

Swallowing Impairment and Feeding Dependency in the Hospitalised Elderly

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Abstract

A prospective study was carried out to determine the prevalence of swallowing impairment and feeding dependency in an acute geriatric medicine unit in Singapore and the co-morbidity associated with it. A total of 211 patients were assessed over a 3-month period. Only 7.1% of patients gave a history of swallowing impairment prior to hospitalisation. We found that 29.4% of patients on admission and 28.2% on discharge had swallowing impairment, with a mortality of 8.1%. The prevalence of feeding dependency, as defined by the need for feeding assistance or tube feeding, was 26.5% before admission and 27.8% on discharge. The mode of feeding between the time of admission and discharge was changed in 14.9% of patients in response to the evolving medical condition. Swallowing impairment was significantly associated with the presence of dehydration (RR = 2.82, CI = 1.74-4.57), chest infection on admission (RR = 2.85, CI = 1.85-4.41), development of nosocomial chest infection (RR = 6.75, CI = 2.60-17.5), discharge to institutional care (RR = 2.8, CI = 1.51-3.47) and increased mortality (RR = 3.77, CI = 1.45-9.70). We concluded that swallowing impairment and feeding dependency are common in the elderly admitted to an acute geriatric unit. As elderly patients seldom inform clinicians of any underlying swallowing impairment and in view of the increased morbidity and mortality associated with this disability, it is important to screen for swallowing impairment. The high prevalence of feeding dependency adds to the burden of care in the ill elderly.

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Introduction

Loss of ability to feed independently and swallowing impairment are common problems in the elderly and will be an increasing cause of disability as the population ages.¹ A study in Europe suggested that up to 10% of people older than 50 experience troublesome dysphagia.² Estimates of the incidence of swallowing disorders in nursing home settings ranged from 30% to 70%.^{3,4} In a study by Steele et al,³ 87% of residents in a home for the aged had meal-time difficulties, of which 68% demonstrated signs of dysphagia and 40% exhibited behavioural changes that made feeding challenging. Siebens et al⁵ found a feeding dependency incidence of 32% in a population of institutionalised elderly.

There is increased risk of dehydration, malnutrition, aspiration pneumonia and mortality in patients with feeding difficulties and dysphagia.⁵⁻⁷ These problems with feeding add to the burden of care in patients who are already likely to have other disabilities. As swallowing impairment is an important cause of morbidity and

mortality, screening for it is important in the elderly.

In Singapore, we do not have information on the incidence and impact of swallowing impairment amongst elderly patients. To our knowledge, there is also no published study on the prevalence of swallowing impairment and feeding dependency in acute geriatric units. As such we conducted a study to determine the prevalence of swallowing impairment and the associated morbidity in the hospitalised elderly. A secondary aim was to determine the need for feeding assistance in our population.

Patients and Methods

A prospective study was carried out amongst patients over the age of 65 who were admitted to the Department of Geriatric Medicine, Tan Tock Seng Hospital, a 64-bedded unit catering to the acutely ill elderly, from 21 July to 21 October 1997. There were 270 admissions in the 3 months of our study of which 232 (85.9%) were assessed. Thirty-eight patients did not wish to partici-

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pate. Out of the 232 assessed, there were 21 re-admissions and they were excluded from the analysis.

Upon admission to our department, patients were assessed clinically by one of the authors (AL, YYS and JJC). Information about the mode of feeding prior to admission was obtained from the patient and/or their carers. On this basis, patients were categorised as follows:

Group A = those who could take orally without need for modification of food consistency or use of specific swallowing techniques (normal diet).

Group B = those who were already on a dysphagia management programme requiring behavioural therapy (modified feeding).

Group C = patients who were on tube feeding.

Oral feeders in Groups A and B were further subdivided into independent feeders (Groups A1 and B1) and those requiring assistance for feeding (Groups A2 and B2).

All patients in Groups B and C were referred to the speech therapist for assessment. Patients in Group A were screened for evidence of dysphagia by means of a bed-side swallowing test. Those with impaired level of consciousness or who were on nil orally were excluded from the test. The bedside swallowing test was later administered in this latter group of patients when their conscious level improved or the acute problem had resolved. The swallowing test was administered with the patient sitting upright and drinking 30 ml of water from a standard medication cup. Observations for the following were made: (1) cough during or within 1 minute of swallowing, (2) presence of drooling, (3) change of voice quality post-swallow. Patients with any of the above features were deemed to have failed the test and were referred to the speech therapist for further assessment. In addition, 1 in 5 patients who did not fail the test were randomly referred to the speech therapist so as to minimise bias in the therapist's assessment. The speech therapist's initial assessment was clinical. This included an assessment of adequacy of postural and head control, examination of lower cranial nerves, voice screening and the ability to take fluid and food of various consistencies. Other than patients who were in Group C (tube feeding), when it was quite obvious from the presence of a feeding tube regarding the high likelihood of swallowing impairment, the speech therapist was blinded to the doctor's assessment. Patients who failed both the bed-side water test and speech therapist's assessment were therefore re-assigned to Groups B or C. If there was any difference between the doctor's or speech therapist's assessment, the speech therapist's decision was accepted.

Patients were considered to have feeding dependency if they could not complete a prepared meal without

assistance (Groups A2, B2 and C). Patients with swallowing impairment included all patients in Groups B and C.

The abbreviated mental test,⁸ Barthel's score,⁹ presence of stroke disease (as defined by clinical history and neurological examination with compatible computed tomography or magnetic resonance imaging), Parkinsonism (as defined by the presence of 2 of 3 of the following: bradykinesia, tremors or rigidity), conscious level (based on the conscious level assessment of Confusion Assessment Method),¹⁰ chest infection and dehydration (clinical and biochemical evidence) were recorded for the patient's stay. Patients were deemed to have decreased conscious level if they were stuporous or in a coma. The diagnosis of chest infection was based on the presence of either radiographic evidence or three or more of the following: fever, crepitation or wheezing, cough or leukocytosis.

Patients were followed up until discharge or death. Reassessment of swallowing ability was performed by the speech therapist periodically and whenever there was a change in patient status for which a change in mode of feeding would be more appropriate.

Statistical analyses were conducted using SPSS for Windows (version 7.5). Categorical and ordinal variables were compared using chi-square and Mann-Whitney U test respectively. Proportions, relative risks (RRs) and 95% confidence intervals (CIs) were derived from these analyses. Statistical analysis with observed probabilities $P \leq 0.05$ were defined as significant. In order to determine the multivariate model for predicting ability to wean off tube feeding, significant factors identified by univariate analysis were entered into a sequence of backward stepwise logistic regression with a significance level cut-off of 0.1 for inclusion in the model.

Results

Of the 211 patients, there were 84 men and 127 women, with a mean age of 81.9 years (SD = 7.11, range 65 to 100 years). The mean length of stay was 16.1 days (range 1 to 161). There were 17 deaths.

Bedside Assessment by Doctor and Speech Therapist

Seventy-seven patients had assessment by both the doctor and speech therapist. There was very good agreement¹¹ between the doctor and the speech therapist (93.5%, $k = 0.87$) in the diagnosis of swallowing impairment. The doctor diagnosed the presence of swallowing impairment in 3 (3.9%) patients when the speech therapist felt otherwise and vice versa in 2 (2.6%) patients.

Swallowing Impairment

On admission, among the 211 patients studied, 62 patients (29.4%) were found to have swallowing impair-

TABLE I: PREMORBID FEEDING PATTERN AND FEEDING DEPENDENCY AS ASSESSED ON ADMISSION AND DISCHARGE

Mode of feeding	Premorbid (n = 211)	On admission (n = 211)	On discharge* (n = 194)
Diet of choice (Group A)	194 (91.9%)	137 (64.9%)	138 (71.1%)
Independent (A1)	152 (72.0%)	125 (59.2%)	130 (67.0%)
Assisted (A2)	42 (19.9%)	12 (5.7%)	8 (4.1%)
Modified feeding (Group B)	3 (1.4%)	15 (7.1%)	30 (15.5%)
Independent (B1)	1 (0.5%)	5 (2.4%)	9 (4.6%)
Assisted (B2)	2 (0.9%)	10 (4.7%)	21 (10.8%)
Tube feeding (Group C)	12 (5.7%)	47 (22.3%)	25 (12.9%)
Parenteral /nil orally		12 (5.7%)	
Unknown	2 (0.9%)		1 (0.5%)

* Mortality = 17

ment requiring either modification of feeds (Group B: 15 patients or 7.1%) or tube feeding (Group C: 47 patients or 22.3%) (Table I). However, only 15 of these 62 (7.1% of 211) patients gave a history of swallowing impairment prior to hospitalisation. The primary reasons for admission in these 62 patients are listed in Table II. There was a high prevalence of swallowing impairment in patients with stroke disease (54/115 or 47.0%) versus those without stroke disease (18/93 or 19.4%), $RR = 2.43$, $CI = 1.53-3.84$ and similarly in patients with Parkinsonism (19/32 or 59.4%) versus those without Parkinsonism (53/176 or 30.1%), $RR = 1.97$, $CI = 1.37-2.84$.

Feeding Dependency

Prior to admission, 56 patients (26.5%) were considered to have feeding dependency. Forty-two (19.9%) of them who although took normal diet (Group A), required feeding assistance to complete their meals (Group A2), 2 patients on modified feeding needed assistance (Group B2) and there were 14 patients on tube feeding (Group C) (Table I). In the analysis of the patients in Group A, the mean abbreviated mental test score and Barthel score for those in Groups A1 and A2 were 5.82

and 1.82 ($P < 0.0001$) and 15.5 and 4.0 ($P < 0.0001$), respectively. More patients in Group A2 were discharged into institutional care (20/36, 55.6% versus 31/143, 21.7%, $RR = 2.56$, $CI = 1.67-3.93$), had chest infection on admission (17/41, 41.5% versus 32/152, 21.1%, $RR = 1.97$, $CI = 1.22-3.17$) and developed nosocomial infection (8/41, 19.5% versus 11/151, 7.28%, $RR = 2.68$, $CI = 1.15-6.22$) than when compared to Group A1 patients. Dependency status did not correlate with age (means in Groups A1 and A2 were 81.5 and 83.4 years, respectively, $P = 0.130$). On admission, many of the 42 feeding dependent patients (A2) were also found to have swallowing impairment ($RR = 4.12$, $CI = 2.77-6.14$) with 7 requiring modified feeds and 23 on tube feeding.

Change in Feeding Pattern during Hospitalisation

During the hospital stay, 29 (14.9%) patients, out of 194 discharged alive, required a change in the mode of feeding. Two patients in Group A were placed on tube feeding and another patient required modified feeding when their condition deteriorated in the ward. Two patients in Group B improved adequately to be allowed back on normal diet. Sixteen patients in Group C improved with 4 patients discharged on normal diet and 12 on modified feeding. There were 12 patients (5.7%) who were on parenteral fluids and nil orally on admission (impaired consciousness in 7, gastrointestinal problems in 3, unstable vital signs in 2). Eight of these patients continued on tube feeding after the acute phase of illness. Fifty patients who required tube feeding survived the admission. Twenty-four of these patients were successfully weaned off the tube (the outcome of another patient could not be confirmed), with 25 patients still requiring tube feeding on discharge. In this group of tube-fed patients, age, sex, presence of tube feeding before admission and presence of stroke were not found on univariate analysis to be significant factors affecting the ability to wean off the nasogastric tube. Whilst

TABLE II: ADMITTING PROBLEM IN PATIENTS FOUND TO HAVE SWALLOWING IMPAIRMENT ON ADMISSION (N = 62)

Diagnosis	Number (%)
Chest infection	23 (37.1)
Urinary tract infection	15 (24.2)
Congestive cardiac failure	6 (9.7)
GI problems (bleeding GIT, hepatobiliary sepsis)	4 (6.5)
Malignancy	3 (4.8)
Acute stroke	3 (4.8)
Cellulitis and diabetic feet	2 (3.2)
Tuberculosis	1 (1.6)
Others	5 (8.1)

GI: gastrointestinal; GIT: gastrointestinal tract

decreased conscious level on discharge, results of the abbreviated mental test, Barthel score and presence of Parkinsonism affected weaning ability, only the conscious level on discharge was significant by multivariate logistic regression.

By the time of discharge, there were 55 patients (28.4%) who had swallowing impairment, with 30 (15.5%) of them on a modified feeding regimen and 25 patients (12.9%) still requiring tube feeding (Table I). Five of the patients on tube feeding were assessed to be able to tolerate a modified oral feeding regimen but were discharged on tube feeding because of inadequate nutrition and hydration from refusal of feeds.

Mortality and Morbidity

Increased morbidity and mortality was found in our patients who had swallowing impairment (Table III). These patients were at increased risk of dehydration, were more likely to be admitted with a chest infection or develop one during hospitalisation. More of these patients were also discharged to nursing homes (RR = 2.28, CI = 1.51-3.47). Mortality risk was also higher in those with swallowing impairment (RR = 3.77, CI = 1.45-9.70).

Discussion

In our population, the prevalence of swallowing impairment in the acutely ill hospitalised elderly was found to be 29.4% on admission. Only 7.1% of the patients presented with a history of swallowing impairment. Increased risk of dehydration, chest infection, discharge into institutional care and mortality were found in this group of patients. The prevalence was 28.4% on discharge. Twenty-six per cent of patients were already dependent on feeding before admission with 27.8% on discharge.

To our knowledge, this is the first described study on swallowing impairment in an acute geriatric unit. Our prevalence of swallowing impairment is understandably much lower than the figures of 30% to 70% quoted by studies in nursing home population,^{3,4} whose residents are generally more dependent on care, but it is higher than that in the community.* Swallowing impairment was not only confined to patients whose primary

reason for admission was for direct causal or complicating illnesses such as stroke, Parkinsonism and chest infection, but also for seemingly unrelated conditions such as hepatobiliary sepsis, urinary tract infection and diabetic foot. In fact, about half of our patients with swallowing impairment fell into this latter group. This can be explained by the multiple co-morbid chronic medical problems in the elderly, many of whom have dementia and suffer from neurological conditions such as stroke and Parkinsonism. Given the high prevalence of patients with swallowing impairment, it is important to think of, enquire about and screen for swallowing impairment in all acutely ill hospitalised elderly patients, even in those who are admitted for an apparently unrelated problem. We also found that during the hospital stay, 29 patients (14.9%) required a change in the mode of feeding. It is also noteworthy that pre-morbid use of tube feeding was not an important factor contributing to the success in weaning off tube feeding. This implies the need for periodic reviews of a patient's swallowing ability and appropriate changes to be made to the mode of feeding when necessary.

In our study, a high proportion of our patients also required feeding assistance. Twenty per cent of oral feeders were being fed by care-givers prior to admission. The poor results of the abbreviated mental test and Barthel scores indicated that these patients had more severe cognitive impairment compared to those who could feed independently. Volicer et al¹² found that 50% of patients with Alzheimer's disease lose the ability to feed themselves within 8 years of diagnosis. It had been suggested by Priefer and Robbins¹³ that feeding ability in demented patients deteriorate according to the degree of attentional capacity required. Tasks requiring little conscious thought (automated tasks) such as transporting food into mouth are more likely to be retained until late in the disease. On the other hand, tasks that require a great deal of thought processing (controlled task), such as re-heating of food or emptying a packet of sauce, are likely to be lost earlier. Hence, to encourage independence, assistance provided by care-givers should be task-specific and relevant to the level of cognitive impairment of the patient.

TABLE III: RISKS OF VARIOUS CO-MORBIDITIES AND MORTALITY WITH SWALLOWING IMPAIRMENT

Event	Number (%) affected		RR	95% CI
	Without swallowing impairment	With swallowing impairment		
Chest infection on admission	24 (17.5)	34 (49.9)	2.85	1.85-4.41
Chest infection in ward	5 (3.6)	17 (24.3)	6.75	2.60-17.5
Dehydration	21 (14.9)	29 (42.0)	2.82	1.74-4.57
Discharge to nursing home	29 (21.5)	28 (49.1)	2.28	1.51-3.47
Mortality	6 (4.3)	11 (16.2)	3.77	1.45-9.70

Our finding of a higher rate of chest infection in those who were feeding dependent is similar to the result obtained by Langmore et al.¹⁴ In that study, 41% of patients who had aspiration pneumonia were dependent upon others for feeding. Feeding dependency remained as the dominant risk factor for aspiration pneumonia even when tube-fed patients were excluded in the multiple logistic regression analysis, with an odds ratio of 19.98 (CI = 5.20-76.76). It was suggested that patients who cannot feed themselves are often fed by untrained nurses, aides or family members who do not understand swallowing problems and who may be under pressure to feed the patients in as short a time as possible, which can sometimes be tantamount to force feeding. Unwittingly by so doing, they could cause the patient to aspirate. Hence, for patients who may require feeding assistance, careful evaluation of swallowing function should be made and family members and carers should be given feeding advice consisting of dysphagia counselling.

Besides the inability to feed independently and presence of swallowing impairment, other mealtime difficulties include such challenging behaviour as distractible, talking/yelling interfering with eating, aggression towards others and spitting. Poor dentition and specific eating problems like oral residue, squirreling of food in cheek and refusal to open mouth may also occur.³ In our study population, there were 5 patients who were assessed by the speech therapist to be able to take orally with a modified feeding regimen but were tube-fed because of refusal of oral feeds. The burden of care in the elderly with feeding dependency is therefore high. Feeding these patients may require special preparation of food and is often time-consuming and frustrating. Family members may also feel inadequate and unable to cope. This might account for our observation that patients with feeding dependency were at increased risk of being discharged to nursing homes, especially patients who require tube feeding.

We acknowledge that one of the limitations of this study was that patients with silent aspiration would be missed out. To capture this group of patients, it is widely accepted that dysphagia is most accurately assessed by a videofluoroscopic barium swallow^{15,16} and more recently using fiberoptic endoscopic examination of swallowing safety (FEES),^{17,18} but these procedures are less readily available, more expensive and time consuming. It is also not practical to refer all patients to the speech therapist for assessment. Hence, despite its lack of accuracy in identifying aspiration in patients,^{15,19} the water swallow test remains the most practical means of screening for swallowing impairment. Its sensitivity may be adequate for this purpose. DePippo et al²⁰ had shown that while it has a sensitivity of only 76% in predicting aspiration during the videofluoroscopic barium swal-

low, its sensitivity in predicting patients who aspirated more than 10% of a given bolus during the examination was 94%. It also has a similar sensitivity of 94% in predicting patients who aspirated thickened liquids or a more solid consistency. Mari et al²¹ found that whereas non-specific complaints of dysphagia showed a very poor predictive value, "cough on swallowing" proved to be very reliable with a sensitivity and specificity of 74%, positive and negative predictive value for the risk of aspiration of 71% and 77%, respectively. The association of cough on swallowing with the 3-oz water test gave a positive predictive value of 84% and a negative predictive value of 78%. Coupled with the skill of the speech therapist, we feel that this was sufficiently sensitive to pick up the majority of clinically significant swallowing impairment in our patients.

In the assessment of the safety and adequacy of the swallowing mechanism, various features need to be considered. Firstly, there should be a high index of suspicion in the presence of recurrent chest infection or neurological conditions such as stroke disease and Parkinsonism. Secondly, the ability of the patient to maintain consciousness, an erect posture and motivation and cooperation to complete a meal needs to be borne in mind. Thirdly, poor laryngeal elevation with dry swallow, poorly coordinated oral muscular function (cheeks, lips, palate and tongue), hoarse or wet voice and absence of strong voluntary cough are worrying signs and evidence of possible swallowing impairment.²² In our department, a screening question for swallowing impairment is included in the clerking notes protocol ("Is there any evidence of swallowing impairment?") to prompt doctors to look out actively for dysphagia. If swallowing ability is doubtful, a 30-ml water swallowing test as described earlier under methodology is administered before patients are allowed to feed orally. Such patients are also referred to the speech therapist for further evaluation. Patients who are already known to have swallowing impairment or when it is deemed unsafe to administer the test are excluded. However, it is very likely that these patients will not be fed orally anyway and be prescribed either tube or parenteral nutrition till further assessment by the speech therapist is carried out.

In conclusion, swallowing impairment and feeding dependency are common in the hospitalised elderly and are associated with increased morbidity and mortality. There should be a high index of suspicion for swallowing impairment and if swallowing ability is doubtful, a clinical assessment of safety and adequacy of the swallowing mechanism and if necessary a bedside water swallowing test should be carried out before patients are allowed to feed orally. Periodic review of a patient's ability to swallow safely is necessary to ensure that the mode of feeding remains appropriate.

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