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ORIGINAL ARTICLE

Implications of Variability in Clinical Bedside Swallowing Assessment Practices by Speech Language Pathologists

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Abstract Speech language pathology (SLP) clinical bedside swallowing assessments (CBSA) are a cornerstone of quality care for patients in acute hospitals who have dysphagia. The CBSA informs clinical diagnosis and decisions regarding further instrumental assessment, and is used to develop a management plan and monitor progress. However, self-report and retrospective research shows that SLPs are highly variable in their use of assessment components considered by experts to be important for quality CBSA, casting doubt on the validity and reliability of CBSA. This prospective study describes the components included by SLPs when designing a standardised evidence based dysphagia assessment protocol for acute care patients and observed patterns of component use. The findings confirm that SLPs use the CBSA for multiple purposes beyond diagnosis of aspiration risk and dysphagia presence/severity. They are highly variable in their use of certain components, but also demonstrate consistent use of a core set. It is apparent that SLPs prioritise the application of clinical reasoning to tailor their CBSA to the patient over following a highly structured item-based protocol. The variability in component use likely reflects a complex clinical reasoning process that draws on a wide variety of information combined with expert knowledge as is also observed in many other medical specialties. Rather than promoting the standardisation of CBSA protocols that constrain SLP practice to strict item-based assessment protocols, consideration should be given to promoting the value and facilitating the clinical reasoning process that supports the utility of the CBSA for diagnosis, patient centred management and treatment planning.

Keywords Deglutition · Deglutition disorders · Clinical bedside assessment · Clinical reasoning · Dysphagia · Validity

Introduction

Management of dysphagia for patients admitted to acute hospitals is a core component of quality care, as dysphagia often has a severe impact on patient health outcomes, including aspiration pneumonia, malnutrition and dehydration [1–3]. Allied health professionals, particularly speech language pathologists (SLP), are commonly an integral part of this assessment management process, and clinical bedside swallowing assessments (CBSA) are the foundation of their practice. CBSA provide information on the patient's swallowing (dis)ability, inform decisions regarding further instrumental assessment, and are used to develop a management plan and monitor progress [4–6]. Specifically, SLPs aim to minimise risks to health by evaluating and ameliorating the risk of aspiration and maximise safe consumption of food and water. Strategies include diet modification, positioning, swallowing techniques or mealtime strategies. SLP intervention may also include therapy that aims to restore safe swallowing by improving airway protection mechanisms and oropharyngeal function. SLPs use the CBSA to inform this process by identifying the likelihood of aspiration, characterising the

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nature of the swallowing difficulty and making a determination regarding severity and risk [5, 6]. This informs decision-making regarding referral for further investigation, intervention planning and monitoring of progress.

However, there is considerable variation with regard to the components SLPs' self-report as routinely included in this assessment process [7–11]. The few standardised protocols available are either screening tools [12, 13] or have been validated only on patients' post-stroke [14]. In addition, the majority of research on clinical dysphagia assessment has narrowly focused on the utility of various combinations of examination items within the CBSA for reliably predicting if a patient will be identified as aspirating on instrumental assessments [15]. The broader aspects of SLPs' CBSA practices have received limited attention and have focussed on standardising and validating assessment practices [14] or identifying what components SLPs self-report as including in their CBSA. Interestingly, SLPs themselves report that less than half of the components of bedside assessments that are considered important are used 'usually/always' [7–11]. These findings have led to a call for increased consistency in clinical practice via standardisation of the clinical examination to manage this variability. The assumption is that this will improve the quality of assessment practice and therefore patient outcomes, as well as yield reliable measures for intervention research.

The Mann Assessment of Swallowing Ability (MASA) [14] is the only current diagnostic bedside assessment tool that was originally designed to address the broader focus of CBSA by SLPs, having been standardised and validated with patients in a rehabilitation setting after their first stroke. However, SLPs also omit assessment components even when using a standardised and validated protocol like the MASA [16]. In a retrospective investigation into the utility of the MASA for diagnosing the presence/absence of aspiration in a mixed non-stroke population in an acute hospital, 79 of the 168 cases selected for review had up to five components omitted [16]. This is particularly striking given the finding that SLPs' clinical judgement, as represented by ordinal ratings on completion of the MASA, had good sensitivity when compared to instrumental findings, even though they were frequently made on 'incomplete' bedside assessments. Gonzalez-Fernandez et al. [16] suggest that these patterns of component omission were non-random and were likely to be due to SLPs' decision-making regarding a component's perceived relevance for their diagnostic reasoning.

This pattern of omitting assessment components aligns with SLPs' reported patterns of assessment practice. Furthermore, the suggestion that these patterns are non-random is supported by the considerable similarity across self-report studies regarding the components that 90 % of responding SLPs across Ireland, the UK, the USA and Australia reported that they do 'usually/always' use (see Table 1) [7–11]. Across these studies, it has been speculated that components may have been less frequently used because the research evidence is not strong or has ruled them out as irrelevant (e.g., gag reflex, cervical auscultation), the survey components were ambiguous (e.g., whether speech and language screening was conducted meant informally or via a standardised assessment) or SLPs may not have had access to required training (e.g., indirect laryngoscopy). When interviewed about their self-reported use of assessment components, respondents stated that they were influenced by their knowledge of the current evidence base, accepted practice in their workplace, the aetiology of the dysphagia and relevant medical conditions, and individual SLP characteristics, such as education and experience [11]. These respondents also noted that they would omit components if they thought the information derived would not add information that would change their management of the patient. This supports the suggestion that patterns of usage of clinical assessment components were logically based on a clinical decision-making process. The SLP would start broadly with the more commonly used components and probe with less commonly used components until a decision was reached regarding the diagnosis and intervention plan or whether further instrumental assessment was required [8]. This process mirrors those used in other disciplines, such as medicine, where clinical examinations and history taking are guided by an overall evidence-based framework to gather information to make a diagnostic judgement or decision for referral for further instrumental assessment; for example, in the clinical assessment of pneumonia [17]. Therefore, good CBSA practice by SLPs is characterised by an efficient decision-making process that determines which components are relevant for a specific patient presentation and therefore should be used. This hypothesis appears to be borne out by the overall similarity in the assessment components that SLPs self-report using during CBSA across studies conducted in Ireland, the USA, the UK and Australia (see Table 1) and may account for the variability in using some components with all patients.

In summary, self-report and retrospective research has found that SLPs omit assessment components that are considered by experts to be important for quality CBSA. This pattern may be intentional and may be related to factors important for high-quality clinical practice. In particular, it suggests engagement in a logical and efficient decision-making process that determines which history and clinical examination components are relevant given the patient's presentation and should be used during an assessment. However, the actual patterns of assessment practice by SLPs using a standardised CBSA protocol

Table 1 Clinical bedside assessment components that SLPs self-report using

	Mathers-Schmidt and Kurlinksi [7]	Pettigrew and O'Toole [10]	Bateman et al. [9]	Vogels et al. [11]
Patient history	Yes	Yes	Yes (5/6 elements)[a]	Yes (2/6 elements)[a]
Patient interview/patient perception of problem	Yes	Yes	No	No
Assessment of mental status	Yes	No	No	Yes[b]
Oral motor examination				
Adequacy of dentition for chewing	Yes	Yes	Yes	Yes
Structural/functional oral motor examination	Yes	Yes	Yes	Yes
Presence strength of volitional cough	Yes	Yes	Yes	Yes
Oral trials				
Adequacy of lip seal	Yes	Yes	Yes	Yes
Judgement of efficiency of oral movements	Yes	Yes	Yes	Yes
Assessment of vocal quality pre/post swallow	Yes	Yes	Yes	n/a
Adequacy/strength of laryngeal excursion	Yes	Yes	Yes	Yes
Judgement of pharyngeal delay	Yes	Yes	Yes	?Yes
Use of a variety of bolus types	Yes	Yes	Yes	Yes
Management of oral secretions	n/a	n/a	Yes	Yes

[a] Later research divided 'patient history' into six elements: drug, social and medical history, and hydration, nutritional and respiratory status

[b] 'Patient's ability to participate' is assumed to equate to 'mental status'

designed by clinicians to be relevant for use with patients in an acute care hospital remains to be evaluated. This study aimed to prospectively identify these assessment patterns and sought to answer the following research question: what components of an SLP-developed standardised CBSA protocol are consistently used in practice by SLPs in an acute care hospital with patients who have mixed aetiologies?

Methods

Research Environment

This research was conducted at a 600-bed acute hospital in a major Australian city. Admitted patients who are suspected of having dysphagia are routinely referred to a SLP, who is part of a multi-disciplinary team and who conducts the CBSA. The area health service ethics board was consulted prior to commencement of data collection and advised that the proposed data collection constituted a quality improvement activity and did not require ethics review. The research team adhered to the Australian National Health and Medical Research Council guidelines [18] and the Declaration of Helsinki for ethical conduct [19].

Bedside Assessment Protocol

SLPs identified that there were variations in how CBSAs were being conducted within their group and developed a consensus on the components to be included in the trial protocol that closely matched typical practice. The selected components represented two aspects of the assessment:

1. Procedural and established best practice [20] elements; e.g., history taking, summary of assessment findings, recommendations and plans [6].
2. Direct assessment of dysphagia with components derived from:

a. The MASA: validated components and assessment processes (see description below) were identified as potentially appropriate for use with a heterogeneous acute care patient group and matched current CBSE practices [14].
b. Cranial nerve examination to determine the precise nature of impairments and underlying neurological correlates [6, 21].

A standard protocol combining these assessment items in an order that reflected the current practice of the SLPs at that hospital and which was suitable for inclusion in medical files was developed based on consensus. This protocol, operationally termed the Speech Pathology Initial Dysphagia Assessment (SPIDA), was trialed and modified twice until the current format was established. The scoring process and the 3–5 point rating scales for the MASA components remained as per the technical manual. Additional cranial nerve assessment components were rated as 'normal/abnormal'. Provision was made for comments against all aspects of the assessment process. See "Appendix 1" for the *pro forma* SPIDA. All SLPs participated in a 2-h training session on using the protocol and were

instructed to use all assessment components with all patients.

Sampling

The SLPs were instructed to use the SPIDA for all initial swallowing assessments, regardless of diagnosis, for the 6-month data collection period. All SLPs working in the five tertiary hospitals in the state are evaluated against the same state-wide acute dysphagia competency framework [20]. The SLPs in this study were credentialed for independent practice in acute dysphagia assessment and management using this framework and had satisfactorily demonstrated competence endorsed under supervision. The SLPs recorded their assessment during and immediately after seeing the patient, photocopied it, placed the original in the patient's medical records and filed the copy in a secure collection box on their return to the SLP offices.

Data Entry

Data were entered into Microsoft Access® database (Microsoft, 2007). SLP students on research internships ($N = 6$) double-entered all data on each SPIDA under the supervision of the authors. Fidelity of data entry was further checked by a professional staff member with expertise in Access®.

Analysis

Descriptive analyses were conducted using SPSS® (IBM, 2013) to investigate patterns of component use and rating behaviours.

Results

Return Rate

An estimated return rate was calculated retrospectively and conservatively, based on the number of patients admitted to the hospital whose files were centrally coded as having been referred for a dysphagia assessment and who had no previous assessments during their admission. The maximum number of inpatients who could have been included in this data collection was 516. The total number of patient SPIDA forms submitted for analysis was 308, a minimum estimated return rate of 60 %. SLPs stated that forms were not returned due to practical constraints (e.g., forgot to bring the SPIDA to the bedside or photocopy it) or because they chose an alternative assessment process tailored to the patient's specific presentation (e.g., if the patient was intubated or non-compliant with standard assessment processes due to cognitive deficits).

Population

The population was representative of patients usually referred for dysphagia assessments at this service. They had mixed diagnoses and were elderly, with 75 % of the sample aged 73 years or above and a median age of 82 years. The majority of the sample stayed longer than average for this hospital (75 % admitted six or more days), with a median stay of 12 days and 40 % being considered long-stay (>12 days). Sixty-two patients (20.1 %) were admitted with a first-time stroke.

Patterns of Assessment Component Use and Ratings

Procedural and Practice Components

The majority of these components (17/26) were completed by the SLPs more than 90 % of the time (see Table 2). Six of the nine elements completed less than 90 % of the time relied on information being available from case notes and/or colleagues; three related to SLP-directed practices (SLP-associated diagnoses, long- and short-term goals).

Dysphagia Examination Components

Seven sets of data were removed from the total data set of 308 as the assessment had not proceeded to a direct assessment of swallowing function. Tables 3 and 4 identify the rating patterns for all components. Table 3 indicates that the SLPs were highly variable in completing the cranial nerve components, with five out of ten items having been rated less than 90 % of the time: masseter palpation, reflexive spontaneous swallow, facial quadrants, pharyngeal sensation and tongue protrusion symmetry. The MASA components were more consistently used, with three out of 24 items having been rated fewer than 90 % of the time: tongue strength, gag reflex and soft palate (see Table 4). However, some rating categories that were available for the MASA components were rarely used, with 20 of the 24 components having rating categories that attracted fewer than ten selections (see italic values, Table 4). In addition, different combinations of items were omitted for different patients, and as a result only 18.6 % (56) of patients had a judgement recorded for all cranial nerve components and only 55.8 % (168) had all MASA components rated. Overall, there were only 7/301 forms returned where all components of the dysphagia examination were completed.

Table 2 Completion rates for each procedural and practice component

Component	Completed, $N = 308$ n (%)
Pre-examination components	
Admission date	308 (100)
Referred by	307 (99.6)
Referred for	308 (100)
Referral date	307 (99.6)
Admission diagnoses	307 (99.6)
SLP-associated diagnoses	184 (59.7)
PMHx	306 (99.4)
Pre-admission residence	304 (98.7)
Pre-admission diet	266 (86.4)
Pre-SP assessment diet	250 (90.3)
Social history	209 (67.9)
Admission details	244 (79.2)
Are any diagnoses progressive	308 (100)
CXR date and results	170 (55.2)
CRP date and results	178 (57.8)
WCC date and results	203 (65.9)
Examination component	
Consistencies trialed	282 (91.6)
Oral hygiene/saliva management/dentition	291 (94.5)
Post examination component	
Assessment findings	305 (99.0)
Recommendations	
Diet/fluid consistency	306 (99.4)
Medication management	305 (99.0)
Mealtime strategies	292 (94.9)
Plan	
ATS coded	283 (91.9)
Discussed with at least one person (patient, carer or nurse)	299 (97.1)
Long-term goal	265 (86.1)
Short-term term goal	258 (83.8)
Management plan	299 (97.1)

Comments

All components had comments in addition to ratings, with the percentage ranging from 2.3 % through to 47.1 % of items having been commented on. Eight of the ten cranial nerve ratings had 25 % or more commented on, with seven of the 24 MASA-derived components having more than 25 % comments.

Discussion

This research prospectively evaluated the CBSA components that SLPs select as important for inclusion in a standardised clinical bedside assessment, and their patterns of use for these components when assessing patients referred for initial dysphagia assessment in an acute hospital over a 6-month period. The results indicate that SLPs included components that captured the process of assessment from prior to the bedside clinical examination (e.g., social history), observations made during the direct clinical examination, which included trials of food and fluids at the bedside, as well as components that capture the diagnostic and treatment planning elements of the process. It is worth noting that these assessment components are in agreement with the CBSA components identified by SLPs across multiple countries as being used 90 % or more of the time and therefore reflect current international best practice.

Overall, the SLPs were highly likely to use most of the components, but did not necessarily use all of them, or all of the available rating categories, with every patient. It was not unusual for comments to be made in relation to many of the items. The documented variability in item use was unexpected given that the SLP team were involved in the selection of components to be included in the SPIDA, were instructed to use all components, and were aware of the importance of adhering to a standardised and validated protocol as a result of the training for this research as well as their own pre-professional education.

Assessment Components Included by SLPs

Following iterative consultation with, and review by, the participating SLPs, the SPIDA included items that map the entirety of the bedside assessment, including components related to both process and outcomes. This confirms that SLPs see their assessment as an evolving process, more than simply identifying the presence/absence or risk of aspiration at the bedside in accordance with best practice [5, 6]. Specifically, SLPs are gathering a wide range of data from a range of sources, including case notes, the patient and their caregivers, and colleagues, as well as a clinical bedside assessment that comprises oral motor assessment elements as well as oral intake trials. The SLPs in this study used this data for multiple purposes, including to identify aspiration risk, to determine dysphagia severity and to develop recommendations for short-term care as well as to assess the prognosis and the need for further bedside and/or instrumental assessment. This range of assessment purposes is consistent with recommended practice that CBSAs should include medical and patient history, assessment of cognition, communication, relevant physiology, anatomy and functioning, including cranial nerve examination, and assessment of ability to consume food and liquids [6].

Table 3 Rating categories for cranial nerve components ($N = 301$)

Cranial nerve component	Abnormal *n* (%)	Normal *n* (%)	Frequency component completed *n* (%)	Frequency comments made *n* (%)
Wet voice after swallow	39 (13.0)	251 (83.4)	297 (98.7)	78 (25.3)
Facial symmetry at rest	83 (27.5)	196 (69.9)	291 (96.7)	111 (36)
Forehead movement/frontalis symmetry	29 (9.6)	234 (77.5)	283 (94.0)	67 (21.8)
Jaw symmetry of movement	33 (10.9)	218 (72.2)	277 (92.0)	84 (27.3)
Jaw ROM/rate	63 (20.9)	182 (60.3)	273 (90.7)	127 (41.2)
Masseter palpation	63 (20.9)	166 (55)	268 (89.0)	141 (45.8)
Reflexive spontaneous swallow	15 (5.0)	234 (77.5)	251 (83.4)	51 (16.6)
Facial quadrants (sensory)	5 (1.7)	169 (56.0)	230 (76.4)	130 (42.9)
Tongue protrusion symmetry	42 (13.9)	144 (47.7)	211 (70.1)	87 (28.2)
Pharyngeal sensation	17 (5.6)	125 (41.4)	153 (50.8)	142 (46.1)

Variability in Assessment Use

Components Assessed

The SLPs in this study used 46 of the 61 (75 %) components of the SPIDA 90 % or more of the time, suggesting that they had included components that were relevant to their practice and that they were conscientious in their professional practice and use of the tool. There are a number of plausible explanations for the less frequent use of the remaining 15 items. The SLPs may not have had access to the information required to complete some components, such as pre-admission diet, or some tests may not have been conducted for some patients at the time of the CBSA; for example, chest X rays, C reactive protein (CRP) and white cell count (WCC). It is also possible that there may not have been enough information gathered at this initial bedside assessment to complete a diagnosis and set goals. Some components from the MASA may have been neglected because their use is not supported by research evidence. For example, the SLPs interviewed by Vogels and colleagues [11] indicated that the evidence base influenced the components they included in a CBSA and cited the elicitation of the gag reflex as an example. In line with this, the gag reflex was assessed in 71.4 % of the assessments in the current study and in 57.7 % of assessments in the research presented by Gonzalez-Fernandez and colleagues [16]. Cranial nerve components may have been used less frequently due to lack of relevance to the specific aetiology of the dysphagia (i.e., stroke or not stroke-related), or could not be completed (e.g., a hypersensitive gag or a resistant patient will make completion of the pharyngeal sensation component difficult). In addition, the relevant information may have already been observed during elicitation of the MASA components of the assessment and therefore excluded from further probing (e.g., reflexive spontaneous swallow, tongue protrusion symmetry). Some components may have been omitted because the patient was unable to cooperate for particular items due to alertness, cooperation or ability to follow instructions. This may also account for why so few patients with severely impaired alertness (7.3 %) and cooperation (4.7 %) were included in this sample, as the assessment would not have proceeded to a full clinical examination. In turn, this was also reflected in the overall return rate of 60 % of SPIDA forms.

It is possible that not including an 'unable to assess' option for the majority of the clinical assessment components (24 of 34 components) may have also contributed to SPIDA forms not being completed/submitted for analysis. The pattern of use of the comments option supports this notion, in that some of the least frequently recorded items were associated with 25 % or more use of the comments section, although this pattern was not consistent across all items. Comments were made against all assessment components on 2.4–46.8 % of assessment occasions, with 16 of the 34 clinical components attracting comments on 25 % or more occasions. The frequent use of the comments option indicates that SLPs found it necessary to add to, or qualify, the judgements they were making on a regular basis, suggesting that the ratings of these components did not always best reflect the information gathering process they were undertaking.

Assessments Completed

SLPS did not complete all assessment components in any of the 308 SPIDA protocols submitted for analysis. The completion rate for all MASA components (44 %) was very similar to previously reported rates of 47 % [16].

Table 4 Rating categories used by SLPs for each MASA component ($N = 301$)

Components	Rating categories used						
	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5	Frequency Component rated, *n* (%)	Frequency Comments made, *n* (%)
	N = no. of ratings observed in this category						
Scales with three rating categories							
5. Respiratory rate	*0*[a]	48	234			282 (93.7)	21 (6.8)
9. Trachea	*2*	*2*	293			297 (98.7)	7 (2.3)
13. Cough reflex	126	44	121			292 (97.0)	49 (15.9)
23. Pharyngeal response	*7*	109	171			287 (95.3)	113 (36.7)
Scales with four rating categories							
1. Alertness	*1*	13	54	233		301 (100)	13 (4.2)
2. Cooperation	*2*	19	54	226		301 (100)	18 (5.8)
14. Voluntary cough	99	*0*	36	154		289 (96.0)	59 (19.2)
17. Tongue strength	37	*0*	129	93		259 (86.0)	77 (25.0)
18. Tongue coordination	47	*0*	134	105		286 (95.0)	60 (19.5)
21. Bolus clearance	16	*0*	98	174		288 (95.7)	71 (23.1)
22. Pharyngeal phase	18	*0*	160	114		292 (97.0)	89 (28.9)
Scales with five rating categories							
3. Auditory comprehension	119	*0*	72	*0*	108	299 (99.3)	56 (18.2)
4. Respiration	92	*0*	43	*0*	155	290 (96.3)	66 (21.4)
6. Dysphasia	23	23	44	66	143	299 (99.3)	59 (19.2)
7. Dyspraxia	35	*3*	*7*	12	242	299 (99.3)	20 (6.5)
8. Dysarthria	27	15	39	77	141	299 (99.3)	42 (13.6)
10. Lip seal	13	15	24	76	163	291 (96.7)	69 (22.4)
11. Gag	45	*3*	12	30	125	215 (71.4)	115 (37.3)
12. Soft palate	51	*0*	*6*	*0*	172	229 (76.0)	103 (33.4)
15. Voice	20	*7*	22	116	131	296 (98.3)	103 (33.4)
16. Tongue movement	*4*	10	19	80	160	273 (90.7)	56 (18.2)
19. Oral preparation	*6*	*2*	30	94	153	296 (98.3)	91 (29.5)
20. Oral transit	*7*	*9*	52	109	116	293 (97.3)	48 (15.6)
24. Saliva	*0*	*4*	*7*	*6*	226	283 (94.0)	15 (4.8)

[a] Italic value indicates rating categories with less than ten observations

Overall, for those forms where a physical examination was conducted ($N = 301$) the clinical components of the SPIDA were only fully complete for seven assessments. The observed variability of assessment item use by graduate SLPs using a protocol they themselves developed in a research study, where they were trained to complete all assessment components, lends weight to the hypothesis by Martino et al. [8] that this may not be random. In line with this hypothesis, the pattern of item use in this study may reflect a hierarchical decision-making process where some components were frequently used but then others were selected on the basis of their relevance for a specific patient. This observation is also in agreement with comments by SLPs, who stated that they used assessment components if they felt they would usefully contribute further information to the diagnostic process [11].

This merits further consideration, given that Gonzalez-Fernandez et al. [16] found that although SLPs did not provide a rating on all components for 47 % of their cases when using the MASA, their overall judgement had good sensitivity when compared to the findings of a videofluoroscopic swallowing study. This fits the approach to clinical assessment used by other health professionals, which have similar outcomes. For example, general medical practitioners make accurate judgements as to whether a patient with an acute cough may or may not have pneumonia based on their case history and clinical examination findings [17]. Likewise, the way in which SLPs interact with CBSA protocols is likely to be influenced by the clinical reasoning processes they employ and their clinical judgement based on previous professional experience. As such, their overall clinical assessment, informed by their

observations of the patient's skill across a variety of assessment components combined with their clinical expertise, may be more accurate than calculating ratings from a strictly administered standardised protocol.

It is well established that clinical reasoning involves the exercise of professional judgement and arises from a combination of different types of knowledge that are applied to diagnostic decision-making in a variety of ways that changes with experience. This knowledge base includes a network of propositional and clinical knowledge that is used by novices to explain the causes of signs and symptoms. With experience, more expert clinicians organise this underlying network of knowledge and experience into overarching illness scripts or patterns of clinical symptoms that they quickly recognise [22]. The clinician uses these to inform the process of data collection and diagnostic decision-making to rule the clinical hypothesis(es) in or out [23–27]. Consequently, decisions are made, frequently intuitively, regarding what information should be gathered to test a restricted number of hypotheses. The current study suggests that SLPs exercise similar clinical reasoning processes to determine which components to assess during a CBSA rather than adhering strictly to a prescribed or standardised assessment process. Understanding the SLPs' expertise and supporting the diagnostic and decision-making process may better support quality assessment compared to constraining the process to a standardised set of data-gathering steps.

Categories Rated Within the MASA Components

SLPs rarely used some rating categories that are available within the MASA components, with 20 of the 24 components having rating categories that attracted fewer than ten selections (see italic values, Table 4). This suggests that these categories are not adding meaningful information to the respective measure, and that therefore it may be argued that these categories could be discarded for these items [28]. There are a number of potential explanations for this finding, all of which require further investigation. For example, the MASA was validated on patients who had experienced their first stroke, whereas the present study was conducted on first assessments for a heterogeneous acute care population. Therefore, it is possible that the rating categories are not all relevant for mapping a continuum of severity for all members of a heterogeneous patient population.

Some of the observed rating behaviours also may arise because SLPs, or indeed any human rater, are not objective measurement instruments and therefore their ratings arise from an interaction between themselves and the tool [29]. For example, research on how rehabilitation teams interact with standardised assessment items has clearly identified that rating decisions are negotiated to better represent patient progress and this is influenced by the clinical reasoning processes employed [30, 31]. Therefore, it is possible that the SLPs may have consistently used categories that best represented their clinical judgement and neglected others. For example, it may be that the three MASA categories consistently used to rate chest status [chest infection (2), fine basal crepitations (6) and chest clear (10)] best represented this group of SLPs' implicit continuum of severity ratings and therefore they did not use the interim categories [coarse basal crepitation, chest physiotherapy (4) and sputum upper airway, other condition (8)]. It is also possible that the SLPs may have been making a judgement that the information in rarely used categories did not contribute meaningful information to their assessment process. For example, the SLPs only consistently used two of the five available categories for the palate component (no spread or elevation and NAD) which may suggest they treated this as a present/absent judgement rather than a continuum of severity.

Limitations and Future Directions

Conducting this research as a quality improvement process ensured that data were collected in the real world of clinical practice rather than a controlled validation trial. However, this also meant that return rates were modest and may have been influenced by non-random factors and that information was not collected that may have explained omitted ratings and non-return of forms. For example, the latter may have been due to assessments being discontinued and therefore forms not returned on patients with more severe or complex presentations and poor alertness.

The competence and level of expertise of the SLP team was assumed based on their credentialing status rather than formally assessed prior to inclusion in this study. Furthermore, the experience level for each SLP was not recorded for each returned form which precluded investigating this as a factor influencing assessment choices.

This study only captured the initial bedside assessment; which, depending on the patient's presentation, may be only the start of information gathering to inform decision-making. This could account for some components that were utilised on less than 90 % of occasions; for example, those related to decision-making such as SLP-associated diagnoses and long- and short-term goals. Conversely, component usage was on average higher than in self-reported studies; for example, there was relatively high compliance with examining the gag reflex (71.4 % in this prospective study compared to 56.4 % in the retrospective study by Gonzalez-Fernandez et al. [16] and less than 20 % in more self-report studies [9, 11]). SLPs' compliance may have been higher due to their awareness of the need to adhere to

a prospective research protocol and standardised assessment process. Actual practice may be more discriminating given that SLPs have commented that they carry out examination components based on research evidence and their judgement as to whether it will contribute useful information to the assessment picture [11].

The SPIDA was designed by the clinicians to support their clinical practice and therefore had limitations as an assessment tool that was not apparent prior to completion of the data collection. A number of likely SLP responses were not able to be recorded including: unable to assess; already noted; assessment discontinued; noting that further assessment was required; or that an item was omitted as it would not contribute relevant information.

Finally, this study protocol focussed on the assessment information collected during the initial CBSA which is only one component of quality care. It also identified that SLPs use the data for multiple purposes including identification of aspiration risk, dysphagia severity, prognosis and identification if further data collection (instrumental and/or clinical) is required to inform diagnosis and management decisions. These decisions would have been monitored and reviewed based on patient outcomes. Further research is needed to determine how effectively the CBSA contributes to this and whether the variability of CBSA practices by SLPs positively influences patient outcomes.

Notwithstanding these limitations, the findings of this study suggest a number of useful lines of inquiry to address concerns regarding the variability of CBSA practices. In particular, it may be that the processes required for high-quality CBSA conflict with establishing a baseline for measuring change through strict adherence to a standardised assessment tool. This is not to say that the CBSA should not be subject to rigour, however, many clinical assessments are conducted by medical and allied health professionals and are accepted as an integral part of high-quality health care. These clinical assessments rely on high-quality clinical examination processes and are informed by the exercise of professional reasoning to interpret findings to guide and inform professional judgement and action. Investigating the clinical reasoning SLPs use during CBSA will identify whether it would be more fruitful to develop strategies to support this process rather than further refinement and/or development of standardised and psychometrically validated assessment tools.

The development and refinement of CBSA components that effectively support the process of consistent and valid clinical judgement may benefit from further investigation of actual assessment processes in the real world of clinical practice with SLPs of various levels of experience and expertise. Lines of inquiry could include identifying assessment content and processes, including further information gathering, and how aspects of dysphagia are being evaluated and the degree of impairment judged. It is also necessary to develop clarity about the decisions being made, and therefore, the purpose of the CBSA; for example, identifying dysphagia type, severity, predicting aspiration risk, determining the impact and suitability of a range of intervention and management strategies, contributing to differential diagnosis or other aspects, or all of these combined. Further investigation of how well component description generalises across SLPs and identification of more continua of severity for assessment components that match clinical judgement may assist with development of baselines against which to measure change. Finally, understanding how the that data gathered during the initial CBSA relates to other data gathered about the patient and contributes to diagnosis and care will be critical to ensure that quality clinical examinations are conducted.

Summary

In summary, the observations of the current study suggest that SLPs will prioritise and exercise their clinical reasoning during a bedside assessment of dysphagia over following a strict item-based assessment protocol. Evidence that SLPs contribute positively to dysphagic patient outcomes [3] indicates that this clinical reasoning and decision-making process may be a sounder approach than following a strict item-based protocol or checklist. This would be in accordance with research on medical clinical reasoning that has found that diagnostic reasoning is not a linear process and is influenced by experience [22–24, 27]. Finally, there were indications that the SLPs' assessment of swallowing was not limited to determining the presence/absence of dysphagia and aspiration risk or measuring its severity. SLPs also included components to describe the type of dysphagia (e.g., oral and/or pharyngeal) and to recommend management, including diet/fluid modification, medication management, mealtime strategies and a care plan for the patient. This confirms that the SLPs use the CBSA for multiple purposes and the way in which they engage in clinical reasoning to do this is likely to be complex. The utility of standardised item-based assessments and the nature of the clinical reasoning employed during CBSA, the quality of the data yielded and their impact on patient care need further investigation in this context.

Furthermore, the concern consistently expressed in the research about SLPs' inconsistent use of recommended CBSA components may be misplaced. It is possible that exerting control over the clinical reasoning and decision-making process by standardising and validating assessment protocols may not improve the quality of the diagnostic process. The findings of this research suggest that a

standardised assessment did not match the clinical reasoning engaged by SLPs during a CBSA, as they select relevant components to assess and judgements to record. Although it is not yet clear what this clinical reasoning process is, it is well accepted and indeed recommended, that the patient and context should determine the assessment process [6] and the CBSA does support better outcomes for patients [3]. Standardised item-based assessments may constrain the clinical reasoning process and the multiple purposes of the assessment further confuse the issue. Evaluation of what and why SLPs do what they do and how CBSA assessment data contribute to the assessment and management of patients in acute care is warranted. This will enable identification of ways to support high-quality assessment processes that yield data that will improve patient outcomes, establish baselines for evaluating effectiveness of interventions and ensure quality pre- and post-professional training and practice. It is likely that awareness of one's own clinical reasoning processes will increase diagnostic specificity and sensitivity, and in turn improve clinical management and outcomes for patients referred for dysphagia assessments in acute care hospitals.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix 1: Speech Pathology Initial Dysphagia Assessment (SPIDA) Proforma

SPEECH PATHOLOGY INITIAL DYSPHAGIA ASSESSMENT - (incorporating the MASA, Mann, 2002)

Admission date:	**Pre-admission residence:**
Referred by:	**Pre-admission diet:**
Referred for:	**Pre-SP Assessment diet:**
Referral date:	**Social history:**
Admission diagnoses:	**Admission details:**
SP associated diagnoses:	
PMHx:	

- **Are any diagnoses progressive?** ***Y*** *or* ***N*** Which diagnosis?
- **What is the severity of the progressive diagnosis?** ***mild / mod / severe***

CXR Date & Results:
CRP Date & Results: **WCC Date & Results:**

						Comment
Alertness	2 no response to speech	5 difficult to rouse	8 fluctuates	10 alert		
Cooperation	2 no cooperation	5 reluctant	8 fluctuating cooperation	10 cooperative		
Auditory comprehension	2 no response to speech	4 occasional motor response if cued	6 follows simple conversation with repetition	8 follows ordinary conversation with little difficulty	10 NAD	
Respiration	2 chest infection suctioning	4 coarse basal crepitations chest physiotherapy	6 fine basal crepitations	8 • Sputum upper airway • other condition	10 chest clear	
Respiratory rate (for swallow)	1 no independent control	3 some control/ uncoordinated	5 able to control breath rate for swallow			
Dysphasia	1 unable to assess	2 no functional speech sounds/single words	3 express self in limited manner short phrases/ words	4 mild difficulty finding words or expressing ideas	5 NAD	
Dyspraxia	1 unable to assess	2 groping /inaccurate / partial or irrelevant responses	3 speech crude / defective in accuracy or speed on command	4 speech accurate after trial and error, minor searching movements	5 NAD	
Dysarthria	1 unable to assess	2 speech unintelligible	3 speech intelligible but obviously defective	4 slow with occasional hesitation or slurring	5 NAD	
Trache	1 trache/ cuffed	5 trache/ fenestrated	10 no trache			

- **Oromotor Ax**

					- Normal / X -AbN	Comment
CN V	Facial quadrants (sensory)					
	Jaw - *ROM/rate (motor)*					
	- Masseter palpation					
	- Symmetry of movement					
CN VII	Forehead movement / frontalis symmetry					
	Facial symmetry at rest					
Lip seal	1 no closure unable to assess	2 incomplete seal	3 unilaterally weak / poor maintenance	4 mild impairment occasional leakage	5 NAD	

SPEECH PATHOLOGY INITIAL DYSPHAGIA ASSESSMENT - (incorporating the MASA, Mann, 2002)

					- Normal / X -AbN	Comment
CN IX + X	Reflexive spontaneous swallow					
	Pharyngeal sensation					
Gag	1 no gag	2 absent unilaterally	3 diminished unilaterally	4 diminished bilaterally	5 hyperflexive NAD	
Palate	2 no spread or elevation	4 • minimal movement • nasal regurgitation/ air escape	6 unilaterally weak	8 • slight asymmetry • mobile	10 NAD	
Cough reflex	1 none observed/ unable to assess	3 weak reflexive cough	5 NAD			
Voluntary cough	2 no attempt/ unable to assess	5 attempt inadequate	8 attempt bovine	10 NAD		
Voice	2 aphonic unable to assess	4 wet/gurgling	6 hoarse	8 • mild impairment • slight huskiness	10 NAD	
					- Normal / X -AbN	**Comment**
CN XII	Tongue protrusion symmetry					
Tongue movement	2 no movement	4 minimal movement	6 incomplete movement	8 mild impairment in range	10 full ROM	
Tongue strength	2 gross weakness	5 unilateral weakness	8 minimal weakness	10 NAD		
Tongue coordination	2 no movement/ unable to assess	5 gross incoordination	8 mild incoordination	10 NAD		

- **Oral Intake Trials**

Consistencies trialled

ORAL PHASE						**Comment**
Oral Preparation	2 unable to examine	4 no bolus formation no attempt	6 minimal chew thrust gravity assisted	8 lip or tongue seal bolus escape	10 NAD	
Oral transit	2 no movement observed	4 delay > 10 seconds	6 delay > 5 seconds	8 delay > 1 second	10 NAD	
Bolus clearance	2 no clearance	5 some clearance / residue	8 significant clearance / minimal residue	10 full cleared		

Additional oral phase features

PHARYNGEAL PHASE						**Comment**
Pharyngeal phase	2 no swallow/ unable to assess	5 • pooling/ gurgling • laryngeal elevation incomplete	8 • laryngeal elevation mildly restricted • slow initiation	10 NAD		
Pharyngeal response	1 not coping/ gurgling	5 cough before/ during/ after swallow	10 NAD			
					– Yes / X - No	**Comment**
Wet voice after swallow						

Additional pharyngeal phase features

- **Oral Hygiene / Saliva Management / Dentition**

						Comment
Saliva	1 gross drool	2 some drool consistently	3 drooling at times	4 frothy/ expectorated	5 NAD	

- **Assessment Findings**

MASA SCORE

- **Recommendations**

- Diet / Fluid consistency:
- Medication management:
- Mealtime strategies:

- **Plan**

- ATS coded D/w Pt/Carer D/w Nursing D/w ..... D/w .....
- Long Term Goal:
- Short Term Goal:
- Management Plan:

Speech Pathologist: …… (print) Pager No.: ……..

References

1. Eslick G, Talley N. Dysphagia: epidemiology, risk factors and impact on quality of life—a population-based study. Aliment Pharm Ther. 2008;27:971–9.
2. Altman K, Yu G, Schaefer S. Consequence of dysphagia in the hospitalized patient. Arch Otolaryngol Head Neck Surg. 2010;136:784–9.
3. Marsh K, Bertranou E, Suominen H, Venkatachalam M. An economic evaluation of speech and language therapy. London: Matrix Evidence; 2010.
4. Carnaby-Mann G, Lenius K. The bedside examination in dysphagia. Phy Med Rehabil Cli. 2008;19:747–68.
5. Speyer R. Oropharyngeal dysphagia: screening and assessment. Otolaryng Clin N Am. 2013;46:989–1008. doi:10.1016/j.otc.2013.08.004.
6. Speech Pathology Australia. Clinical guideline: dysphagia. Melbourne: Speech Pathology Australia; 2012.
7. Mathers-Schmidt BA, Kurlinski M. Dysphagia evaluation practices: inconsistencies in clinical assessment and instrumental examination decision-making. Dysphagia. 2003;18:114–25. doi:10.1007/s00455-002-0094-z.
8. Martino R, Pron G, Diamant NE. Oropharyngeal dysphagia: surveying practice patterns of the speech-language pathologist. Dysphagia. 2004;19:165–76. doi:10.1007/s00455-004-0004-7.
9. Bateman C, Leslie P, Drinnan MJ. Adult dysphagia assessment in the UK and Ireland: are SLTs assessing the same factors? Dysphagia. 2007;22:174–86. doi:10.1007/s00455-006-9070-3.
10. Pettigrew CM, O'Toole C. Dysphagia evaluation practices of speech and language therapists in Ireland: clinical assessment and instrumental examination decision-making. Dysphagia. 2007;22:235–44.
11. Vogels B, Cartwright J, Cocks N. The bedside assessment practices of speech-language pathologists in adult dysphagia. Int J Speech LangPathol. 2015;17:390–400. doi:10.3109/17549507.2014.979877.
12. Leder SB, Suiter DM (2014) The Yale swallow protocol: an evidence-based approach to decision-making. Springer, Heidelberg. doi:10.1007/978-3-319-05113-0.
13. Martino R, Silver F, Teasell R, Bayley M, Nicholson G, Streiner DL, Diamant NE. The Toronto Bedside Swallowing Screening Test (TOR-BSST): development and validation of a dysphagia screening tool for patients with stroke. Stroke. 2009;40:555–61. doi:10.1161/STROKEAHA.107.510370.
14. Mann G. MASA: the mann assessment of swallowing ability. New York: Singular; 2002.
15. Daniels SK, Anderson JA, Willson PC. Valid items for screening dysphagia risk in patients with stroke: a systematic review. Stroke. 2012;43:892–7. doi:10.1161/STROKEAHA.111.640946.
16. Gonzalez-Fernandez M, Sein MT, Palmer JB. Clinical experience using the mann assessment of swallowing ability for identification of patients at risk for aspiration. Am J Speech Lang Pathol. 2011;20:331–6. doi:10.1044/1058-0360(2011/10-0082.
17. Blauer SR, Bally K, Tschudi P, Martina B, Zeller A. Acute cough illness in general practice—predictive value of clinical judgement and accuracy of requesting chest X-rays. Praxis. 2013;102:1287–92.
18. National Health and Medical Research Council of Australia and Australian Vice-Chancellors' Committee (2007) National statement on ethical conduct in human research. Australian Government, Canberra. http://www.nhmrc.gov.au/guidelines/publications/e72. Accessed 15 March 2016.
19. World Medical Association. World Medical association declaration of Helsinki ethical principles for medical research involving human subjects. JAMA. 2013;310:2191–4.
20. Mills E, Nimmo L. Speech pathology acute adult dysphagia management competency training programme. Adelaide: Adelaide Local Health Networks; 2012.
21. Carnaby G. Importance of a clinical exam/cranial nerve assessment. Perspect Swallow Disord Dysphagia. 2012;21:143–9.
22. Schmidt HG, Rikers RM. How expertise develops in medicine: knowledge encapsulation and illness script formation. Med Educ. 2007;41:1133–9. doi:10.1111/j.1365-2923.2007.02915.x.
23. Crosskerry A. A universal model of clinical reasoning. Acad Med. 2009;84:1022–8.
24. Norman G, Young M, Brooks L. Non-analytical models of clinical reasoning: the role of experience. Med Educ. 2007;41:1140–5. doi:10.1111/j.1365-2923.2007.02914.x.
25. Charlin B, Boshuizen HP, Custers EJ, Feltovich PJ. Scripts and clinical reasoning. Med Educ. 2007;41:1178–84. doi:10.1111/j.1365-2923.2007.02924.x.
26. Norman G. Research in clinical reasoning: past history and current trends. Med Educ. 2005;39:418–27.
27. Benner PA, Tanner CA, Chesla CA. Expertise in nursing practice: caring, clinical judgment, and ethics. New York: Springer Publishing Company; 1996.
28. Linacre JM. Optimizing rating scale category effectiveness. J Appl Measure. 2002;3(1):85–106.
29. Govaerts MJ, van der Vleuten CP, Schuwirth LW, Muijtjens AM. Broadening perspectives on clinical performance assessment: rethinking the nature of in-training assessment. Adv Health Sci Educ. 2007;12:239–60. doi:10.1007/s10459-006-9043-1.
30. Greenhalgh J, Flynn R, Long AF, Tyson S. Tacit and encoded knowledge in the use of standardised outcome measures in multidisciplinary team decision making: a case study of in-patient neurorehabilitation. Soc Sci Med. 2008;67:183–94. doi:10.1016/j.socscimed.2008.03.006.
31. Greenhalgh J, Long AF, Flynn R, Tyson S. 'It's hard to tell': the challenges of scoring patients on standardised outcome measures by multidisciplinary teams: a case study of neurorehabilitation. BMC Health Serv Res. 2008;8:217. doi:10.1186/1472-6963-8-217.

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