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Speech-language pathology in acute pediatric chemical or button battery ingestion injury

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Abstract

Objectives: Dysphagia is a common consequence of pediatric ingestion injury, yet there is a lack of data relating to recommencement of oral (per os; PO) intake or use of feeding therapy. We describe patterns of early PO intake, and referral to speech-language pathology (SLP) for feeding therapy, during the acute admission of a pediatric cohort post-chemical or button battery ingestion injury.

Methods: Retrospective chart review of pediatric ingestion injuries admitted to a quaternary hospital from 2008 – 2013. Clinical parameters, PO intake progression, and nature of referrals for feeding therapy during the acute admission were examined.

Results: Fifty-one children (26 males; mean age: 31.5, range 4 -170 months) were identified (75% with grade II or III mucosal injuries), of whom 31 (60%) had impaired PO intake. Of these, five recommenced premorbid PO intake during admission. At discharge, 16 remained on modified PO intake, and 10 remained nil PO (NPO). Eight (26%) were referred to SLP for feeding therapy during acute admission, or within 4-months of discharge. Feeding therapy-

referred children were more likely to have pediatric intensive care admission (PICU) (100% vs 26%), and longer hospital admission (36.1 vs. 9.3 days for those not referred).

Conclusions: Over half of the cohort had impaired PO intake, and one-third were NPO at time of discharge. Referrals for feeding therapy were limited. Our findings may provide some guidance for clinicians, patients, and their families regarding possible PO intake recovery patterns, as well as provide background for evaluating the potential for feeding therapy and SLP involvement within this population.

Key Words: Caustic ingestion

Speech-language pathology

Pediatric dysphagia

Button battery

Feeding therapy

What is known about this topic?

- Children with ingestion injury frequently experience dysphagia and impaired oral (per os; PO) intake
- Clinical presentation and pathways to recommencement of PO intake have not been fully explored within this population

What are the new findings and/or what is the impact on clinical practice?

- Many children experienced impaired PO intake during the initial, acute admission, and half had not returned to premorbid PO intake at time of hospital discharge
- There was limited use of speech-language pathology (SLP) services for provision of feeding therapy during acute admission
- These data provide guidance for clinicians, patients, and families, regarding possible PO intake recovery patterns
- There may be potential for increased early referral to feeding therapy for patients post-ingestion injury to aid safe and effective PO intake progression, timely initiation of dysphagia rehabilitation, and patient/ carer education and support

Introduction

Dysphagia and difficulty with oral (per os; PO) intake are common initial symptoms following ingestion injury in children [1-4]. More than one third (n = 106/298) of children have difficulty with PO intake within 48 hours following injury [1] with PO intake difficulties continuing to develop in the weeks following injury in an additional 20% of cases [5, 6].

The causes of dysphagia and difficulty re-establishing age-appropriate PO intake for children post-ingestion injury are multifaceted and heterogeneous. Children who ingest liquid chemical substances (acid or alkali) sustain diffuse injuries to multiple sites across the oral cavity, pharynx, larynx and esophagus [6]. In contrast, button battery ingestion causes more focal injury, usually secondary to lodgment in the esophagus [7, 8]. Difficulties with PO intake generally manifest early post-injury (i.e., initial 24-72 hours) arising from mucosal edema, erythema, and necrosis [1-4]. From two weeks following injury and beyond, esophageal strictures, dysmotility and reflux account for further PO complications [8, 9]. Severe injuries and associated complications often involve child or health professional initiated cessation of PO intake, as well as long-term non-oral feeding [4, 5, 8, 10], with gavage feeding often used to avoid further damage to tissues in the short-term [10]. Once PO intake is possible, it is often facilitated by modification of texture and consistency of diet and fluids (i.e., blended solids +/- thickened fluids), with recent evidence indicating this process is predominately led by the treating medical/surgical team [11].

Although dysphagia is a well-documented occurrence following ingestion injury, there is a lack of detailed information regarding management of early, acute dysphagia or milestones associated with recommencement of PO intake. There is also minimal documentation of contribution from other members of the multidisciplinary team for management of dysphagia or provision of feeding therapy. Therefore, the aim of the current study was to explore the

characteristics of a cohort of children with ingestion injury and examine (a) clinical presentation, (b) details of feeding pathways post-injury, and (c) the nature of speech-language pathology (SLP) involvement (the professional group providing feeding therapy in this service) during the initial acute care admission. These data may inform enhanced multidisciplinary management, care pathways, and referral practices.

Methods

Children admitted to a quaternary hospital in Brisbane, Australia, for the acute care management of a chemical or button battery ingestion injury during a 6-year period (January 2008- December 2013) were included in this study. Acute care represented the duration of management from initial admission to first hospital discharge. Ingestion injury was defined as any burn to the oral cavity, pharynx, larynx, and/or upper gastrointestinal tract (esophagus and stomach) caused by ingestion of caustic materials (acid or alkali) or a button battery. Cases were retrospectively identified through a medical records search using International Classification of Functioning (ICD-10-AM Sixth, Seventh and Eighth Edition) diagnostic codes that denote burns or corrosion to larynx, trachea and esophagus (specifically T27.0-T27.3, T28.0-T28.4, T95.8, and K22.2).

Clinical parameters relating to: patient demographics (age, gender); length of admission; need for and duration of pediatric intensive care unit (PICU) admission; need for intubation/ventilation; substance ingested; location of ingestion event (home, other); symptoms on presentation to hospital; concomitant burn injury to other body parts (e.g., neck, chest); endoscopic evaluation (yes/no); endoscopic grading of mucosal injury [12] (where 0 = normal examination, I = edema and hyperemia of the mucosa, IIa = superficial ulceration, erosions, friability, blisters, exudates, hemorrhages, and whitish membranes, IIb = grade IIa

plus deep discrete or circumferential ulcerations, IIIa = small scattered areas of multiple ulceration and areas of necrosis with brown-black or greyish discoloration, and IIIb = extensive necrosis); dilations, and; any surgery during acute care admission were collected.

All children were subsequently classified as either having impaired PO intake (i.e., texture or consistency modification, or necessitated gavage feeding or parenteral nutrition) during initial admission, or having non-impaired PO intake (i.e., those children reported to have resumed age-appropriate PO intake post-injury as soon as they were deemed medically suitable for any PO intake). Specific PO intake milestones were also collected for all participants. These included: Days to Initiation of Oral Feeding (DIOF; i.e., days from injury to safe initiation of PO diet or fluids, even if texture/consistency modified); Days to achievement of Total Oral Feeding (DTOF: i.e., days from injury to tolerating total PO intake without need for gavage feeding or parenteral nutrition), and; Days post-injury to the Resumption of Normal PO Intake (DRNI: i.e., age appropriate PO intake without need for gavage feeding or parenteral feeding, or texture/consistency modified PO diet and/or fluids). The nature of any gavage (transpyloric tube, nasogastric tube, or gastrostomy tube), or parenteral feeding, was recorded. Where participants were placed on modified PO diets and/or fluids, these modified dietary consistencies were recorded and defined using the Australian terminology for texture modified diet and fluids [13].

It is acknowledged that various professionals are involved in provision of feeding therapy across services (i.e., SLPs, physiotherapists, occupational therapists), however SLPs were the predominant providers of feeding therapy within the service in which this research was conducted. Therefore, in order to identify all children seen for feeding therapy as a consequence of the chemical ingestion injury, cases were reviewed for any SLP involvement during both their early acute admission and during any re-admissions within 4-months post-

discharge. For those who were identified as being referred to, and seen by SLP, days to initial assessment and number of SLP inpatient service occasions were collected from medical and SLP department records. Ethical approval was obtained from the Children's Health Services Queensland Human Research Ethics Committee (HREC/13/QRCH/44), and The University of Queensland Medical Research Ethics Committee (approval #2013000889).

Data analysis

Descriptive statistics were performed for the total cohort and the subgroups of children identified as having impaired/non-impaired PO intake during acute admission. For those participants identified as having impaired PO intake, the characteristics of those referred/not referred for SLP during their hospital admission were also reported. For key medical demographics, comparisons were conducted between subgroups using inferential statistics, completed using Stata software (Statacorp, Version 10.0, 2007). An alpha of <0.05 was used to denote statistical significance. Due to the retrospective nature of this study, data for all variables were not available. Where data were not reported in sufficient details (e.g., injury etiology not specified), a percentage of 'unknown' is reported.

Results

From the ICD-10 code search, a total of 67 cases were identified. Children with primary diagnoses that did not relate to chemical ingestion (n = 10), those who received palliative management or died during their admission secondary to complications from their injuries (n = 2), and children with pre-existing swallowing issues (n = 0) were excluded. From the remaining 55 identified cases, an additional four were excluded from further analysis, as insufficient medical data were available. Fifty-one cases were included in the final analysis.

Prior to group analysis, exploratory statistics were run to determine if injury etiology significantly impacted on the admission characteristics. Comparison of the key clinical parameters from the children who had ingested a button battery (n = 15) was not found to differ significantly ($p>0.05$) from those ingesting chemical substances, (n = 36 [alkali liquid + other/unknown]. Therefore, the group was analyzed as a single cohort.

Characteristics of total cohort

Demographics of the total cohort are provided in Supplemental Table 1 (Supplemental Digital Content, Table 1, http://links.lww.com/MPG/A688). The mean age of the 51 children was 31.5 (range 4-170) months, with 26 (51%) males. The home was the most common location for ingestion injury (n = 40, 78%) to occur. Three (6%) injuries occurred at other locations, and eight (16%) were unspecified. Thirty-three children (65%) had ingested alkaline liquids (i.e., cleaning products), and 15 (29%) had injuries caused by button battery ingestion. For three (6%), the ingested substance was either not reported in medical notes, or not classifiable as a chemical substance or button battery (i.e., ammonia). Upon admission to hospital, reported symptoms included excessive salivation/drooling (n = 22, 43%), emesis/gagging (n = 11, 22%), oral erythema (n = 10, 20%), edema (n = 10, 20%), and mucosal sloughing, (n = 6, 12%). Within 24 hours of admission to hospital, 94% (n = 48) underwent endoscopic evaluation, with 75% (n = 38) presenting with grade IIa or IIb injury. Fifteen children (29%) required endoscopic evaluation combined with removal of foreign body (button battery). Fourteen children (27%) required admission to PICU, with 11 (22%) requiring intubation and ventilation. Forty-one (80%) children were admitted under gastroenterology, five (10%) under otolaryngology, two (4%) under general pediatrics and one each under surgery, ophthalmology and the burn unit. Although four children sustained

concomitant cutaneous burns, only one required admission to the burn unit. Mean total length of hospital stay was 11 days, with modal duration of 2 days.

During acute care admission, no child required surgery, but two children (4%) underwent esophageal dilatation at 16 and 51 days, respectively, post-injury. Seven (14%) other children required subsequent dilatations 2-6 months post-discharge, and seven (14%) required surgical intervention. Thirty-one children (61%) required alterations to PO intake during initial admission and the remaining 20 resumed age appropriate PO diet and fluids during admission when deemed able by the treating medical team.

Comparision of impaired and non-impaired PO intake groups

Demographic information and parameters relating to the injury and hospital admission, for the impaired and non-impaired PO intake groups, is given in Supplemental Table 1 (Supplemental Digital Content, Table 1, http://links.lww.com/MPG/A688). There was no significant difference in gender or injury etiology between impaired and non-impaired PO intake groups. Children with impaired PO intake had significantly more severe endoscopic-graded esophageal injuries; grade II and III injuries (87% vs 55%, $\chi^2 = 10.3$, p=0.03), were more likely to have a PICU admission (45% vs 0%, $\chi^{2\,=}$ 12..4, p= <.001) and had longer hospital stays (mean 16.2 vs 2.0, t = 4.5, p=<.001) than children with non-impaired PO intake.

Within the non-impaired PO intake group, all commenced initial PO intake and returned to regular premorbid diet at an average of one day post-injury (DIOF/DTOF/DRNI M=1.09, SD = 0.3, range 1-2 days). In the impaired PO intake group (n=31), 23 (74%) received gavage (transpyloric, nasogastic, gastrostomy) or parenteral feeding, during admission (see Supplemental Figure 1, Supplemental Digital Content, http://links.lww.com/MPG/A689). Eleven of these 23 (48%) transitioned through multiple types of gavage feeding during

admission. Fourteen of the 23 (61%) started PO intake, with mean DIOF = 5.6 days (SD = 3.7, range 1-11), though one returned to nil PO (NPO) three days after initiation of PO intake. Twelve children achieved full PO intake (52%) with mean DTOF = 8 days (SD = 5, range 2-19) and, of these, 4/23 (17%) achieved a full PO regular diet, with mean DRNI = 8.5 days (SD = 7.9, range 2-18).

(See table, Supplemental Table 1(Supplemental Digital Content, Table 1, http://links.lww.com/MPG/A688), *which contains all demographic information and parameters pertaining to injury and hospital admission for the impaired and non-impaired PO intake groups)*

The eight children who did not require gavage feeding or parenteral nutrition during admission, yet had impaired PO intake, initiated PO intake by a mean two days (SD = 0.5, range 1-3) after admission, with three commencing clear fluids only, two on a puree (i.e., blended) diet, and three on a soft (i.e., easily masticated solids) diet. One of the eight transitioned to pre-morbid PO diet by discharge.

At discharge, 10/31 children (32%) in the impaired PO intake cohort were NPO (nine with gavage, and one recieving TPN), one child was receiving gavage with some PO intake (thin fluids, soft diet), 15/31 (48%) were managing full modified PO intake (two on clear fluids only, eight on soft diet and five on puree diet), and five (16%) had returned to regular premorbid PO diet.

(See figure, Supplemental Figure 1, Supplemental Digital Content, http://links.lww.com/MPG/A689, which contains a flow chart detailing children with modified oral intake during admission, and at discharge)

Characteristics of children referred and not referred to SLP

Of the 31 children with modified PO intake, gavage feeding, or parenteral nutrition, six (19%) (four males, two females) were referred for SLP intervention during initial admission (12% of total cohort). A further two (6%) children were referred during subsequent admissions, at 90 and 116 days post-injury. Key characteristics of children referred to SLP are given in Table 2. The cohort referred to SLP included 4 (63%) liquid alkali ingestions, and 3 (38%) button battery ingestions. Comparisons between those seen and not seen by SLP revealed no significant difference (p=>0.05) in age, gender, injury etiology, need for intubation/ventilation, duration of PICU admission, or injury severity. However, there was a greater proportion of children in the SLP group who required PICU admission ($\chi 2$ =13.1, $p<0.01$), and these children had longer hospital admission ($t=4.7$, $p<0.01$) (Table 1). SLP was involved with 8/23 children (two seen during subsequent admissions) who received gavage or parenteral feeding. There were 18 children (58%) who, at discharge, remained NPO, on a PO modified diet with gavage feeding, or on modified texture PO diet only, who had no contact with SLP during the first admission or in the four months post-admission. For the eight children seen by SLP during first or subsequent admissions, duration to initial referral was 46.6 days post-injury (SD = 42.6, range 3-116), with children seen for an average of 2.5 (SD = 2, range 1- 6) service occasions.

INSERT TABLE 1 near here

Discussion

The demographics of this cohort resembled those reported in other studies, the majority of children between 2-3 years of age, most ingestions occurring within the domestic environment [14], and alkali substances the most commonly ingested agent [8]. However, in our cohort, the prevalence of difficulties with PO intake in the early acute period was almost

twice (60%) that previously reported, possibly a result of reporting prevalence across the entire first admission, rather than only the initial 48 hours following injury [1].

Preliminary comparisons did not find any effect of injury etiology on need for PO intake modification. Specifically, children with focal injury (i.e., as a result of button battery ingestion) did not differ from those with diffuse injury on the clinical parameters in this study. These data suggest that esophageal damage, regardless of injury etiology, is likely a useful predictor of potential difficulties with PO intake. Therefore, consultation with members of the feeding team for any child with esophageal injury may assist with education regarding non-oral feeding and monitoring of progression to suitable diet and fluids.

Within the impaired PO intake group, endoscopic grading revealed more severe injuries, and medical records revealed there was increased rate of PICU admittance and longer duration of hospitalization. Nearly half the children in the impaired PO intake cohort required PICU admission, compared with none in the non-impaired PO intake group. In addition, duration of acute admission was eight times longer for children with impaired PO intake (16.2 vs. 2 days). This is consistent with prior research that supports that presence of comorbidities and extent of mucosal damage is associated with longer hospitalization [15, 16]. These additional data presented here may be useful for health care professionals to aid prognostic insight and provide collateral information to assist with communication of accurate discharge planning to patients and their families.

Approximately half the children in this study required gavage or parenteral feeding, and one third of children with necessitated alterations to PO intake during admission remained NPO upon discharge from the initial acute admission. Children who required gavage or parenteral feeding typically initiated PO intake within one week of injury, with half returning to exclusive PO intake at eight days post-injury. Twenty-percent of the total cohort remained

completely dependent on gavage feeding at time of discharge. Generally, gavage feeding within this population ranges from one week [10] to "long-term" if swallow function does not improve [8]. A high proportion of our study cohort required texture or consistency modified PO intake, and 29% remained on a modified PO diet at discharge. Diet modification may be initiated by the treating health care professional on the basis of presumed mucosal fragility and esophageal dysmotility [8, 17-22]. In our cohort, clear fluids only, or fluids with puree and minced diet consistencies, were typically advised. In the absence of any previously published PO intake milestones for this population, these data provide some guidance for clinicians, patients and their families regarding possible recovery patterns. This background is also vital when evaluating the role and benefits of intervention such as SLP referral. These data are necessary to guide treatment planning, and evaluation of interventions.

Despite 60% of the children requiring gavage, parenteral nutrition, or modified PO intake, few children received feeding therapy from SLP services during the acute phase of injury. Children who were referred to SLP services had a higher incidence of PICU admission, and longer acute hospital admission. The probability of being seen by SLP was likely increased in these cases as they fell into a higher risk category for morbidity and their longer admission periods enabled a shift in management focus from acute medical issues to rehabilitation. PICU is also more intensively multidisciplinary than medical/surgical wards, with the increased likelihood of a PICU designated specialist SLP service being more readily available [23].

It is postulated that the low-volume of referrals to SLP services in this specific study population are likely reflective of logistical difficulties in coordinating care pathways across multiple medical teams, and identifying appropriate indicators for SLP involvement, rather than a reflection of need. We hypothesize that early feeding therapy would likely enhance management of dysphagia within this population, as well as mitigate potential problems

arising from aversive oral experiences, and lengthy periods of NPO [23, 24]. This study describes important characteristics of children with ingestion injury seen by SLP, but not comparative feeding outcomes for those seen. We propose earlier SLP involvement will support the safe and effective reintroduction of PO intake, but this can only be confirmed by prospective investigation. Further research is also required regarding the benefits of parental education and training regarding issues such as management of modified PO intake, as well as the potential impacts of ingestion injury on oral, pharyngeal, and esophageal function. Additional support for primary carers may help to alleviate the concerns and fears regarding changes to swallowing function, how to prepare modified diets and fluids, and to support the progressive implementation of more regular PO intake as recovery occurs [25, 26]. A more active role by professionals experienced in feeding therapy could play an important role in providing this education and support. The impact of SLP expertise and parental support on patient and carer quality of life during and after discharge for ingestion injury is also worthy of further research.

As this was a single site, retrospective review, there are limitations in the amount and range of data collected. The heterogeneous and irregular nature of SLP involvement restricted analysis of the features of SLP intervention. Prospective research will enable collection of targeted information regarding the management of difficulties with PO intake, as well as details regarding the suitability and efficacy of intervention.

Conclusion

Children admitted to hospital with severe ingestion injury to the oral cavity, oropharynx and esophagus have significant and sustained delay in the recovery of effective PO intake milestones, with many requiring ongoing gavage feeding at hospital discharge. Feeding therapy may provide the opportunity to improve patient safety, support return to a

developmentally appropriate PO diet, and improve quality of life for children with ingestion injury, and their families.

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Table 2. Demographics of the children with impaired oral (per os; PO) intake seen (n=8) and not seen (n=23) by speech-language pathology (SLP)

Parameter	Total Cohort N=51	Patients with impaired PO intake (n=31) seen and not seen by SLP	
		Not seen by SLP n=23*	Seen by SLP n=8*
Age (months)	31.5 (SD=35.4; 4-170)	42.4 (SD=48.2; 10-170)	15.3 (SD=6.4; 4-22)
Gender			
Male	25 (49%)	14 (61%)	4 (50%)
Female	26 (51%)	9 (39%)	4 (50%)
Injury Etiology			
Alkali liquid	33 (65%)	14 (60%)	5 (63%)
Button Battery	15 (29%)	8 (35%)	3 (38%)
Other/Unknown	3 (6%)	1 (4%)	0 (0%)
Endoscopic evaluation	48 (94%)	23 (100%)	8 (100%)
Injury severity†			
Grade 0	2 (4%)	1 (4%)	0 (0%)
Grade I	8 (16%)	2 (9%)	1 (13%)
Grade IIa	22 (43%)	10 (43%)	3 (38%)
Grade IIb	11 (22%)	6 (26%)	3 (38%)
Grade III	5 (10%)	4 (17%)	1 (13%)
No endoscopy	3 (6%)	0 (0%)	0 (0%)
Concomitant burns	4 (8%)	1 (5%)	1 (13%)
PICU admission	14 (27%)	6 (26%)	8 (100%)
Duration (days)	M=6.8 (SD=4.6; 2-17)	M=5.2 (SD=3.3; 2-9)	M=8.1 (SD=4.9; 2-17)
Intubation & ventilation	11 (22%)	5 (22%)	5 (63%)
Altered PO during admission	31 (60%)	23 (100%)	8 (100%)
Received enteral feeding	23 (45%)	15 (65%)	8 (100%)
Feeding status at discharge			
Nil per os (NPO)	10 (20%)	3 (13%)	7 (88%)
PO with gavage/ parenteral	1 (2%)	1 (4%)	0 (0%)
Modified PO diet only	15 (29%)	14 (61%)	1 (13%)
Pre-morbid (regular) PO diet	25 (49%)	5 (22%)	0 (0%)
SLP involvement	8 (16%)	0 (0%)	8 (100%)
Duration of acute admission (days)	M=10.6 (SD=15.7; 1-66)	M=9.3 (SD=8.8; 1-30)	M=36.1 (SD=23.3; 8-66)

*Note: *percentages expressed as a proportion of the total group/subgroup size; †injury severity determined using Zargers (1991) Grading of Mucosal Injury, PICU = pediatric intensive care unit, M = mean, SD = standard deviation*

Table 4.2
Demographics of the children with impaired oral (per os; PO) intake seen (*n*=8) and not seen (*n*=23) by speech-language pathology (SLP)

		Patients with impaired PO intake (n=31) seen and not seen by SLP	
	Total Cohort	**Not seen by SLP**	**Seen by SLP**
Parameter	***N*=51**	***n*=23***	***n*=8***
Age (months)	31.5 (*SD*=35.4; 4-170)	42.4 (*SD*=48.2; 10-170)	15.3 (*SD*=6.4; 4-22)
Gender			
Male	25 (49%)	14 (61%)	4 (50%)
Female	26 (51%)	9 (39%)	4 (50%)
Injury Etiology			
Alkali liquid	33 (65%)	14 (60%)	5 (63%)
Button Battery	15 (29%)	8 (35%)	3 (38%)
Other/Unknown	3 (6%)	1 (4%)	0 (0%)
Endoscopic evaluation	48 (94%)	23 (100%)	8 (100%)
Injury severity†			
Grade 0	2 (4%)	1 (4%)	0 (0%)
Grade I	8 (16%)	2 (9%)	1 (13%)
Grade IIa	22 (43%)	10 (43%)	3 (38%)
Grade IIb	11 (22%)	6 (26%)	3 (38%)
Grade IIIa/ IIIb	5 (10%)	4 (17%)	1 (13%)
No endoscopy	3 (6%)	0 (0%)	0 (0%)
Concomitant burns	4 (8%)	1 (5%)	1 (13%)
PICU admission	14 (27%)	6 (26%)	8 (100%)
Duration (days)	*M*=6.8 (*SD*=4.6; 2-17)	*M*=5.2 (*SD*=3.3; 2-9)	*M*=8.1 (*SD*=4.9; 2-17)
Intubation & ventilation	11 (22%)	5 (22%)	5 (63%)
Altered PO during admission	31 (60%)	23 (100%)	8 (100%)
Received enteral feeding	23 (45%)	15 (65%)	8 (100%)
Feeding status at discharge			
Nil per os (NPO)	10 (20%)	3 (13%)	7 (88%)
PO with gavage/ parenteral	1 (2%)	1 (4%)	0 (0%)
Modified PO diet only	15 (29%)	14 (61%)	1 (13%)
Pre-morbid (regular) PO diet	25 (49%)	5 (22%)	0 (0%)
SLP involvement	8 (16%)	0 (0%)	8 (100%)
Duration of acute admission (days)	*M*=10.6 (*SD*=15.7; 1-66)	*M*=9.3 (*SD*=8.8; 1-30)	*M*=36.1 (*SD*=23.3; 8-66)

Note: *percentages expressed as a proportion of the total group/subgroup size; †injury severity determined using Zargar's (1991) Grading of Mucosal Injury, PICU = pediatric intensive care unit, *M* = mean, *SD* = standard deviation