

*Title Page***Speech-Language Pathology Services in Australian and New Zealand Paediatric Burn Units: A Survey Report**

Anna M. Follent BA(Psych), PGDipPsych, MSpPathSt

The University of Queensland, School of Health and Rehabilitation Sciences, Queensland, Australia

Anna F. Rumbach BSc, MSpPathSt, GCHEd, PhD

The University of Queensland, School of Health and Rehabilitation Sciences, Queensland, Australia

Elizabeth C. Ward BSpPath (Hons), GradCertEd, PhD

The University of Queensland, School of Health and Rehabilitation Sciences, and Centre for Functioning and Health Research, Queensland Health, Queensland, Australia

Pamela Dodrill, BSpPath(Hons), PhD

Speech Pathology Department, The Royal Children's Hospital, Queensland Health

Nicola A. Clayton BAppSc, MScMed

Speech Pathology Department and Burns Unit, Concord Repatriation General Hospital, New South Wales, Australia

Details of contact author: Anna Follent

Tel: 61-7 38963081

Fax: 61-7 34062267

Email: anna.follent@uqconnect.edu.au

Centre for Functioning and Health Research,

PO Box 6053, BURANDA QLD 4102

Conflicts of Interest: None Declared

Blinded Title Page

**Speech-Language Pathology Services in Australian and New Zealand Paediatric Burn Units: A
Survey Report**

Abstract

To date, little is known regarding the extent and nature of involvement of speech-language pathology (SLP) services within paediatric burn settings. The aim of this clinical service study was to investigate the role of SLP services within burn teams across Australia and New Zealand. Eleven paediatric burn units were identified as members of the Australian and New Zealand Burn Association Bi National Burns Registry. Representatives from both Burn Units and SLP departments at each setting were sent a link to a purpose-built online questionnaire. Seven representatives from eight centres were received, with paired responses [burn units and SLP departments] being obtained from six centres. Paediatric burn units and SLP departments were found to differ in perceptions of SLP involvement in burn care. No Burn Units reported utilization of a protocol for referral to SLP. Dysphagia, followed by orofacial contracture management was the most frequently reported areas of SLP involvement, and multidisciplinary contribution within these areas was recognised. A majority (71%) of SLP Departments reported involvement with chemical ingestion injury; however referral rates were low. This study confirms that SLP services are utilised within Australian and New Zealand paediatric burn units, and SLPs are involved with paediatric patients with chemical ingestion injuries. However, potential exists for increased SLP input. There is also evident need for established guidelines surrounding referrals and greater education regarding the role of SLPs within paediatric burn care.

Key Words: Burn Unit, Speech Pathology, Paediatric, Service Delivery, Chemical Ingestion

Introduction

Paediatric burn injuries represent a significant proportion of total burn cases annually, with children under the age of five accounting for approximately 20% of total burn cases (ANZBA, 2012). Medical and surgical advancements over the past five decades have led to significant reductions in mortality, and most children, even those with large total body surface area burns, are expected to survive (Branski et al. 2012; Sheridan et al. 2012). Such decrease in mortality has, in turn, led to higher levels of morbidity and, thus, there is increased attention on ensuring appropriate clinical services are available to optimise functional outcomes. Optimal treatment of children with burn injuries requires a multi-skilled team approach. This has resulted in development of specialist paediatric Burn Units that have made the delivery of multidisciplinary care possible in both the acute and rehabilitation phases of recovery (Herndon, 2012).

Historically, speech-language pathologists (SLPs) are relatively new members of the multidisciplinary burn care team. Research has demonstrated that SLPs may be involved in the assessment and management of dysphagia (swallowing impairment) and communication disorders following burn injury, including the management of vocal fold injury following intubation (with or without concomitant inhalation injury), tracheostomy management, and non-surgical orofacial contracture management when facial mobility and effective communication, and range of movement to facilitate oral feeding are impaired (Clayton et al. 2009; Clayton et al. 2010; ; Rumbach et al. 2009; Rumbach et al. 2011a; Rumbach et al. 2011b; Ward et al. 2001; Williams et al. 1992). However, such roles have been described in relation to adult burn care management only. The level and nature of SLP involvement in paediatric Burn Units remains largely unexplored. In a service study of SLP in burn care, Snyder et al. (2003) reported that 11 of the 39 units surveyed in the USA were involved in paediatric burn care. Unfortunately, no other information was provided about the nature of these services. Other research has advocated for SLP involvement in the assessment and management of communication disorders in children with burn injuries (Brooks et al. 1986). However, specific information regarding the extent of SLP involvement, the current role of the paediatric SLP in burns units, and the current nature of SLP involvement is yet to be clarified.

There is also limited information regarding the nature of SLP services across different types of paediatric burn injury. Paediatric burns encompass injury from thermal, electrical, friction and

chemical causes. Of these injury types, chemical burn injuries constitute 2.1% of total paediatric burn injury (ANZBA, 2012). In this group, chemical injury caused by the ingestion of chemical-containing items in the household, in liquid or solid form (including items such as button batteries) forms the largest proportion (Litovitz et al. 2010; Lupa et al. 2009). Whilst a number of large cohort descriptive studies have examined the nature and clinical presentation of ingestion injuries (Bautista et al. 1997; Bicakci et al. 2010; de Jong et al. 2001; Gaudrault et al. 1983; Gun et al. 2007; Nuutinen et al. 1994; Riffat et al. 2009; Urganci et al. 2014), these studies have focused on information central to the medical and surgical management of this population. How SLP services are involved with this population of children is of particular interest, as studies have shown that chemical burns can have a significant impact on swallowing and oral intake, with dysphagia reported as both, an early indicator of chemical ingestion injury, and as a late sequelae related to oesophageal damage (Kay et al. 2009; Riffat et al. 2009). Dysphagia incidence post-chemical ingestion injury has been reported as high as 36% (Gaudrault et al. 1983) with 8% of children presenting with ongoing dysphagic symptoms at three weeks following ingestion injury and beyond (Bicakci et al. 2010; Nunes et al. 2014). With an absence of information on the clinical characteristics or impact of dysphagia on oral intake, or the role of SLP in the management, and the recovery of dysphagia in these patients, there is minimal information available to help inform SLP services.

Whilst it is recognised that SLP is relatively new to the multidisciplinary team involved in burn care, it is critical that patterns of practice and service characteristics are documented and understood, such that ongoing growth and development of this role can continue. Therefore, the current study aims to: 1) establish the extent and nature of SLP involvement across the continuum of paediatric burn injury in Australian and New Zealand; 2) establish the nature and extent of SLP involvement in chemical ingestion injury, and; 3) compare and contrast the views of SLP Departments and Burn Units regarding current SLP service delivery in paediatric burn care.

Methods

The Australian and New Zealand Burn Association (ANZBA), the peak body for health professionals responsible for the care of burn injured patients in Australia and New Zealand, acted as a gatekeeper for participant recruitment. An advertisement prepared by the research team was

disseminated by ANZBA to all registered paediatric burn units in Australia and New Zealand. At the time of the study, 11 paediatric burn facilities were identified as providing either exclusively paediatric burn care, or combined paediatric and adult burn services, and were registered data contributors to the ANZBA Bi-National Burns Registry (ANZBA, 2012). In order to gain both Burn Unit and SLP Department service perspectives from each site, a senior representative from each department (Director of nursing or equivalent in the Burns Unit, and speech pathologist allocated to the burns caseload in the SLP departments) at each facility was asked to complete a secure online questionnaire (administered via www.surveymonkey.com), designed specifically for this research, during a four-month period (March – June 2013). It was specifically requested that respondents be a senior burns unit representative and the SLP responsible for this caseload in order to ensure that the responding person for each group had a sound overall perspective on the units'/departments' management practices.

The survey respondents were asked to identify the service they were representing (i.e., the burn unit or the SLP department), with all other aspects of the survey being non-identifiable. Two separate surveys were developed - one for the Burn Units (Appendix A), and one for the SLP Departments (Appendix B). This was to enable the collection of general information pertaining to each service area (i.e., from either the SLP department or the burn unit), as perceptions regarding service delivery were predicted to differ both between SLP departments and burn units, and also between facilities, depending on service needs. This also enabled comparison of views from two departments at the same facility. Consenting Burn Units were asked to forward the SLP survey link to the SLP Department at their facility for completion.

The Burn Unit survey consisted of 13 questions, which related to perceived sufficiency of SLP services in the Burn Unit, referral practices, Burn Unit awareness of SLP services, and the members of the burn care team. The SLP service survey contained 17 questions addressing the aforementioned burn survey topics, and additional questions pertaining to full time equivalent (FTE) SLP positions dedicated to the Burn Unit, frequency of referrals received for burns, and specific questions relating to chemical ingestion injuries. Questions surrounding chemical ingestion injuries were exclusive to the SLP survey, as the majority of paediatric patients with this injury type typically do not receive medical or surgical care within a Burn Unit (rather, generally receiving primary care from Otolaryngology, Gastroenterology, or general Surgical staff). Therefore, it was anticipated that it was less likely that the Burn Unit representative would be able to provide detailed feedback about this population.

Both surveys consisted of dichotomous (e.g., yes/no), multiple choice, and open-ended response questions. For some questions, additional open-ended response fields were included, so that respondents were able to elaborate or clarify their responses. Question and page skip logic was utilized to create custom paths depending on participant's answers, to ensure extraneous or irrelevant questions were not asked. Both surveys were intentionally designed to be brief to encourage participation and their purpose was to collect general information only, rather than detailed information on specific practices. As such, it is acknowledged that some concepts e.g., orofacial contracture management and tracheostomy management are used in a broad sense, with the survey intent only to determine if SLPs were involved in this aspect of care, rather than defining actual activities completed by each member of the MDT in contracture and tracheostomy management. Furthermore, as surveys were being completed by health professionals with experience in burn care management, it was not felt necessary to define common burn care terminology. Participants were required to consent before they could access the online survey, and all data were collected in a de-identified manner to encourage participation. The study was conducted with ethical approval from The University of Queensland's Behavioural and Social Sciences Ethics Committee.

Results

A total of eight separate centres provided some information (response rate of 72%), consisting of seven verified Burn Units, and seven SLP Departments. Six centres provided responses from both the Burn Unit and SLP Department co-located at the same facility. Locations of responding centres are indicated in Table 1.

/insert table 1 near here/

Service Provision and Sufficiency

Given the diverse nature of responding services, the reported average number of admissions to paediatric Burn Units varied greatly, ranging from 70 to 700 annual admissions ($M = 234.33$, $SD = 214.68$). Four (57%) Burn Units reported that SLP provided services to the Unit, and that services were sufficient to fulfil patient needs. Three reported having no SLP services. Of the four Burn Units that reported having SLP services, all reported SLP involvement in swallowing, voice, and speech, as well

as general communication and developmental issues. Three of the four sites also noted SLP involvement in orofacial contractures and tracheostomy management.

In comparison to the Burn Unit responses, all (n = 7) of the SLP Departments reported providing professional services to their co-located Burn Unit. Of these, only four Departments said the level of service was sufficient, which did not match the Burn Unit data responses about service sufficiency. Only one SLP service reported having a dedicated FTE (0.3) position in the Burn Unit, whilst the remainder provided services from general SLP staff pools. Across all settings, average general SLP Department size was 8.85 FTE SLPs (range = 4 – 14 SLP team members).

Referral Practices

No Burn Unit reported use of an established referral protocol to inform referral practice to SLP. Referral methods included open referral (i.e., the SLP has access to any patient which they felt would benefit from their services; 28%, n = 2), referral from medical staff (57%, n = 3), and referral from other health professionals (e.g., nursing, allied health; 57%, n = 3). Similarly, 100% (n = 7) of SLP Departments reported that patients were referred on an individual, case-by-case basis. Overall, referral rates to SLP were low, with a majority of SLP Departments (71.4%, n = 5) reporting less than five referrals from the Burn Unit annually. Two (28.5%) remaining SLP Departments reported 5-10 referrals per year.

SLP and Multidisciplinary Management

Regarding allied health services, all Burn Units reported availability of services from physiotherapy, occupational therapy, dietetics, and social work staff (100%, n = 7). Psychological support services were available in 85% (n = 6) of Burn Units. Additional members of the multidisciplinary team included a play coordinator (14.2%, n = 1) and music therapist (14.2%, n = 1). Both Burn Units and SLP Departments also noted multidisciplinary involvement in swallowing/feeding issues and orofacial contracture management (Figure 1 & 2). All respondents from both groups indicated that SLPs were involved in swallowing and feeding difficulties. Other team members were also identified as involved in this area (including mention of dietetics in the “other category”), with the Burn Unit responses indicating higher involvement of other allied health staff. Regarding orofacial

contracture management, both groups identified that numerous professionals were involved. Burns units specifically identified involvement of dentists in the management of orofacial contractures.

/insert Figures 1 & 2 near here/

Chemical Ingestion Injury

The majority of SLP Departments (71.4%, n = 5) reported staff involvement with children with chemical ingestion injury. However, all five services noted that referrals were infrequent, with most (n = 4) reporting less than five referrals per year. The one SLP Department that reported having 5-10 referrals per year was noted to be the largest of the surveyed Departments (annual admissions of 700/year). Referrals to these five services were reportedly received via a variety of methods, including through the feeding service (20%, n = 1), medical team (40%, n = 2), and the Burn Unit nursing staff (20%, n = 1). One respondent reported referrals were received on an 'as needed' basis, but did not specify a common method or source of referral. Children with chemical ingestion injuries were routinely managed under differing medical teams, depending on injury presentation, with gastroenterology (80%, n = 4), otolaryngology (60%, n = 3), general surgery (20%, n = 1), and paediatric medical teams (20%, n = 1) noted to be involved in care.

The survey asked the relative frequency with which SLPs were involved in managing various clinical areas related to management of chemical ingestion injury. Of the five services that managed children with chemical ingestion injury, swallowing was the only area in which most SLP Departments reported they were 'always/often' involved (Figure 3). Tracheostomy management, voice/speech, and general communication were indicated by most clinicians as areas in which involvement was infrequent. Regarding other team members involved in management of chemical ingestion injuries, only two clinicians listed other professionals, and these included occupational therapy, dietetics, psychology, and social work. One SLP Department also acknowledged the inclusion of child advocacy services. The other three SLP Departments indicated they were unsure of which other members of the team were involved with these children.

/insert figure 3 near here/

Discussion

This study provides preliminary evidence regarding the extent and nature of SLP involvement in Australian and New Zealand paediatric burn care teams. Based on the number of admissions and FTE staff, respondent centres represented a range of paediatric Burn Units and SLP Departments, with responses from most Australian states and territories. Overall, the results from this study indicate that perceptions between Burn Units and SLP Departments differ regarding the extent of SLP involvement. There is scope for increased education, awareness, and organisational processes surrounding SLP involvement in paediatric burn care.

Burn Units and SLP Departments differed in their perceptions of the availability of SLP services. No prior studies have reported the perceptions of services from both perspectives; therefore, this is a novel finding. It was noted that only one SLP service identified that they had a dedicated service for the Burn Unit, and SLP Departments reported receiving low levels of referrals (i.e., on a case-by-case basis). At present, due to the absence of available data, we are unable to determine the proportion of children with burn injuries who would require referral for SLP intervention. Hence, it is currently unclear if this reported level of referrals indicates a lack of appropriate referral practices, or is simply a reflection of the low frequency of admissions for this population. For example, the population of children with chemical ingestion injuries has low prevalence. Incidence extrapolated from various retrospective reviews conducted worldwide over the last five decades indicates average annual rates of paediatric chemical ingestion presenting at specific services spans from two to thirty children per year (Bautista et al. 1997; Bicakci et al. 2010; Gaudreault et al. 1983; Gun et al. 2007; Nuutinen et al. 1994; Riffat et al. 2009; de Jong et al. 2001). Furthermore, of these cases, studies suggest that up to one third may have associated swallowing difficulties (Gaudreault et al. 1983). Hence, the number of referrals reported by the SLP departments may be representative of the number of cases requiring their involvement for dysphagia management.

Interestingly, although only small numbers of patients were reportedly referred to SLP services, most Departments reported that they felt their service to this caseload was insufficient. While the survey did not ask for reasons for this decision, it could be that SLPs identified further opportunities for increased scope and inclusion in paediatric burn care. As such, there is potential for increased education surrounding SLP services within paediatric burn care, and advocacy for these services. It has been noted in studies of rural and remote populations (O'Callaghan et al. 2005), that consumers who are unaware of services provided, or where to access them, may manage without these

services. Similarly, it's possible that in Burn Units, promotion of SLP services may be required to (1) highlight the potential benefits of SLP services to staff, and (2) enhance utilisation of and access to SLP services for those patients who need it.

The absence of established referral pathways to SLP services was evident across both Burn Units and SLP Department responses. This lack of established, consistent referral processes, agreed upon by Burn Units and SLP counterparts, could be an additional factor contributing to referral rates to SLP services annually. Targeted referral of children who present with dysphagia risk factors (e.g., referral of all children with chemical ingestion injury and endoscopically verified 2nd or 3rd degree oesophageal burns, known to have an increased risk of stricture development and consequent dysphagia; Sanchez-Ramirez et al. 2012) is likely to be the most appropriate method. However, in order to establish such targeted referral criteria, it is acknowledged that empirical data establishing the link between risk factors and communication/swallowing outcomes in any population is first required (Morgan et al. 2011). Until such specific data becomes available for children, the ANZBA (2014) published evidence-based referral criteria for SLP services which outlines specific criteria for SLP involvement (e.g., chemical ingestion, facial and/or neck burns, presence of tracheostomy tube) and is applicable to all patients with burns, should be more widely implemented (Clayton et al. 2014).

Establishment of evidence-based clinical guidelines surrounding SLP intervention is also likely to improve service delivery. Clinical guidelines are known to improve health outcomes and service efficiency, and highlight under recognised health problems (Woolf, et al. 1999). Particularly within the burn population, evidence based, current guidelines are required (Foster et al. 2014). Established protocols to guide practice are important to increase SLP exposure to populations of low incidence, such as chemical ingestion, and enable acquisition of clinical experience.

The team approach to burn care is well established in the literature, and is recognised as essential for enhancing patient outcomes (Al-Mousawi et al. 2009). It is evident from this study that a multidisciplinary team approach is being employed in paediatric burn care, particularly in the areas of swallowing, tracheostomy and orofacial contracture management. Of these areas, SLP role in dysphagia management was well recognised. In comparison, SLP services were not consistently recognised as having a major contribution to orofacial contracture management or tracheostomy management. While Australian publications do specify SLP as a core burn multidisciplinary team member, ANZBA (2014) allied health guidelines suggest that management of some aspects, such as

orofacial contracture management, will differ according to site policy, which may limit involvement of SLP in this area (Simons et al. 2014). Role ambiguity may also be being fostered by the availability of training programs that facilitate acquisition of multiple skills, and the increase in cross training of burn allied health professionals (Sutton, 1993; Whitehead et al. 2009). Furthermore, lack of recognition of the role SLP to aspects of care such as tracheostomy management post-burn may simply be a reflection of the relatively low numbers of children who receive tracheostomy following burn injury (Barrett et al. 2000). Future development of clear role delineation within the multidisciplinary team is essential to best utilise the skills of contributing professions (Rumbach et al. 2011; Sutton, 1993). It is possible that specific training to help SLPs enhance their clinical skills in this area and ensure that they are equipped with the knowledge and abilities specific to the burn population will help to build role recognition and ensure a targeted service is developed and delivered. Furthermore greater awareness and understanding regarding how SLP may contribute to patient care could be achieved through increased SLP presence through attendance at multidisciplinary team meetings and ward rounds.

The results of this study indicate that SLP Departments are involved in management of chemical ingestion injuries, most often for dysphagia management. Given that current medical studies report a proportion of children post ingestion injury may experience significant, long standing dysphagia with some requiring long periods of non-oral nutrition (Gaudreault et al. 1983; Riffat et al. 2009) there is likely scope for increased SLP involvement. Specifically this may involve an active role in the re-introduction of oral intake and weaning from non-oral nutrition once medically suitable. However, as little is currently known about the role of SLP services for this clinical population, further research is required to establish and define the SLP role within this population, inform markers for timely SLP involvement, and facilitate necessary referral practices to SLP when required.

Limitations and Future Directions

This study is the first of its kind to examine the involvement of SLP services in Australian and New Zealand paediatric burn care. The responses from the study provide insight into the nature and extent of SLP involvement in paediatric burns, and allow for comparison of responses between the Burn Unit members and SLP Departments. However, a number of limitations around the nature, design and distribution of the survey were evident. The sample cannot be deemed truly representative of the state of all Burn Unit teams or clinical management practices, due to the lack of control over the

professionals who completed the survey. In the current study, only a single member from both the burns team and the SLP department completed the survey. Hence views may represent their personal perspectives only. Although senior burns team members and SLPs involved in this caseload were the targeted group for completing the survey to ensure recruitment of respondents with awareness and insight into current management practices, the level of respondent experience and knowledge of care practices for patients with burn and chemical ingestion injuries was not defined. It is possible that respondents may not have been fully aware of all aspects of current management within their teams and as such the current information can only be considered as only an indication of current burn care practices and is not a definitive representation. Survey questions were also general and aimed only to provide an initial insight into current SLP services. Therefore, specific detailed information about service patterns and the nature of clinical services provided is beyond the scope of the current survey. Another limitation of the study design is the collection of the responses via an online-only method. Although this allows for fast and efficient data collection, interviews and focus groups would have revealed more detailed data, with potentially greater insights into Burn Unit operative practices and staff involvement in clinical areas.

Conclusion

This study provides the first step towards identifying the nature and extent of SLP involvement within paediatric burns. The findings revealed that SLPs are involved to some extent in the management of children with burn injury, including chemical ingestion injuries; however, there is scope for increased involvement. Further research is required to establish and define the clinical applications of the SLP role within the paediatric population. A greater evidence-base is needed support the role of SLP involvement with children with burn injuries, to inform referral and practice guidelines. In parallel, enhanced education regarding the potential advantages and skills of increased SLP involvement within paediatric burns would be beneficial.

Acknowledgements

The authors would like to thank ANZBA for assistance with distribution of the survey used in this study. We would also like to thank the participating Burn Units and SLP Departments who completed the survey.

References

- Al-Mousawi, AM, Mecott-Rivera, GA, Jeschke, MG, et al. Burn teams and burn centers: the importance of a comprehensive team approach to burn care, *Clin Plast Surg* 2009;36:547-54.
- Australian and New Zealand Burn Association 2012, *Bi-National Burns Registry Annual Report*, viewed 5th July, 2014, http://199.238.172.3/assets/Bi-NBR_AnnualReportYear3_Final.pdf
- Barrett, JP, Desai, MH, Herndon, DN. Effects of tracheostomies on infection and airway complications in pediatric burn patients. *Burns* 2000; 26:190-93.
- Baustista, CA, Estevez, ME, Varela, CR, et al. A retrospective analysis of ingestion of caustic substances by children. Ten year statistics in Galicia. *Eur J Pediatr*, 1997; 156: 410-14.
- Bicakci, U, Tander, B, Deveci, G, et al. Minimally invasive management of children with caustic ingestion ingestion: less pain for patients. *Pediatr Surg Int* 2010; 26: 251-55.
- Branski, LK, Herndon, DN & Barrow, RE 2012, A Brief History of Acute Burn Care Management in *Total Burn Care*, ed D Herndon, Saunders Elsevier, Edinburgh, pp. Edinburgh, pp. 1-7.
- Brooks, J, & Hammond, JS. Nonverbal communication: the role of the speech pathologist on the burn team. *J Burn Care Rehabil*, 7;1986: 42-44.
- Clayton, NA, Ledgard, JP, Haertsch, PKM, et al. Rehabilitation of speech and swallowing after burns reconstructive surgery of the lips and nose. *J Burn Care* 2009; 30:1039-45.
- Clayton, NA, Kennedy, PJ, & Maitz, PKM, 2010, 'The severe burns patient with tracheostomy: Implications for management of dysphagia, dysphonia and laryngotracheal pathology, *Burns* 2010; 36: 850-855.
- Clayton, N, & Rumbach, A 2014, 'Speech Pathology', in Edgar, D (ed), *Burn Trauma Rehabilitation: Allied Health Practice Guidelines*, Walters Kluwer, Philadelphia, PA., pp. 309-23.
- de Jong, AL, Macdonald, R, Ein, S, et al. Corrosive esophagitis in children: a 3-year review. *Int J Ped Oto* 2001; 57: 203-11.
- Foster, K. Clinical guidelines in the management of burn injury: A review and recommendations from the organisation and delivery of burn care committee. *J Burn Care Res* 2014;35:271-282.
- Gaudreault, P, Parent, M, McGuigan, MA, et al. Predictability of esophageal injury from signs and symptoms: a study of caustic ingestion in 378 children. *Pediatr* 1983; 71: 767-70.

- Gun, F, Abbasoglu, L, Celik, A, et al. Early and late term management in caustic ingestion in children: a 16 year experience. *Acta Chir Belg*, 2007; 107: 49-52.
- Herndon, DN 2012, 'Teamwork for total burn care' in *Total Burn Care* ed in D Herndon, Saunders Elsevier, Edinburgh, pp. 9-13.
- Kay, M, & Wyllie, R. Caustic ingestions in children. *Current Opinion in Pediatr* 2009; 25: 651-54.
- Leeds, M, & Richards, J. (2012). Ingestion Injuries, Kidsafe, WA (No. 25).
- Litovitz, T, Whitaker, N, Clark, L, et al. Emerging battery ingestion hazard: clinical implications. *Pediatr* 2010; 125: 1168-77.
- Lupa, M, Magne, J, Guarisco, JL, & Amedee, R. Update on the diagnosis and treatment of caustic ingestion. *Ochsner Journal* 2009; 9: 54-59.
- Morgan, AT, & Skeat, J. Evaluating service delivery for speech and swallowing problems follow paediatric brain injury: an international survey. *J Eval Clin Pract* 2011;17:275-81
- Nunes, T, de Souza Chagas, M & Biccias, B. A 70-year-old women with dysphagia beginning 6 decades after caustic ingestion. *Gastroenterology* 2014:1174-1431.
- Nuutinen, M, Uhari, M, Karvli, T, et al. Consequences of caustic ingestions in children. *Acta Paediatr* 1994; 83: 1200-05.
- Ofri, A, Harvey, JG, & Holland, AJA. Pediatric upper aero-digestive and respiratory tract burns. *Int J Burn Trauma* 2013;3:209-13.
- O'Callaghan, AM, McAllister, L, & Wilson, L. Barriers to accessing rural pediatric speech pathology services: health care consumers perspectives. *Aust J Rural Health* 2005; 13:162-71.
- Rumbach, AF, Ward, EC, Cornwell, PL, Bassett, LV, Khan, A, & Muller, MJ, 2011, Incidence and predictive factors for dysphagia after thermal burn injury, *J Burn Care Res* 2011; 32: 608-16.
- Rumbach, AF, Ward, EC, Cornwell, PL, et al. The challenges of dysphagia management and rehabilitation after extensive thermal burn injury: a complex case. *J Burn Care Res* 2009; 30: 901-5.
- Rumbach, AF, Ward, EC, Cornwell, PL, et al. Physiological characteristics of dysphagia following thermal burn injury. *Dysphagia* 2012; 27: 370-83.
- Riffat, F, & Cheng, A. Pediatric caustic ingestion: 50 consecutive cases and a review of the literature. *Dis Esophagus* 2009; 22: 89-94.

- Sanchez-Ramirez, CA, Larrosa, A, & Vasquez-Garibay, EM. Socio-demographic factors associated with caustic substance ingestion in children and adolescents. *Int J Ped Oto* 2012; 76:253-256
- Sheridan, RL 2012, *Burns: A practical approach to immediate treatment and long-term care*. Manson Publishing, London.
- Simons, M, Thynne, A, & Clayton, N 2014, 'Orofacial Contracture Management, in Edgar, D (ed), *Burn Trauma Rehabilitation: Allied Health Practice Guidelines*, Walters Kluwer, Philadelphia, PA., pp. 210-225.
- Snyder, C, & Ubben, P. Use of speech pathology services in the burn unit. *J Burn Care Rehabil*, 2003; 24:217-22.
- Sutton, G. Entry to the burns team: stressors, supports and coping strategies. *Burns* 1993; 19: 349-51.
- Urganci, N, Usta, M, Kalyoncu, D, et al. Corrosive substance ingestion in children, *Indian J Pediatr* 2014; 81:675-79.
- Ward, EC, Uriate, M, & Conroy, AL. Duration of dysphagia symptoms and swallowing outcomes after thermal burn injury. *J Burn Care Rehabil* 2001; 22:441-53.
- Williams, AI, & Baker, BM. Advances in burn care management: role of the speech-language pathologist. *J Burn Care Rehabil* 1992; 13: 642-49.
- Whitehead, C, & Serghiou, M. A 12-year comparison of common therapeutic interventions in the burn unit, *J Burn Care Res* 2009; 30:281-7.
- Woolf, SH, Groi, R, Hutchinson, A, et al. Potential benefits, limitations, and harms of clinical guidelines. *BMJ* 1999; 318:527-30.

Appendices

Appendix A: Burn Unit Survey

Demographics

1. What country do you work in?
 - a. Australia
 - b. New Zealand
2. In which state/territory are you located?
3. Approximately how many acute admissions does the Burn Unit have each year?

Speech-language Pathology Involvement

4. Is there a speech-language pathology service in the Burn Unit?
5. Are the following services provided by speech-language pathology in your burns unit (yes, no, unsure)?
 - a. Orofacial contracture management
 - b. Swallowing
 - c. Tracheostomy management
 - d. Voice/Speech
 - e. General communication/developmental issues
6. In your opinion is the level of speech-language pathology services available for your unit:
 - a. Sufficient
 - b. Insufficient

Referrals

7. How are patients referred to speech-language pathology services? Select all relevant.
 - a. Open referral; the speech-language pathologist has input with any patient they feel would benefit from their services.
 - b. Referral from medical staff (e.g. requested by a doctor)
 - c. Referral from other health professional (e.g. nursing staff, allied health)
 - d. Other (please specify)
8. Is there a protocol for referral to speech-language pathology (e.g. for all patients with oral burns, patients with total body surface area burns greater than a certain percentage)?
9. If yes, please outline the protocol for referral to speech-language pathology.

Clinical Areas and Allied Health Input

10. What other allied health services do you currently have available in the burns unit?
 - a. Physiotherapy
 - b. Dietetics
 - c. Social Work
 - d. Occupational Therapy
 - e. Psychology
 - f. Unsure
 - g. Other (please specify)

11. For children in the burns unit with swallowing or feeding issues, which allied health professionals are routinely involved in assessment and management?
 - a. Speech-language Pathology
 - b. Occupational Therapy
 - c. Physiotherapy
 - d. Medical
 - e. Nursing
 - f. Unsure
 - g. Other (please specify)

12. For children in the burns unit with orofacial contractures, which allied health professionals are involved in prevention, assessment or management?
 - a. Speech-language Pathology
 - b. Occupational Therapy
 - c. Physiotherapy
 - d. Medical
 - e. Nursing
 - f. Unsure
 - g. Other (please specify)

13. Do you have any further comments regarding speech-language pathology involvement in the assessment and management of patients with burn injuries?

Appendix B: Speech-language Pathology Department Survey

Demographics

1. Which country do you work in?
 - a. Australia
 - b. New Zealand

2. In which state/territory are you located?
3. Approximately how many Full Time Equivalent (FTE) speech-language pathologists are in your Department?

Services

4. Does the speech pathology Department provide a service to the Burn Unit at the hospital?
5. Is there a dedicated FTE position for the burns unit (e.g. .5 FTE)?
6. In your opinion is the level of speech-language pathology service to the Burn Unit:
 - a. Sufficient
 - b. Insufficient

Referrals

7. How are patients seen by speech pathology (e.g. referred vs open/blanket referral)?
8. Approximately how many referrals does the speech-language pathology Department receive from the Burn Unit each year?
 - a. <5
 - b. 5-10
 - c. 10-20
 - d. Over 20
 - e. Other (please specify):

Clinical Areas and Input by Other Health Professionals

9. In the burns unit at your hospital, which professionals are involved in the assessment and management of swallowing impairments?
 - a. Speech-language Pathology
 - b. Occupational Therapy
 - c. Physiotherapy
 - d. Medical
 - e. Nursing
 - f. Unsure
 - g. Other (please specify):
10. In the burns unit at your hospital, which professionals are involved in the assessment and management of orofacial contractures?
 - a. Speech Pathology
 - b. Occupational Therapy
 - c. Physiotherapy
 - d. Medical
 - e. Nursing
 - f. Unsure
 - g. Other (please specify):

Chemical Ingestion Injury

11. Is the speech-language pathology Department involved in the management of patients admitted with chemical ingestion injury?
12. Please briefly outline how you receive referrals for chemical ingestion injuries:
13. Approximately how many chemical ingestion injury referrals do you receive each year?
 - a. <5
 - b. 5 – 10
 - c. 10 – 20
 - d. Above 20
 - e. Other (please specify):
14. For patients with chemical ingestion injury, how often do you provide services for the following?
 - a. Swallowing – Never, Seldom, Often, Always, Unsure
 - b. Tracheostomy – Never, Seldom, Often, Always, Unsure
 - c. Voice/Speech – Never, Seldom, Often, Always, Unsure
 - d. Communication/Developmental Issues – Never, Seldom, Often, Always, Unsure
 - e. If you provide another type of service not listed above, please specify:

15. What other members of the multidisciplinary team are routinely involved in the management of chemical ingestion injuries in your service?
- a. Occupational Therapy
 - b. Physiotherapy
 - c. Dietetics
 - d. Psychology
 - e. Social Work
 - f. Unsure
 - g. Other (please specify):
16. Which medical teams routinely manage patients with chemical ingestion injuries in your service?
- a. Ear, Nose and Throat
 - b. Gastroenterology
 - c. General Surgery
 - d. Other (please specify):
17. Do you have any further comment regarding speech-language pathology involvement in the assessment and management of patients with burn injuries (chemical ingestion or thermal burns)?

Table 1. Participating Australian and New Zealand States and Territories

States/Territories	Responding Group	
	Burn Unit	SLP Department
Auckland	-	✓
New South Wales	✓	✓
Northern Territory	✓	✓
Queensland	✓	✓
South Australia	✓	-
Tasmania	✓	✓
Victoria	✓	✓
Western Australia	✓	✓
Total	7	7

Note: SLP = Speech-language Pathology

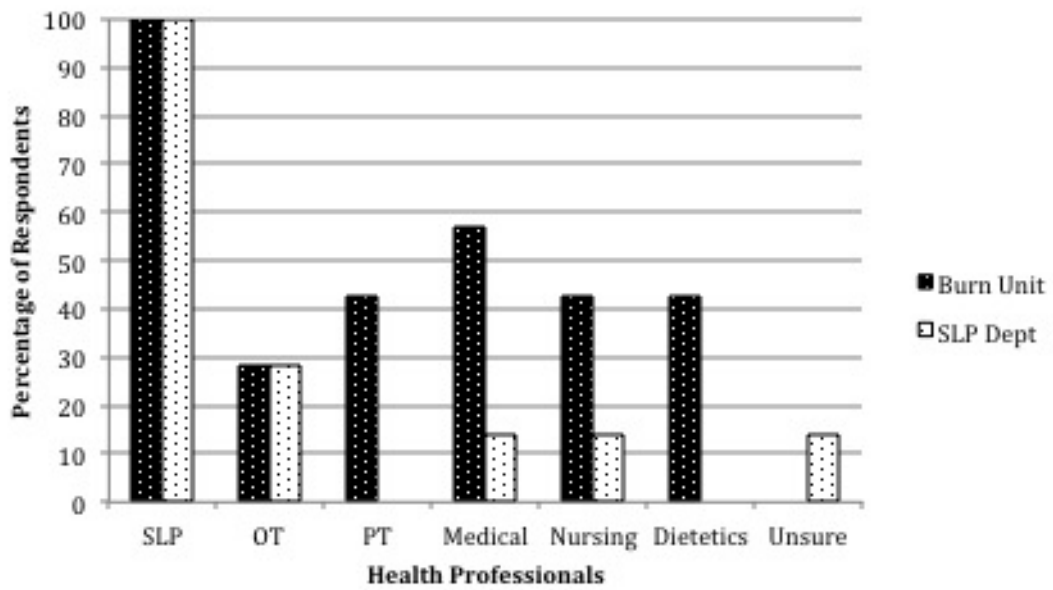


Figure 1. Health Professionals indicated as involved in Swallowing Management by Response Group

Note: SLP Dept = speech-language pathology department, SLP = speech-language pathologist, OT = occupational therapist, PT = physiotherapist

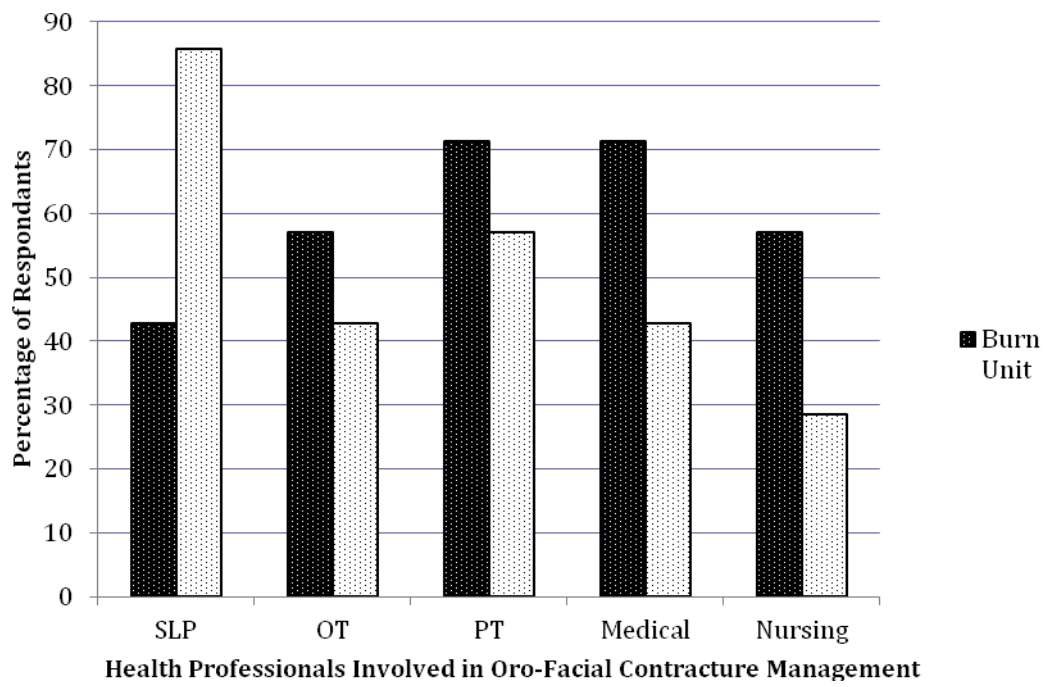


Figure 2. Professionals identified as Involved in Oro-Facial Contracture Management by response group
 Note: SLP Dept = speech-language pathology Department, SLP = speech-language pathologist, OT = occupational therapist, PT = physiotherapist

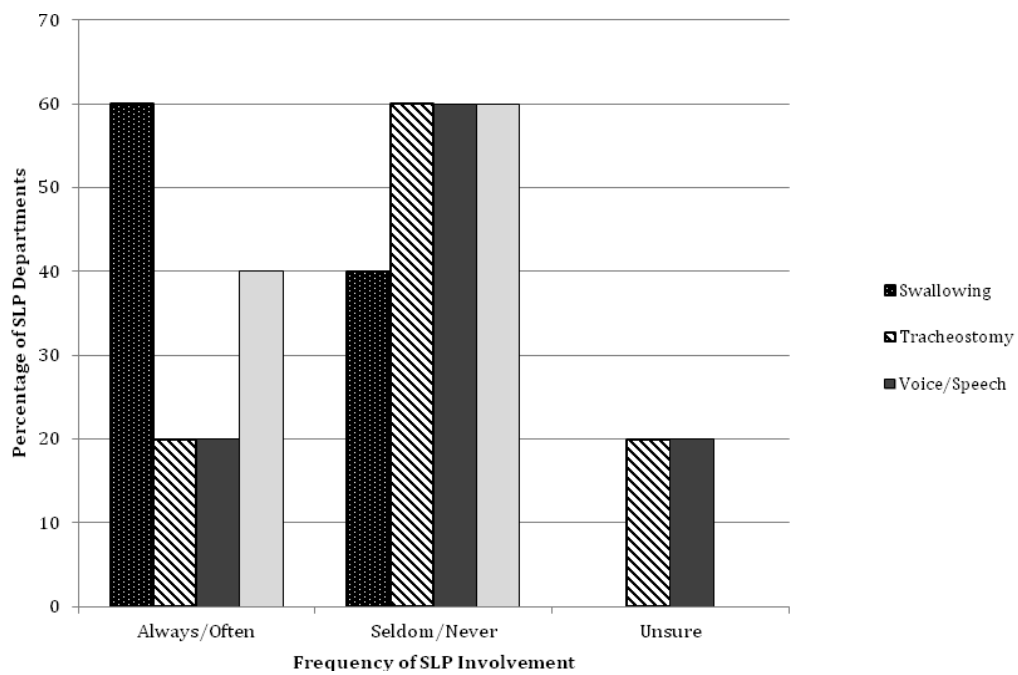


Figure 3. SLP involvement in clinical areas (by frequency of response by SLP group)
 Note: SLP = speech-language pathology