

PRESSURE INJURY RISKS WITH HEAD & NECK POSITIONING FOR SEVERE BURN INJURY PATIENTS IN THE INTENSIVE CARE SETTING

Akane Katsu¹, Tanya Iddamalgoda¹, Iain Brown², Kate Welsh³, Rachel Edmondson⁴, Julie Bricknell⁴, Matt Tinker⁵

¹Occupational Therapy Department, Royal North Shore Hospital, St Leonards, Australia, ²Assistive Technology & Seating, Northern Sydney Local Health District, North Ryde, Australia,

³Severe Burn Injury Unit, Royal North Shore Hospital, St Leonards, 2065, ⁴Physiotherapy Department, Royal North Shore Hospital, St Leonards, Australia, ⁵Intensive Care Unit, Royal North Shore Hospital, St Leonards, Australia

Background

The inherent risk of pressure injuries (PI) for severe burn injury (BI) patients begins from the time of their admission into intensive care unit (ICU). Areas such as the occiput, frontal eminence, mental protuberance and ear are most at risk of PI in patients who have significant head and neck (H&N) burns ⁽¹⁾.

A plethora of contributing factors makes it challenging to prevent and assess for PI in severe BI patients. In ICU, these factors include, the presence of burn oedema, immobility, sedation, use of vasoactive medications, the use of splints and devices, burn injured skin integrity, H&N positioning and concomitant spinal injuries ⁽²⁻⁴⁾. Furthermore, it can become difficult to assess the occipital skin when dressings obscure the area or to differentiate an evolving burn wound from a PI (Photo 1).

A number of occipital PI in our patients prompted our burns team to investigate and review our current practice surrounding H&N positioning, which may include use of a neck extension pillow (NEP) (Photo 2). It was questioned whether the use of a NEP contributed to the development of an occipital PI. Thus, the objectives of this study were to investigate a method of assessing occipital pressures and to compare these interface pressures with and without the use of a NEP.



Methods

The study was conducted in three stages:

Stage 1

Review current clinical practice for positioning H&N BI patients in ICU. Determine clinical assessment criteria and neck positioning intervention for burn contracture prevention and method of measuring occipital pressure. The biomedical engineer from our local assistive technology and seating services (AT&S) recommended the use of a handheld pressure gauge and provided education and training for staff.

Stage 2

Assess patients weekly (if they were still in ICU) according to study inclusion criteria: patients with H&N BI, admitted to ICU between March and June 2018 and had >48hour stay in ICU. Patients were measured "in vivo" with no measurements undertaken if it was unsafe to use the pressure gauge (e.g. uncleared C-spine).

Stage 3

Assess occipital pressures with and without the use of a NEP in supine and at 45 degrees of head of bed angle (HOBA) (Photo 3) in a single patient with developing neck burn contractures and a healthy volunteer.



Photo 2 Neck Extension Pillow (NEP)



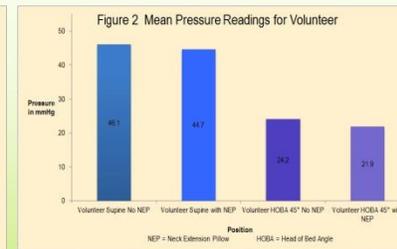
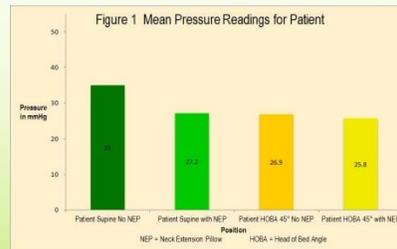
Photo 3 Head of Bed Angle (HOBA)

Summary of Findings

- Five patients were reviewed with a total of eight pressure measurements were undertaken (Table 1)
- Two of these patients were remeasured due to their lengthy ICU stay (>30 days). 10 pressure readings were undertaken at each assessment at two-minute intervals to adequately include the full cycle of the alternating air mattresses (Pegasus Healthcare, 2018)
- Occipital pressure readings were **reduced** when the HOBA was increased in both patient and volunteer (Figure 1 and 2)
- Occipital pressure readings were **reduced** when the NEP was in situ irrespective of the head of bed angle in both patient and volunteer (Figure 1 and 2)

Table 1 Stage 2 Results – ICU patients assessed

Pt	Age	Sex	TBSA %	#Days Post DCI	HOBA (°)	NEP Used	Sedated	Head/Face Burn	Neck Burn	Facial Oedema	Medical Issues	Mattress Used	Mean Pressure (mmHg)	Std Dev
1	38	F	85	20	20	N	Y	Y	Y	Present	Reduced sedation	CAIRWAVE®	20.8	2.40
1	38	F	85	36	20	N	Y	Y	Y	Present	Posterior scalp used as donor site	CAIRWAVE®	25.4	2.20
1	38	F	85	43	20	Y	Y	Y	Y	Present	Not recorded	CAIRWAVE®	12.8	0.98
2	42	M	85	36	40	N	Y	Y	Y	Present	C-Spine not cleared	PEGASUS®	28.4	1.96
2	42	M	85	14	20	N	Y	Y	Y	Reduced	?Occipital PA observed	CAIRWAVE®	30.6	1.28
3	55	F	3.5	6	30	N	Y	N	Y	Reduced	Not recorded	CAIRWAVE®	24.4	1.50
4	16	M	80	15	20	Y	N	Y	Y	Minimal	Ax postponed due to Code Blue	CAIRWAVE®	33.2	2.40
5	25	M	21	8	0	N	Y	Y	Y	Reduced	Not recorded	CAIRWAVE®	28.0	4.65



Discussion

Patients with severe H&N BI in the ICU are at risk of PI due to patient and environmental factors ^(1,4). Our observations with the targeted patient population showed that occipital pressure readings varied widely. We identified multiple patient factors that impacted upon pressure readings e.g. presence of burn oedema, vasoactive medications and level of sedation. Environmental factors such as the cycle of the alternating pressure mattress, variations in the selection of pressure care device (head support), use of NEP and bed configuration also impact upon interface pressure. Pressure readings between patients were therefore not comparable due to the high number of variables. Pressure readings are comparable for a single patient by using them to review how interface pressures vary with different bed setups and different pressure care device options.

Our pilot study aimed to investigate and review our current practice surrounding positioning of the H&N, which may include the use of a NEP to counter neck flexion contracture. Limitations of the study were the small number of patients, short study period, inconsistent measurement parameters and medical constraints resulting in pressure readings being unable to be collected. However these limitations also helped to identify parameters that would need to be considered for further research, for example, standardised measurements for all patients at predetermined HOBA. Our data was able to demonstrate that the use NEP lowered occipital pressure measurements and may not be the standalone cause for the development of occipital PI.

Recommendations

1. Continue use of the NEP where indicated
2. PI prevention continues to require an MDT approach
3. Use a pressure gauge objectively assess occipital pressures in H&N BI patients in the ICU setting
4. Further investigation is warranted in this area

Conclusion

Patients in ICU with severe H&N BI are at risk of PI and our standard practice is the use of a NEP. In this pilot study, it was demonstrated that the use of a NEP **reduced** pressure at the occiput compared to not using the NEP.

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