# Emergency Room Assessment and Intervention for Dysphagia: A Pilot Project

# L'évaluation en salle d'urgence et l'intervention face à la dysphagie : un projet pilote

*Catriona M. Steele*

**Abstract**

A review of procedural efficiency by speech-language pathologists in a community hospital raised concerns regarding delays following a patient's arrival in the emergency department. A pilot project was designed to explore the benefits of providing dysphagia assessments in the emergency room (ER) within 24 hours of patient registration. Ten high-risk categories of patients were targeted to receive ER assessment. Data were collected for 246 patients over a seven-month period and analyzed to determine the impact of ER assessment on length of stay. The number of swallowing difficulties observed in referred patients was significantly associated with length of hospitalization. We conclude that the emergency room is an appropriate, albeit nontraditional, location for speech-language pathologists to provide dysphagia assessment and intervention services.

**Abrégé**

Un examen de l'efficacité des méthodes employées par les orthophonistes dans un hôpital communautaire a soulevé des préoccupations concernant les délais auxquels un patient fait face après son arrivée au service d'urgence. En conséquence, un projet pilote a été entrepris pour examiner les avantages d'une évaluation de la dysphagie en salle d'urgence au plus tard 24 heures après l'admission du patient. Dix catégories de patients à risque élevé ont été sélectionnées pour une évaluation en salle d'urgence. Nous avons recueilli des données pour 246 patients sur une période de sept mois, puis les avons analysées pour déterminer l'incidence d'une évaluation en salle d'urgence sur la durée du séjour. Le nombre de troubles de déglutition observés chez les patients dirigés vers les orthophonistes avait un lien étroit avec la durée de l'hospitalisation. Nous croyons que la salle d'urgence constitue un endroit approprié, bien que non traditionnel, pour que les orthophoniste évaluent la dysphagie d'un patient atteint et offrent les services d'intervention qui s'imposent.

**Key words:** dysphagia, swallowing, emergency room, outcome measures, cost benefit, program evaluation

*Catriona M. Steele, MHSc*
*Graduate Department of Speech-Language Pathology, University of Toronto;*
*Toronto Western Hospital, University Health Network*
*Toronto, Ontario*

The scope of practice for speech-language pathology includes the "screening, identification, assessment, interpretation, diagnosis, management, and rehabilitation of disorders of the upper aerodigestive tract, including swallowing" (Canadian Association of Speech-Language Pathologists and Audiologists, 1998, p.2). The goals of a speech-language pathologist's assessment of swallowing are to assess the biomechanics of swallowing, to identify abnormalities which pose risks for dysphagia-related comorbidities including aspiration (i.e., entry of material into the airway), aspiration pneumonia,

malnutrition and dehydration, and to plan appropriate interventions (Logemann, 1983). The goals of intervention are to reduce or alleviate risk for such comorbidities through rehabilitation of, or compensations for, the disordered swallowing mechanism (Huckabee & Pelletier, 1999). Intervention strategies commonly include a prescription of precautionary diet texture restrictions that eliminate food or liquid items that the patient is considered likely to aspirate. One means of assessing the effectiveness of such interventions is to measure associated changes in the prevalence and incidence/nonincidence of dysphagia-related comorbidities.

The literature contains mixed reviews of speech-language pathology interventions for swallowing difficulties particularly with respect to treatment efficacy (Bryant, 1991; Crary, 1995; De Pippo, Holas, Reding, Mandel, & Lesser, 1994; Huckabee & Cannito, 1999; Neumann, 1993; Neumann, Bartolome, Buchholz, & Prosiegel, 1995; Rosenbek, Robbins, Fishback, & Levine, 1991). The benefits gained from screening patients for swallowing difficulties remain equivocal (Martino, Pron, & Diamant, 2000). Odderson, Keaton, and McKenna (1995) implemented a clinical pathway for patients with acute, nonhemorrhagic stroke, including swallowing screening within one day of admission. Their results suggested that stroke patients with swallowing difficulties (compared to nondysphagic stroke patients) have greater overall severity scores on the Functional Independence Measure™ (FIM) at admission, significantly greater lengths of stay, and a lower likelihood of returning home to live independently in the community. These conclusions attest to the importance of recognizing dysphagia as a comorbidity with economic and quality-of-life implications, but fail to address the benefits of providing appropriate interventions for such patients.

Funding restrictions have become a familiar reality in the Ontario healthcare system throughout the 1990s. They have led to lower overall length of stay and to a strong emphasis on the provision of cost-effective clinical services:

Ontario hospitals have experienced unprecedented change over the last few years. The combination of two years of budgetary reductions representing approximately 11% of hospital allocations, voluntary and Health Services Restructuring Commission (HSRC) directed restructuring, Year 2000 issues, the weakened Canadian dollar, along with increasing population growth and aging, have created financial and other pressures on hospitals (Lozon & Alton, 1998, p. 1).

Nonrevenue generating, globally funded patient care services are strongly encouraged to document efficacious outcomes and improve their efficiency. As a globally funded resource, speech-language pathology services in Ontario hospitals, together with allied health professions like occupational therapy and physiotherapy, have experienced significant pressures in this regard.

This paper documents a preliminary study undertaken by speech-language pathologists in an acute care community hospital in the greater metropolitan Toronto area. The speech-language pathologists at this facility, St. Joseph's Health Centre (SJHC), recognized that one area of potential inefficiency was the referral process for their services. Historically, speech-language pathology services for either communication or swallowing difficulties were initiated within two working days following receipt of the attending physician's written referral. During the latter half of 1998, SJHC, like other hospitals in the metropolitan Toronto area, experienced bed closures that placed great pressure on the staff in the emergency room. It became fairly common for patients at SJHC to wait for an extended period of time (days) in the emergency room prior to admission. The speech-language pathologists were not deployed to or used as consultants in the emergency room at SJHC. They became increasingly concerned that patients with dysphagia were going unrecognized, without appropriate management, while waiting for inpatient accommodation.

The service delivery project was designed to explore the benefits of providing swallowing assessment and intervention in the emergency room to patients presumed to be at risk for dysphagia-related comorbidities, such as aspiration pneumonia. It was hypothesized that detection of signs and symptoms of dysphagia in the emergency room, followed by immediate implementation of precautionary management strategies (i.e., diet texture restrictions and/or teaching of compensatory swallowing techniques), should translate to earlier discharge from the hospital. Length of stay was assumed to be one indicator, albeit indirect, that would reflect both hospital costs and general health outcomes of the patient.

This pilot project was conceptualized with three guiding questions:

1. Do patients who receive swallowing assessment and management in the emergency room (ER) have shorter hospital stays than patients who did not receive this service?

2. Are the results of ER-based swallowing assessment (i.e., presence/absence of swallowing abnormalities) correlated with length of hospitalization?

3. What interventions, if any, are most commonly recommended after ER assessment for dysphagia?

The independent variables for these questions were the availability/provision of emergency room based assessment and management, the patient's primary diagnosis, and the results of the assessment (presence/absence of observed swallowing abnormalities). The presumed outcome variables were the specific interventions recommended following the ER assessment, and length of hospital stay.

Diagnosis was defined according to the International Classification of Diseases (ICD-9) classification system (World Health Organization, 1980). The ICD-9 classification system forms the basis for case-mix methodology, a system developed by the Canadian Institute of Health Information (CIHI) in 1983. The system is based on research showing that patients with similar characteristics, such as age, sex, primary and secondary diagnoses, are likely to require similar treatments and incur similar costs to the health care system. Case-mix methodology is used by all Canadian hospitals as the basis for cost and resource-utilization analysis (Ladak, 1998).

Length of stay was defined as the number of days of acute care hospitalization per patient admission. This variable excluded alternative level of care (ALC) days, a classification assigned when a patient continues to occupy an acute hospital bed following completion of acute care interventions (completion status being determined and reported by the attending physician) while awaiting placement to a rehabilitation, convalescent, or long-term care institution.

A full-time speech-language pathologist was assigned on a half-time, on-call basis to the SJHC ER beginning in February 1999. For the purposes of the study, 10 high-risk categories of patient were specifically targeted to receive ER assessment. These categories were selected based on a comprehensive review of prevalence and incidence information in the literature (Groher & Bukatman, 1986; Sheth & Diner, 1988; Siebens et al., 1986; Steele, Greenwood, Ens, Robertson, & Seidman-Carlson, 1997) and on historical referral and utilization patterns at SJHC (Steele, 1998). The 10 high-risk categories were: acute neurological event, chronic neurological condition/dementia, pneumonia, chronic respiratory illness, dysphagia as primary complaint, dehydration, failure to thrive, orthopedic fracture, head/neck trauma, and tardive dyskinesia.

During the week prior to the commencement of pilot services, the speech-language pathologist assigned to the ER provided a 30-minute in-service education session to all nurses who were responsible for patient in-take and triage. They were asked to contact the speech-language pathologist and request a swallowing assessment for new patients in any of the 10 targeted high-risk categories, or for any other patients the nurses suspected of having swallowing difficulties. A poster listing the targeted high-risk categories was displayed prominently in the triage area of the emergency room. All triage nurses were provided with a handout version of the poster.

As a general convention, the inclusion criteria were set to capture patients aged 65 years and over, given previous studies documenting higher prevalence of swallowing difficulties and nutritional deficits in the elderly (Kerstetter, Holthausen, & Fitz, 1993; Sheth & Diner, 1988; Tracy et al., 1989). It was assumed that younger patients with signs of dysphagia would be captured primarily on the basis of their presentation, and that the age criterion would help to avoid inappropriate inclusion of respiratory difficulties of viral origin. It was anticipated that some referred patients would fall outside the targeted categories and that subsequent analysis of these cases would provide information to guide refinement of referral criteria for the future. The speech-language pathologist made a commitment to be available to respond to any concerns or questions from the nurses for the duration of the project. As such, the intent of the project was to be inclusive in a broad sense and to respond to even the slightest concerns of possible swallowing difficulties. In the event that a nurse's concerns should prove unwarranted, this was viewed both as a positive indicator that nurses were alert to the possibility of swallowing difficulties in their patients and as a valuable educational opportunity.

### *Pilot Project Procedures*

The project started in February 1999. Following notification of a referral (by pager), the speech-language pathologist provided a brief swallowing assessment before the end of the same working day. The assessment was an adaptation of procedures described by Shipley and McAfee (1992), including obtaining case history information, an oro-facial examination, and assessment of dysphagia (including clinical swallowing trials, as tolerated). Additionally, the speech-language pathologist observed general cognitive-communication skills during the interaction and, where possible, made notations regarding abnormal cognitive or language behaviours. These latter variables are not discussed in this paper. Assessment findings were recorded on a custom-developed triplicate one-page form (Figure 1). The assessment form contained 29 different fields, adapted from the assessment content guidelines proposed by Shipley and McAfee. All clinical observations were recorded on-line by the speech-language pathologist using a three-point Likert scale (i.e., within normal limits, abnormal, or not assessed). A single copy of the form was filed on the patient's medical chart. A second copy was

kept by the speech-language pathologist and used for data entry. The third copy was retained in the patient's file in the speech-language pathology office and used for triage purposes; for example, if follow-up through an inpatient or outpatient program was indicated, the third copy was hand-transferred on the same working day to the appropriate speech-language pathologist for follow-up.

## Method

### *Sampling Procedures*

Program evaluation was conducted using data for the first 100 referred patients in each of three successive fiscal quarters, beginning February, May, and August of 1999. The decision to repeat sampling on a quarterly basis was made with the intention of tracking changes in referral patterns over the duration of the project. Only partial data were available for the third quarter, (n = 46 patients), due to staffing shortages elsewhere in the facility, that necessitated caseload reassignment for the clinician who was working in the emergency room. The target pool totaled 246 patients. A research assistant transferred the speech-language pathologist's clinical observations for these 246 patients directly from the assessment form into a spreadsheet (Microsoft Excel 4.0). The research assistant was not required to interpret the data in any way prior to data entry. Data were imported into SPSS 9.0 for Windows prior to statistical analysis.

**Figure 1**
Form Used for Recording Observations During Emergency Room Assessments

**SPEECH LANGUAGE PATHOLOGY**

**EMERGENCY ROOM ASSESSMENT for SWALLOWING and COMMUNICATION DIFFICULTIES**

Hospital Card Imprint

Date of Registration: _____ Time: _____ Date of Screening: _____ Time: _____
Presenting Complaint: _____ Location of Screening: ☐ Emergency ☐ _____ th Floor
_____ Patient admitted to: _____

**Type of Residence:**
☐ House/Apartment
☐ Retirement Home: _____
☐ Nursing Home/Chronic Care: _____

**Primary Language:**
☐ English ☐ Other: _____
Translation provided by: _____

**Screening Eligibility Criteria:** (check all that apply)

| | | |
|---|---|---|
| ☐ 1. Acute Neurological Event | ☐ 2. Chronic Neurological Condition/Dementia | ☐ 3. Pneumonia |
| ☐ 4. Chronic Respiratory Illness | ☐ 5. Dysphagia as primary complaint | ☐ 6. Dehydration |
| ☐ 7. "Failure to Thrive" | ☐ 8. Orthopaedic (Hip/other fracture) | ☐ 9. Head/Neck Trauma or Surgery |
| ☐ 10. Tardive Dyskinesia | ☐ 11. Other: | |

**Relevant History:**

| Signs/Symptoms: | N/A* | WNL* | ABNORMAL | Signs/Symptoms: | N/A* | WNL* | ABNORMAL |
|---|---|---|---|---|---|---|---|
| LOC | ☐ | ☐ | ☐ Reduced | Compliance | ☐ | ☐ | ☐ Poor |
| Saliva Control | ☐ | ☐ | ☐ Drooling | Voluntary Cough | ☐ | ☐ | ☐ Weak/absent |
| Speech Intelligibility | ☐ | ☐ | ☐ Reduced | Speech Resp. Support | ☐ | ☐ | ☐ Reduced |
| Facial Symmetry | ☐ | ☐ | ☐ Describe: | | | | |
| Oral Motor Skills | ☐ | ☐ | ☐ Describe: | | | | |
| Voice Quality | ☐ | ☐ | ☐ Describe: | | | | |
| Language Content | ☐ | ☐ | ☐ Describe: | | | | |
| Aud. Comprehension | ☐ | ☐ | ☐ Unable to follow instructions | | | | |

*(*N/A = Not assessed, WNL = Within Normal Limits)*

| Swallowing Trials: | Timing | | Hyolaryngeal Excursion | | Cough | | △ Voice/Resp Quality | |
|---|---|---|---|---|---|---|---|---|
| Cold Metal Spoon/Saliva | WNL | Slow | WNL | Reduced | N/A | Present | N/A | Present |
| 3 ml Water | WNL | Slow | WNL | Reduced | N/A | Present | N/A | Present |
| Sips of Water | WNL | Slow | WNL | Reduced | N/A | Present | N/A | Present |
| Thick Juice | WNL | Slow | WNL | Reduced | N/A | Present | N/A | Present |
| Other: _____ | WNL | Slow | WNL | Reduced | N/A | Present | N/A | Present |
| Other: _____ | WNL | Slow | WNL | Reduced | N/A | Present | N/A | Present |

**Comments:**

**DIET TEXTURE RECOMMENDATION:**

**Interventions and Plan:**

| | | |
|---|---|---|
| ☐ Pt. counselled re. diet texture | ☐ Pt. counselled re. risks & management | ☐ Modified Barium Swallow recommended |
| ☐ Diet Office Notified | ☐ Therapy Exercises provided | ☐ X-ray requisition initiated |
| ☐ Feeding Instructions Provided | ☐ Recommend aggressive Oral Hygiene | ☐ Continue Speech/Language Assessment |

**Triage and Follow Up Priority:** ☐ Urgent ☐ 48 hours ☐ Stable ☐ Not indicated

**Triage Plan:** ☐ Medicine SLP ☐ Surgical SLP ☐ Outpatient Follow Up ☐ Referral to ECHS

Signature, designation _____ Phone extension _____ Pager _____

Form # 125 Mar/99

The research assistant reviewed each patient's hospital chart to determine a single most responsible diagnosis (using ICD-9 classifications) for each patient; the most responsible diagnosis is the condition recorded by the attending physician at the time of discharge as the primary reason for hospitalization. Discharge diagnosis was then verified through a medical record number matching with information in the hospital's master health records database. Diagnosis was verified for 170 of the 246 patients in the target patient pool. At the time of the study, the Health Records Department of SJHC did not conduct indicator database coding for patients discharged directly from the emergency room. It is assumed that the 76 patients for whom a discharge diagnosis was not available, were either under age 65 (and therefore, not captured in the master health records inquiry), still awaiting coding and associated entry in the health records database at the time of the study, or discharged directly from the ER. For the 170 patients with verified discharge coding, ICD-9 diagnoses included: sepsis ($n$ = 5), lung cancer ($n$ = 3), dehydration ($n$ = 4), anemia ($n$ = 4), acute transverse myelitis ($n$ = 1), atrial fibrillation ($n$ = 9), congestive heart failure ($n$ = 19), cerebral infarct ($n$ = 4), dementia ($n$ = 9), transient ischemic attack ($n$ = 2), cerebrovascular accident (n = 18), bronchitis ($n$ = 7), pneumonia ($n$ = 34), asthma ($n$ = 2), chronic obstructive pulmonary disease ($n$ = 5), pleural effusion (n = 1), chronic renal failure ($n$ = 1), syncope ($n$ = 1), weakness ($n$ = 2), failure to thrive ($n$ = 14), dysarthria ($n$ = 2), shortness of breath ($n$ = 15), dysphagia ($n$ = 1), and fractures of the pelvis ($n$ = 1), hip ($n$ = 4), and ankle ($n$ = 2).

Nonparametric statistical tests were performed to determine the validity of basing subsequent statistical analyses on only the 170 patients with verified data. Chi-square goodness-of-fit tests for frequency distributions of demographic and assessment variables showed no significant between-group differences (see Table 1). It was decided that the 170 patients with validated discharge information in the health-records database could be used as a representative proxy sample for the larger target patient pool ($N$ = 246), and would comprise the target pool for all subsequent statistical analyses. Data for a retrospective comparator sample ($N$ = 2576) of patients aged 65 and older with the same ICD-9 discharge diagnoses were obtained from the health records database. The patients in the comparator group were discharged from SJHC during the 21 months preceding this study.

## Results

### *Discharge Diagnoses*

International Classification of Diseases diagnostic codes are tabulated by raw numbers and percentage for both the target and retrospective comparator samples (see Table 2). The seven most prevalent diagnoses in the target sample were pneumonia (n = 34), congestive heart failure (n = 19), cerebrovascular accident (n = 18), shortness of breath (n = 15), failure to thrive (n = 14), dementia (n = 9), and atrial fibrillation (n = 9). The remaining diagnostic categories were each represented by less than 5% of the target sample. Within the retrospective comparator sample, three of the top seven diagnoses (congestive heart failure, pneumonia, and dementia) showed prevalencies of five percent or greater. Diagnoses of lung cancer and asthma also exceeded five percent prevalence. Four diagnoses (acute transverse myeli-

**Table 1**
Chi-square Comparisons for Referral and Assessment Variables Between Patients with Verified Discharge Diagnoses ($n$ = 170) and Total Referred Patient Pool ($n$ = 246)

| Comparison | $\chi 2$ | *df* | *p* |
|---|---|---|---|
| Presence of single versus multiple targeted risks | 3.64 | 1 | 0.19 |
| Abnormalities on oral-motor/communication items | 1.48 | 1 | 0.60 |
| Abnormalities on swallowing trials | 1.16 | 1 | 0.87 |
| Pass/fail status on the assessment | 2.11 | 1 | 0.53 |
| Prolonged swallowing transit times | 0.03 | 1 | 0.94 |
| Reduced hyolaryngeal excursion | 0.01 | 1 | 0.97 |
| Postswallow spontaneous cough | 0.28 | 1 | 0.82 |
| Altered postswallow voice quality | 1.60 | 1 | 0.74 |

**Table 2**
Frequencies for ICD-9 Diagnoses in the Target and Retrospective Comparator Samples

| | Target Sample (*n* = 170) | | Comparator Sample (*n* = 2576) | |
|---|---|---|---|---|
| | *n* | % of sample | *n* | % of sample |
| Pneumonia | 34 | 20% | 431 | 17% |
| Cerebrovascular Accident | 18 | 11% | 36 | 1% |
| Congestive Heart Failure | 19 | 11% | 447 | 17% |
| Shortness of Breath | 15 | 9% | 0 | 0% |
| Failure to Thrive | 14 | 8% | 18 | 1% |
| Atrial Fibrillation | 9 | 5% | 101 | 4% |
| Dementia | 9 | 5% | 197 | 8% |
| Lung Cancer | 3 | 2% | 303 | 11% |
| Asthma | 2 | 1% | 248 | 10% |
| Other[1] | 47 | 28% | 795 | 31% |

1. Other discharge diagnoses, representing less than 5% of either the target or retrospective comparator samples included sepsis, pancreatic cancer, dehydration, anemia, acute transverse myelitis, hemiparesis, hemiplegia, cerebral infarct, transient ischemic attack, bronchitis, chronic bronchitis, chronic obstructive pulmonary disease, pleural effusion, chronic renal failure, syncope, weakness, dysarthria, dysphagia, fractured pelvis, fractured hip and fractured ankle.

tis, shortness of breath, dysarthria, and weakness) were not represented at all in the comparator sample. It is assumed that equivalent patients are captured under the label of "other," however direct comparisons for these diagnoses are not possible.

### *Length of Stay*

Length of stay was calculated based on the dates of registration and discharge recorded in the hospital chart. Acute care length of stay ranged from 0 days to 85 days for the target sample (n = 170; M = 8.49 days; MSE = 0.14 days). This compared to a range of 1 to 106 days, (M = 6.83 days; MSE = 0.88 days) for the retrospective comparator sample (N = 2576).

### *Reasons for Referral*

Frequency distributions for the 10 target risk categories were calculated for the target sample. The distributions are shown in Table 3. The most common reason for referral was acute neurological event followed by pneumonia. Eleven percent of the target sample (19 out of 170) were referred on the basis of observed symptoms but no identified target risk category. Patients within the target sample were referred on the basis of single target risk category match 64% of the time (n = 109). Multiple, coexistent target risks were responsible for 24.7% of the total referrals (n = 42). The mean number of identified target risk categories per referred patient was 1.17.

### *Timeliness of Service Provision*

Time of registration was available for 164 of the 170 patients within the target group. Time lapse (from registration to encounter with the speech-language pathologist) ranged from 0 minutes (immediate) to 24 hours. The mean time lapse before assessment was 9 hours, 37 minutes.

### *Pass/Fail Status*

Frequency distributions for the target sample for failure on the assessment and abnormalities in either oral-motor/communication or swallowing trials were calculated as follows:

- 84% (*n* = 142) failed the assessment, indicating at least one recorded abnormality in either oral-motor/communication or swallowing skills;
- 81% (*n* = 137) failed the oral-motor/communication assessment;
- 61% (*n* = 103) failed the swallowing assessment;
- 58% (*n* = 98) failed both the oral-motor/communication and swallowing assessments;

**Table 3**
Reasons for Referral for Swallowing Assessment

| Reason for Referral (Targeted Risk Category) | *n* | % of target sample |
|---|---|---|
| Acute Neurological Event | 59 | 35% |
| Pneumonia | 38 | 22% |
| Chronic Respiratory Illness | 20 | 12% |
| Failure to Thrive | 18 | 11% |
| Chronic Neurological Condition/Dementia | 7 | 4% |
| Orthopedic fracture | 3 | 2% |
| Primary Dysphagia | 3 | 2% |
| Head/Neck Trauma | 1 | 1% |
| Tardive dyskinesia | 0 | 0% |
| Multiple targeted risks | 42 | 25% |
| Other (based on observed symptoms) | 21 | 12% |

- 23% ($n$ = 39) patients who failed the oral-motor/communication assessment but passed the swallowing assessment;
- 3% ($n$ = 5) patients who showed no oral-motor/communication abnormalities but failed the swallowing assessment;
- 18% ($n$ = 28) of the 151 patients referred on the basis of a targeted high-risk category did not demonstrate any abnormalities. Conversely, 100% ($n$ = 21) of the patients who were referred based on observed symptoms, in the absence of a match with the targeted risk categories, demonstrated an abnormality.

Table 4 presents the frequency distributions for each recorded swallowing abnormality, together with frequency distributions for recommendations. The mean number of swallowing abnormalities per patient was two.

A few observations deserve special comment. The most common diet texture recommendation was a puréed food texture with thickened liquids (31%, n = 52), followed by NPO/nothing by mouth (8%, n = 13) and soft foods with regular (thin) liquids (8%, n = 13). Thickened liquids are frequently used as a precautionary diet when health professionals implement care pathways for dysphagia (see, for example, Odderson et al., 1995). It is worth noting, however, that 61% of our target sample was considered safe to swallow thin liquids following assessment. Recommendations for further instrumental (radiographic) swallowing assessment were made for only four patients. While this might appear low, it must be remembered that these recommendations were made within 24 hours of registration at the hospital. Emergency room assessment with no further follow-up was considered adequate for 74 of the 170 target sample patients. Of these 74 patients, 8% (n = 6) were discharged with a texture modification of either soft or minced foods with thin liquids, 12% (n = 9) received instruction regarding appropriate feeding techniques, and 3% (n = 2) received general instruction regarding mouth care.

### *Correlation Analyses*

Nonparametric correlations were computed to examine the relationship between the provision of an early assessment service and length of stay. All comparisons were two-tailed, with $\alpha$-levels set at 0.05. Spearman's rho coefficients failed to yield any significant correlations between acute care length of stay and sample assignment (target versus retrospective comparator), ($r_s$ = 0.011, $n$ = 2746, $p$ = 0.554); failure on the assessment, ($r_s$ = 0.047, $n$ = 170, $p$ = 0.542); number of target risk category matches, ($r_s$ = 0.064, $n$ = 170, $p$ = 0.406); or number of swallowing abnormalities observed, ($r_s$ = 0.118, $n$ = 170, $p$ = 0.126).

### *Between-Group Comparisons*

Independent-sample t-test comparisons were performed to identify whether there were statistically significant differences in length of stay and assessment in the

emergency room. There were no significant differences in acute care length of stay as a function of sample assignment (target versus retrospective comparator), ($t = 0.506$, $df = 2652$, $p = 0.613$); identification of multiple coexistent target risk categories, ($t = 1.332$, $df = 76$, $p = 0.187$); or pass/fail status on the assessment, ($t = -0.439$, $df = 76$, $p = 0.662$).

Single-factor, one-way analysis of variance (ANOVA) comparisons were also performed for length of stay for the target sample on the basis of the number of target risk categories identified at the time of referral and the number of swallowing abnormalities observed during assessment. There were no significant differences in the length of stay and number of target risk categories, ($F = 0.051$, $df = 3$, $p = 0.985$). However, there was a significant difference between length of stay and total number of observed swallowing abnormalities ($F = 3.116$, $df = 4$, $p = 0.017$, $2 = 0.070$), with longer mean lengths of stay for patients exhibiting a higher number of coexisting swallowing abnormalities.

## Discussion

The statistical analysis provides preliminary evidence that the number of swallowing abnormalities observed by a speech-language pathologist providing assessments in the ER of an acute care hospital is associated with hospital length of stay. Findings also suggest that a strategy of targeting high-risk categories for assessment is useful for designing ER-based service delivery. These preliminary results support further research addressing the health status and cost impact of providing early interventions for dysphagia. Results also provide support for deployment of acute care speech-language pathologists in emergency rooms, with a mandate to provide assessment and intervention as early as possible, rather than postponing dysphagia assessments until patients are admitted.

The findings also provide evidence to guide future modifications in service design and delivery methods. In particular,

**Table 4**
Frequency Distributions for Swallowing Assessment Observations and Recommendations

| Variable | *n* | % of target sample (*n* = 170) |
|---|---|---|
| **Swallowing trials results** [1] | | |
| Prolonged swallowing transit times | 87 | 51% |
| Reduced hyolaryngeal excursion | 75 | 44% |
| Post-swallow spontaneous cough | 58 | 28% |
| Altered voice quality postswallow | 60 | 35% |
| **Number of swallowing abnormalities observed** [2] | | |
| Single swallowing abnormality | 23 | 14% |
| Two swallowing abnormalities | 25 | 15% |
| Three swallowing abnormalities | 23 | 14% |
| Four swallowing abnormalities | 32 | 19% |
| **Diet texture restrictions** [2] | | |
| Pureed foods with thickened liquids | 52 | 31% |
| Nothing by mouth | 13 | 8% |
| Soft foods with thin liquids | 13 | 8% |
| Minced foods with thin liquids | 4 | 2% |
| Pureed foods with thin liquids | 3 | 2% |
| **Other recommendations** [1] | | |
| Diet texture education | 53 | 31% |
| Mouth care instruction | 31 | 18% |
| Instrumental swallowing assessment (videofluoroscopy) | 4 | 2% |
| **Priority for follow-up** [2] | | |
| Urgent | 48 | 29% |
| Within 48 hours | 35 | 15% |
| Stable | 9 | 5% |
| Unnecessary | 74 | 44% |

Notes
1. Categories listed are not mutually exclusive.
2. Categories listed are mutually exclusive.

diagnoses of cardiac problems (atrial fibrillation and congestive heart failure) comprised almost 17% of the target sample, despite the fact that cardiac conditions were not included in the a priori list of targeted risk categories. Future research should explore the prevalence and significance of dysphagic symptoms for patients presenting with cardiac problems.

### *Limitations*

Foremost among the weaknesses of this project is the fact that a group comparison was chosen, rather than a randomized experimental design. The validity of comparing patients in 1999 to those with similar diagnostic profiles from 1997 and 1998 is somewhat problematic. The comparisons do not support a cause-effect relationship between the services provided and length of stay. The average nine and a half hour time lapse between registration and assessment by the speech-language pathologist is shorter than that experienced by patients prior to the initiation of this study. However, actual time-lapse data prior to the study were not available and such comparisons are purely speculative. Replication of this study using randomized assignment of patients to target and control groups would likely yield more definitive conclusions, although decisions to withhold early dysphagia assessment and intervention for patients with presumed risks pose substantial ethical concerns. A reasonable alternative would be extension of the current study, using an ABA design (i.e., discontinuation of the early assessment service for a period, followed by reinstatement of the service), with comparative evaluation of hospital indicators associated with availability (or lack of availability) of the early assessment and intervention service. But once again, withdrawal designs carry ethical concerns. However, it also must be recognized that the education provided to the nursing staff in the emergency room as part of this project is likely to have altered their approach to managing patients with suspected swallowing problems. One clear indication of changes in nursing knowledge and practice is the fact that thickened liquids are now stocked in the emergency department refrigerator which was not the case prior to the study.

A second limitation of this study relates to the procedures used to select patients for inclusion in the target sample. As described above, an initial sample of 246 patients was selected, which was then reduced to 170, based on the availability of complete data and health records coding. Workload measurement records submitted during the course of the study indicate an average referral rate of three referrals per day in the emergency room. This means that the 170 patients in the sample represent only 37% of the total number of patients assessed during the seven months of the study. Future replications of this type of service delivery project should limit the effect of partial sampling.

A third limitation relates to the specificity of coding practices used for health records analyses. The ICD-9 diagnostic codes permit substantial leeway in labelling patients with similar etiologies (see Table 3). For example, a patient with a stroke might be coded as one of cerebrovascular accident, hemiplegia, or cerebral infarct. The overlap among diagnostic codes does not facilitate the use of diagnosis as an independent variable for program evaluation research. Furthermore, there was no clear fit between the ICD-9 diagnostic coding system and the targeted referral criteria used in this study. A further gap in the health records systems was the lack of any procedures for coding patients who were discharged directly from the emergency room. This meant that it was not possible to track immediate discharges that were directly facilitated by the prompt provision of dysphagia assessment and intervention services.

Finally, no validation of the single clinician's assessment conclusions was performed . It is certainly possible that assessment conclusions might differ between speech-language pathologists performing similar services. Between-group comparisons for variables related to the early assessment can reflect a single clinician's opinion. Replications of this pilot project should consider strategies to mitigate this concern such as simultaneous observation and concurrent coding of clinical observations by a second clinician.

### *Cost-Benefit Analysis*

The staffing costs associated with the pilot project were calculated at $15,181, based on an annual full-time salary of $44,850 and 16% benefits. At the outset of the study, a cost-benefit analysis had been planned. This plan was subsequently abandoned, for a number of reasons. Firstly, all patients in Canadian hospitals are assigned case weights for the purposes of cost per case analyses. Case weight assignment is completed by health records staff on the basis of the most responsible diagnosis and complexity coding assigned by the attending physician. The complexity code status assigned for our patients was outstanding for a large number of patients. Secondly, cost analysis requires a clear assignment of discharge diagnosis. As discussed previously, the ICD-9 coding system tolerates considerable variation in diagnostic labelling. Thirdly, as mentioned previously, the list of most responsible diagnoses assigned by physicians to reflect the primary reasons for hospitalization for the patients in our sample failed to map clearly onto the targeted risk categories selected for referral. For these

reasons, the use of diagnostic categories for a cost-based evaluation of the pilot project was not feasible.

Prior to the beginning of this project, there was speculation that the project might result in a recommendation to train other providers (e.g., nursing, nursing assistants, or rehab assistants) to conduct emergency room dysphagia screening in order to identify patients requiring speech-language pathology assessment. Such a strategy would result in personnel issuing generic precautions, such as thickened liquids for all patients suspected of having swallowing problems but deemed safe for oral intake. In light of the fact that 61% of our target sample were assessed and categorized to be safe to continue to swallow thin liquids, the broad precautionary utilization of thickened liquids could have a negative impact both on program costs and patient hydration. Since non speech-language pathologists would not be qualified to interpret swallowing screening findings and authorize the immediate implementation of appropriate interventions, the relative benefits of using assistants to provide front line screening are questioned.

### *Health Status Outcomes*

This study was unable to provide convincing evidence of the effectiveness of speech-language pathology assessment and interventions for dysphagia in terms of impact on overall health status. However, it is important to note that the interventions prescribed for dysphagia management were substantially more specific than the general recommendations adopted in some facilities for all patients considered at risk for dysphagia. The traditionally common dysphagia precautions of NPO (no oral intake) and puréed foods with thickened liquids were only recommended for 8% and 31% of the target sample, respectively. The fact that the remaining 61% of target patients were able to enjoy more varied and normal diet textures, with the comfort of knowing the risks of this practice had been clinically evaluated, undoubtedly had significant quality of life benefits that were not captured in our analysis.

The current data do not provide conclusive evidence that provision of an early swallowing assessment translates to shorter length of hospital stay. The data do provide strong evidence, however, that dysphagia is a prevalent and important health care concern, although its presence and contribution to comorbidity may not be captured through health records coding practices at the participating hospital. Furthermore, the data provide preliminary evidence that the severity of dysphagia may affect length of stay. The prevalence of swallowing abnormalities identified in our early assessments suggests that emergency rooms are clinically appropriate places in which speech-language pathologists should provide service.

In closing, it should be noted that the emergency room staff welcomed the speech-language pathologist as a valued team member, in direct response to their positive experiences from this research project. The perspective held by both the nursing and speech language pathology staff following this project is that teaching and leading by example has been an effective method of raising awareness of swallowing disorders, and providing training in front-line swallowing screening to emergency room staff.

## Author Note

This research was supported by a grant from the St. Joseph's Health Centre Foundation. The author would like to acknowledge the assistance of Suzette Anzinger and Lori Longo in completing the research. The author would also like to thank Drs. Maggie Lee Huckabee and Michael Hawke, and two anonymous reviewers for helpful comments regarding an earlier version of this manuscript. Please address all correspondence to Catriona Steele, Graduate Department of Speech-Language Pathology, University of Toronto, 6 Queen's Park Crescent, Toronto, Ontario, M5S 3H2.
Email: catriona.steele@utoronto.ca.

## References

Bryant, M. (1991). Biofeedback in the treatment of a selected dysphagic patient. *Dysphagia, 6,* 140-144.

Canadian Association of Speech-Language Pathologists and Audiologists. (1998). *Scopes of practice in speech-language pathology and audiology in Canada.* Retrieved February 16, 2002 from http://www.caslpa.ca/english/pubs/scopes.html

Crary, M. (1995). A direct intervention program for chronic neurogenic dysphagia secondary to brainstem stroke. *Dysphagia, 10,* 6-18.

De Pippo, M., Holas, M., Reding, M., Mandel, F., & Lesser, M. (1994). Dysphagia therapy following stroke: A controlled trial. *Neurology, 44,* 1655-1660.

Groher, M., & Bukatman, R. (1986). The prevalence of swallowing disorders in two teaching hospitals. *Dysphagia, 1,* 3-6.

Huckabee, M. L., & Cannito, M. (1999). Outcomes of swallowing rehabilitation in chronic brainstem dysphagia; a retrospective evaluation. *Dysphagia, 14,* 93-109.

Huckabee, M. L., & Pelletier, C. A. (1999). *Management of adult neurogenic dysphagia.* San Diego, CA: Singular.

Kerstetter, J. E., Holthausen, B. A., & Fitz, P. A. (1993). Nutrition and nutritional requirements for the older adult. *Dysphagia, 8,* 51-58.

Ladak, N. (1998). *Understanding how Ontario hospitals are funded: An introduction.* Hospital funding committee reference document RD #6-11. Toronto: Joint Policy and Planning Committee. Retrieved, February 25, 2002 from http://www.jppc.org

Logemann, J. A. (1983). *Evaluation and treatment of swallowing disorders.* San Diego, CA: College Hill Press.

Lozon, J., & Alton, T. (1998). *Understanding the financial pressures of Ontario hospitals: Short and long term solutions.* Financial issues advisory group reference document #RD 7-10. Toronto, ON: Joint

Policy and Planning Committee. Retrieved, February 25, 2002 from http://www.jppc.org

Martino, R., Pron, G., & Diamant, N. E. (2000). Screening for oropharyngeal dysphagia in stroke: Insufficient evidence for guidelines. *Dysphagia, 15,* 19-30.

Neumann, S. (1993). Swallowing therapy with neurologic patients: Results of direct and indirect therapy methods in 66 patients suffering from neurological disorders. *Dysphagia, 8,* 150-153.

Neumann, S., Bartolome, G., Buchholz, D., & Prosiegel, M. (1995). Swallowing therapy of neurologic patients: Correlation of outcome with pretreatment variables and therapeutic methods. *Dysphagia, 10,* 1-5.

Odderson, I. R., Keaton, J. C., & McKenna, B. S. (1995). Swallow management in patients on an acute stroke pathway: quality is cost effective. *Archives of physical medicine and rehabilitation, 76,* 1130-1133.

Rosenbek, J., Robbins, J., Fishback, B., & Levine, R. (1991). Effects of thermal application on dysphagia after stroke. *Journal of Speech and Hearing Research, 34,* 1257-1268.

Sheth, N., & Diner, W. C. (1988). Swallowing problems in the elderly. *Dysphagia, 2,* 209-215.

Shipley, K. G., & McAfee, J. G. (1992). *Assessment in speech-language pathology: A resource manual.* San Diego, CA: Singular.

Siebens, H., Trupe, E., Siebens, A., Cook, F., Anshen, S., Hanauer, R. et al. (1986). Correlates and consequences of eating dependency in institutionalized elderly. *Journal of the American Geriatrics Society, 34,* 192-198.

Steele, C. M. (1998). *Annual Report: Speech-Language Pathology and Audiology Service.* Unpublished report, St. Joseph's Health Centre, Toronto.

Steele, C. M., Greenwood, C., Ens, I., Robertson, C., & Seidman-Carlson, R. (1997). Mealtime difficulties in a home for the aged: Not just dysphagia. *Dysphagia, 12,* 43-50.

Tracy, J. F., Logemann, J. A., Kahrilas, P. J., Jacob, P., Kobara, M., & Krugler, C. (1989). Preliminary observations on the effects of age on oropharyngeal deglutition. *Dysphagia, 4,* 90-94.

World Health Organization. (1980). ICIDH: International Classification of Impairments, Disabilities, and Handicaps (9th rev., clinical modification). Geneva: Author.

*Manuscript received: September 18, 2001*

*Accepted: April 17, 2002*