal care. A challenge for nurses caring for neonates is reducing the risk of iatrogenic injuries, predominately caused by the equipment or treatment required to support a neonate admitted to an NICU^{15,16}.

This study has demonstrated the usefulness of the SRAMT in predicting a neonate's category of risk, which prompts the development of the nursing care plan to reduce skin injuries and promote appropriate skin care.

LIMITATIONS

This was a pragmatic study that grew from a clinical issue in one NICU and we acknowledge it is just the first step in the development of the SRAMT. The small sample size and the need for further statistical evidence may limit transferability of the tool to other NICUs or neonatal populations. We encourage other researchers to test the SRAMT in their units and report the if changes they find are necessary to meet the needs of their NICU's population.

FUTURE RESEARCH

The next stage of our study is to undertake powered methodology such as logistic regression and predictive validity testing to assess the capability of the tool in predicting skin injury. Currently the cut-off points and scores have been developed by a group of senior nurses; however, future work to provide high-powered statistical evidence is core to validating the tool as suitable for use across neonatal populations and different NICUs.

CONCLUSION

There continues to be a gap in the research undertaken relating to the prevention and treatment of neonatal skin injuries; more specifically, a tool to predict neonates' risk of skin injuries. We have shown how implementing the SRAMT has reduced the number and severity of skin injuries in the study NICU. Further research is required to validate the SRAMT and investigate its benefit in other NICU populations.

ACKNOWLEDGEMENTS

We would like to thank to the nurses who have assisted with data collection throughout the study and Janine McEwan who assisted with the review of the SRAMT. This study was assisted through funding from a Nurse Practice Development Grant from the Nursing and Midwifery Office of the Chief Nurse ACT Health.

CONFLICT OF INTEREST

Nothing to declare.

REFERENCES

- Vance DA, Demel S, Kirksey K, Moynihan M, Hollis K. A Delphi study for the development of an infant skin breakdown risk assessment tool. *Adv Neonatal Care* 2015;15(2):150–157.
- Kottner J, Hauss A, Schlüer AB, Dassen T. Validation and clinical impact of paediatric pressure ulcer risk assessment scales: A systematic review. *Int J Nurs Stud* 2013;50:807–818.
- Baharestani MM, Ratcliff CR. Pressure ulcers in neonates and children. *Adv Skin Wound Care* 2007;20(4):208–220.
- August DL, Edmonds L, Brown DK, Murphy M, Kandasamy Y. Pressure injuries to the skin in a neonatal unit: Fact or fiction. *J Neonatal Nurs* 2014;20:129–137.
- Huffines B, Logsdon MC. The Neonatal Skin Risk Assessment Scale for predicting skin breakdown in neonates. *Issues Compr Pediatr Nurs* 1997;20(2):103–114.
- Lund CH, Osborne JW. Validity and reliability of the neonatal skin condition score. *J Obstet Gynecol Neonatal Nurs* 2004;3:320–327.
- Australian Commission on Safety and Quality in Health Care, National Safety and Quality Health Service Standards (September 2012). Sydney: ACSQHC; 2012.
- National Pressure Ulcer Advisory panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline. Perth, Australia: Cambridge Media; 2014.
- Curley MAQ, Razmus IS, Roberts KE, Wypij D. Predicting pressure ulcer risk in pediatric patients: The Braden Q Scale. *Nurs Res* 2003;52:22–33.
- Dolack M, Huffines B, Stikes R. Updated Neonatal Skin Risk Assessment Scale. *Kentucky Nurse* 2013;61(4):6–8.
- Grosvenor J, O'Hara M, Dowling M. Skin injury prevention in an Irish neonatal unit: An action research study. *J Neonatal Nurs* 2016;22(4):185–195. DOI: 10.1016/j.jnn.2016.01.004.
- Lu Y-F, Yang Y, Wang Y, Gao L-Q, Qiu Q, Li C, Jin J. Predicting pressure ulcer risk with the Braden Q Scale in Chinese pediatric patients in ICU. *Chinese Nursing Research* 2015;2(1):1–5. DOI: <http://dx.doi.org/10.1016/j.cnre.2015.01.002>.
- Scheans P. Neonatal pressure ulcer prevention. *Neonatal Network* 2015;34:126–132.
- Mulhall A. Nursing, research, and the evidence. *Evid Based Nurs* 1998;1:4–6.
- Nist MD, Rodgers EA, Ruth BM *et al.* Skin rounds: a quality improvement approach to enhance skin care in the neonatal intensive care unit. *Adv Neonatal Care* 2016;16(5):S33–S41.
- Johnson DE. Extremely preterm infant skin care: a transformation of practice aimed to prevent harm. *Adv Neonatal Care* 2016;16(5):S26–S32.