THE PREVALENCE OF DYSPHAGIA IN A LONG-TERM CARE FACILITY

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by

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Abstract

Dysphagia, or difficulty in swallowing, poses a major health threat if it is not promptly diagnosed and treated. Problems secondary to dysphagia may include malnutrition, aspiration pneumonia, dehydration, psychosocial problems and increased health care costs secondary to professional time for feeding, treatment of medical complications, food wastage, and the length of time required to feed residents. The objectives of this research were to 1) determine the prevalence of dysphagia, 2) determine the severity of dysphagia, and 3) characterize the dysphagic population in a long-term care institution in St. John's, Newfoundland. Other objectives were to determine the medical diagnoses and conditions associated with dysphagia, to assess the extent of complications secondary to dysphagia and to document management techniques currently being used.

Information for this retrospective, descriptive study was obtained by medical record review and a questionnaire completed by nursing personnel. The study population consisted of 193 subjects (138 female/55 male) with a mean age of 75.6 years. Identification of dysphagia and the level of severity were based on the following: signs and symptoms of dysphagia, history of aspiration pneumonia, diagnosed neurological condition, documented reports of dysphagia, medical complications, and dietary modifications.

The prevalence of dysphagia was 45.5%. Of the subjects with dysphagia, 56%, 39% and 6% were mildly, moderately and severely dysphagic, respectively. For only 22% of dysphagic subjects was dysphagia documented in the medical record. Nursing staff identified only 39% of subjects with dysphagia. They were able to identify all severely dysphagic

subjects.

Dysphagia was associated with fluid and texture modifications; poor hydration status; nursing reports of subjects being "not well nourished"; use of nutritional supplements, poor skin integrity; the need for crushed medications; impaired chewing ability; feeding dependency; and level of assistance required at meal time. Dysphagia was not associated with age; sex; inadequate nutritional intake; decubitus ulcers; length of time to be fed; weight status; use of antipsychotic or tricyclic antidepressant medications; difficulty swallowing medications; reports of "not being hungry"; and needing encouragement to eat. Due to small numbers it was not possible to examine associations of dysphagia with medical complications. Recommendations are provided for future management of dysphagic individuals in long-term care facilities.

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List of Abbreviations

FID	Fleming Index of Dysphagia
GERD	Gastroesophageal Reflux Disease
UES	Upper Esophageal Sphincter
BSA	Bedside Swallowing Assessment
MBS	Modified Barium Swallow
EMG	Electromyography
TEN	Total Enteral Nutrition
TPN	Total Parenteral Nutrition
KBC	Kim Butt Chedore, Primary Researcher
LP	Lorna Power, Research Assistant

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1.0 INTRODUCTION

Dysphagia, or difficulty swallowing, can have many detrimental effects in those persons afflicted with the disorder. Undiagnosed or untreated dysphagia can lead to malnutrition, dehydration, aspiration pneumonia, psychosocial problems and choking episodes. Dysphagia is more common in the elderly population as the diseases and conditions which cause or exacerbate dysphagia are highly prevalent in this group (Sonies, 1992). As well, the elderly long-term care population is at higher risk for dysphagic complications due to possible pre-existing malnutrition, alterations in respiratory status, or generalized deterioration in health status.

In addition to the complications directly affecting an individual's health status, unrecognized and untreated dysphagia places financial burdens on the health care system. Additional costs are associated with treatment of malnutrition, aspiration pneumonia, and dehydration, feeding dependency, nursing time necessary to feed dysphagic individuals nutritionally adequate meals, and food wastage.

Dysphagia in the elderly may be more common than it appears since many elderly people will not complain about swallowing problems unless they are specifically asked (Kuhlemeier, 1994). Even persons with severe dysphagia do not voluntarily report symptoms of dysphagia or consult a doctor. Many elderly persons accept their problem as an unavoidable complication of getting old (Bloem et al., 1990). Tibbling and Gustafsson (1991) reported that of the dysphagic persons who do consult a doctor, 40% have just as many psychosocial problems at meal times, such as anxiety and the wish to eat alone, as those who have not seen a physician. This may indicate that some physicians are not aware of the severity of dysphagic complications or of appropriate management.

Early detection and management of dysphagia improves the medical management (Carter-Young and Durant-Jones, 1990) and overall health of such individuals. Appropriate treatment significantly decreases the development of malnutrition, aspiration pneumonia, dehydration and associated sequelae. Treatment may help avoid negative feelings of self worth associated with swallowing impairment. Dysphagia management can promote a less complicated admission at a hospital or long-term care facility and may lead to decreased costs for the health care facility.

It is essential that health care institutions understand and are convinced of the importance of prompt diagnosis and treatment of dysphagia. Governments, hospital and nursing home administrators, community based programs, physicians and health-care professionals must all be aware of this problem. This is necessary so that adequate dysphagia management programs may be developed and maintained (White-Martin, 1987).

To accomplish these goals, the prevalence of dysphagia and its consequences must first be determined. Knowledge of the epidemiology of dysphagia including prevalence and incidence rates will enhance dysphagia research (Kuhlemeier, 1994) and since the Canadian population is aging at a persistent rate (McEwan et al., 1991), the prevalence of dysphagia will increase.

In 1991, Canada's elderly (aged 65+) represented 11.9% of the population (Chartrand, 1993) and this figure has been estimated to increase to 14% by the year 2001 (Lipps, 1988). Similarly, in 1991 in Newfoundland, the elderly (aged 65+) represented 9.7% of the total population, for a total of 55,160 people (Statistics Canada, 1995). The group of elderly with the greatest population growth in Newfoundland and Canada are those in the 90+ age group. From 1975 to 1993 the rate of increase for this age group in Canada

more than doubled and in Newfoundland the rate was slightly lower. Newfoundland's annual elderly growth rate of 3.7% is higher than the national average of 3.5%. If one were to apply the prevalence rates of dysphagia as found in other countries for free living elderly (i.e. 16 to 22.3%) (Kjellen and Tibbling, 1981, Bloem et al., 1990), approximately 8825-12300 persons in Newfoundland in 1991 could have had oropharyngeal or esophageal dysphagia. This number is expected to increase.

This study focuses on dysphagia in a long-term care population. Radiological studies on all residents within the institution were not available and therefore a chart review was completed as this has been shown to be the most efficient way to identify the dysphagic population and management procedures currently being used (White-Martin, 1987). Due to the limitations in recording data in the medical chart, a nursing questionnaire was also used to avoid missing valuable information which may not have been documented in the chart.

The objectives of this study were to determine: 1) the prevalence of dysphagia, 2) the severity of dysphagia based on associated complications, and 3) the characteristics of the dysphagic population in a long-term care facility in St. John's, Newfoundland. In Canada and especially the Atlantic Provinces, information on the extent of dysphagia and associated problems is scarce. To date, there have been no published papers on the prevalence of dysphagia in Canada.

2.0 LITERATURE REVIEW

2.1 Dysphagia Defined

Dysphagia is defined as difficulty in swallowing and is a symptom of disease or dysfunction that can be caused by a number of medical conditions (Sonies, 1992). In the elderly, dysphagia most often is neuropathologic in etiology and affects the oral and/or pharyngeal stages of swallow (Ergun and Miskovitz, 1992). However, some swallowing problems may involve the esophagus, secondary to diseases such as cancer, or involve a combination of the four stages of swallowing. In the past decade, interest in dysphagia research has increased and this is contributing to our knowledge of dysphagia in the aging population.

2.1.1 Available Information on Incidence and Prevalence Rates

Various studies have estimated the prevalence or incidence of dysphagia, but the majority of these have been in disease specific cases. Few studies have evaluated the prevalence of dysphagia in long-term care facilities, and to date, no studies have evaluated the full extent of the problem in a Canadian facility.

General Population

In the general population, the incidence and prevalence of dysphagia is largely unknown. Kjellen and Tibbling (1981) completed a study on a general population of 55 year old Swedes to determine the incidence of esophageal dysphagia. Questionnaires were sent to a study population,

which included 1156 females and 1173 males, to assess symptoms of cardiac and esophageal origin. The response rate for the initial questionnaire was 90%. Out of the original population, 384 subjects were randomly selected to have an acid perfusion test and manometry completed to further assess esophageal dysfunction. Of these, 209 subjects agreed to the investigation for esophageal function, giving a response rate of 54%. Thirty-four percent of subjects had esophageal dysfunction and of those with normal esophageal function, 13% had dysphagia. The overall incidence of dysphagia based on this study was 22%. No reference was made with respect to gender and this study did not evaluate oro-pharyngeal dysphagia.

In another study by Bloem, et al. (1990), the prevalence of dysphagia in a group of free-living elderly Dutch people, older than 87 years, was determined during a one month period. Nine hundred and seventy-seven participants who, three years previously, had a medical interview and mini mental state exam were questioned about symptoms of swallowing problems and choking. Specific questions related to: choking or coughing after eating or drinking; food getting stuck in throat; swallowing more than once to get the same bite down; and nasal regurgitation of swallowed fluid. A positive answer to at least one question was considered evidence that the subject had dysphagia. Data on swallowing was only available for 130 out of the 977 subjects. Symptoms of dysphagia were reported for 16% (21/130) of the population. Six out of 21 people had severe dysphagia, which was classified as daily choking, impaired passage of food or necessity of a pureed-type diet. None of these six people had volunteered this information prior to the study.

Lindgren and Janzon (1991) studied the prevalence of dysphagia, or obstruction when eating, in 50 to 79 year old men and women in an urban Swedish population. Six hundred persons were sent questionnaires and

79% of subjects responded. Only 19 persons, 3% of the population, reported symptoms of bolus obstruction and 20% reported globus sensation.

Tibbling and Gustafsson (1991) investigated if dysphagia leads to weight loss, reduction in quality of life and to what extent it is accompanied by chest symptoms. Questionnaires were randomly sent to 2480 Swedish subjects over 59 years old. The response rate was 32% (n=796) and 46% of the subjects were male. The questionnaire consisted of 16 questions regarding dysphagia, associated symptoms, and anxiety and isolation at meal times. Dysphagia was considered to exist if the subject responded yes to " there is a feeling of food sticking in the chest when eating" or "food sometimes sticks in the throat". The authors found that 8% of subjects answering the questionnaire had symptoms of dysphagia. The median age of the dysphagic subjects was 67 years and there was an equal distribution of males to females.

Räihä et al. (1992) studied the prevalence of gastroesophageal reflux disease (GERD) in non-institutionalized Finnish subjects older than 65 years of age. Data were collected via a postal questionnaire that was randomly sent to 559 subjects. Despite a response rate of 92%, only 87% of questionnaires could be analysed as some questionnaires were not fully completed. The mean age of subjects was 76 for men and 75 for females. Dysphagia was defined as swallowing a bolus which felt as if it had not normally passed through the esophagus. Based on this definition, 21.4% of the total population had dysphagia and this occurred in 15.3% and 6.1% of patients with and without gastroesophageal reflux symptoms, respectively.

Acute and Long Term Care Facilities

To date, most of the literature on the prevalence of dysphagia is based on diagnostic groupings of disease such as stroke or Parkinson's disease. In patients with stroke, which is probably the most common cause of dysphagia (Kuhlemeier, 1994), the incidence of dysphagia has been found to be 16-45% depending on methodology of data collection in various studies (Gordon et al., 1987, Veis and Logemann, 1985, Kuhlemeier, 1994). However, incidence reports of dysphagia for stroke patients depend on the length of time post-stroke that the study was completed since dysphagia usually resolves during the recovery process. For example, in one study (Barer, 1989), almost one-third of strokes patients were dysphagic within two days of having the stroke. In contrast, only 16% of stroke patients on a rehabilitation unit displayed dysphagic symptoms (Kuhlemeier et al., 1989).

Carter-Young and Durant-Jones (1990) completed a needs assessment to identify management techniques and outcome for 225 randomly selected stroke patients discharged over a three year period. Data were collected via a retrospective chart review. Only those patients who were over 18 years old, noncomatose, and who had no previous history of neurological disease, stroke or dysphagia were included for analysis. The incidence of dysphagia was identified by defining dysphagia as "any oral or pharyngeal neuromuscular dysfunction that affected the patient's ability to be fed orally". Their findings were identical to those of Veis and Logemann (1985) in that 28% of stroke patients developed dysphagia. The results of this study can be criticized. The authors report that the most common procedure for diagnosing dysphagia was a bedside evaluation assessing the absence or presence of the gag reflex. It is now commonly accepted that absence or presence of a gag reflex is not indicative of dysphagia.

As reported by Carter-Young and Durant-Jones (1990), Gordon et al. (1987) completed a prospective study and found the incidence of dysphagia to be 45% in stroke patients. It must be noted that prospective studies usually report higher incidence rates than do retrospective studies.

A number of recent studies have been published on the prevalence and incidence of dysphagia within acute and long-term health care facilities. Groher and Bukatman (1986) completed a prevalence study in two acute care facilities. One week prior to the start of the study, nursing staff identified patients considered to have a "swallowing dysfunction". Dysfunction was classified as difficult oral intake, choking or coughing, no oral intake, history of aspiration pneumonia, and the need for diet texture modification, non oral feeding route, or for individual meal time supervision. Only those patients with oro-pharyngeal stage disorders were selected for the study as this group would potentially benefit from various treatment modalities. A nursing questionnaire, cardex, and chart review was conducted and patients were classified as having dysphagia if they met one of the following: (1) reported signs of choking, drooling or inability to complete an attempted swallow or (2) a history of aspiration pneumonia with a primary or secondary diagnosis of a neuromuscular disorder. Results of this study indicated a prevalence of dysphagia of 12% and 13% in the two acute care facilities. Further details are outlined in Table 2.1. It has been recognized that this research is only an estimate of the true prevalence because of the limited time span in which it was conducted (three weeks) and because a modified barium swallow study and physical exam was not used in determining the presence of dysphagia.

Layne et al. (1989) identified the prevalence of "possible, probable or definite" dysphagia in a long-term neuropsychiatric facility to be 66%. All 513 patients within the facility, primarily adult men, were screened on one

day using the Fleming Index of Dysphagia (FID). This identified oral-pharyngeal and/or esophageal dysphagia using various indicators of dysphagia and then assigning each indicator a score (refer to Appendix 1 for details of the FID). The FID was completed via medical chart review and interview with a charge nurse to obtain information such as the presence of aspiration pneumonia, dehydration, enteral nutrition, weight loss, reflux, strictures, ill-fitting dentures, complaints of dysphagia, and radiographic findings of swallowing problems. Total scores were obtained for each patient indicating one of four groupings: unlikely to have dysphagia (score=0-2), possibly has dysphagia (score=3-5), probably has dysphagia and should be further evaluated (score=6-9), or patient has definite dysphagia (score≥10). Results for the study showed that 35% of the total population had either "possible", "probable" or "definite" dysphagia. In this study, a texture modified diet included diets restricting whole meats and raw fruits and vegetables. This classification, however, may be too general to indicate swallowing problems since restrictions of these food items may be secondary to gastrointestinal disorders and not associated with the inability to swallow. Layne et al. (1989) report that Trupe et al. (1984) had also published on the prevalence of dysphagia, however, this study appears to have been presented at a conference, and therefore specific details are not available.

Keller (1993), who investigated malnutrition in Canadian institutionalized elderly, also reported a six month prevalence rate of dysphagia to be 19% in 200 subjects with a mean age of 78.5 years. In this study, a swallowing assessment by the multidisciplinary team had to be in the medical chart in order for the patient to be classified as having dysphagia.

Kuhlemeier (1994) states that the incidence of dysphagia in a hospital setting is easier to determine than the prevalence rate because hospital

statistics and national standards are coded for each specific patient problem. As well, since the symptoms of dysphagia are often under-reported in the elderly population, it has been suggested that actual incidence and prevalence rates may be higher than those reported in the literature. According to Campbell-Taylor (1994) a conservative estimate is that sixty percent (60%) of all residents in long term care facilities and hospitals have some type of swallowing difficulty. To date, the true incidence and prevalence of dysphagia in the geriatric population remains unknown. The only way to correctly identify the incidence and prevalence rate of dysphagia is to conduct a longitudinal study which routinely screens and assesses subjects using a modified barium swallow (MBS) study. However, it would not be ethically appropriate to conduct such a study because the average MBS exposes a subject to radiation for five minutes and many non-dysphagic subjects would receive unnecessary radiation.

In summary, the prevalence of dysphagia in a long term population has been reported as 19%, 59% and 66%. In rehabilitation and acute care facilities, the reported prevalence of dysphagia is between 6% and 50%. In free-living populations, the prevalence of dysphagia has been documented to be between 16% and 22%. Differences in prevalence rates occur in each study because of differences in study design (e.g. prospective versus retrospective), operational definitions used to define dysphagia, methodology, such as techniques to evaluate the presence of dysphagia (e.g. bedside swallowing assessment, presence and absence of gag reflex, chart review, nursing questionnaire, self-reported questionnaire, FID) and study population (e.g. age, gender, geographic location, primary diagnosis, etc.).

The current research study combines various techniques used in these studies while omitting those which have been shown to be questionable in diagnosing dysphagia in a long-term care population. For example, self-

reported swallowing problems in the elderly population tend to be inaccurate due to forgetfulness and confusion which is inherent in a large percentage of elderly in long-term care facilities. As well, the elderly tend not to report swallowing problems unless they are severe. A bedside swallowing assessment completed on one occasion may not be appropriate because there may be daily fluctuations in a persons swallowing ability. As well, the bedside swallowing assessment is unable to clinically detect aspiration 40% of the time (Logemann, 1983, 1995) and therefore, would still be an imprecise estimate of the true prevalence. The findings of prevalence / incidence studies completed to date are summarized in Table 2.1.

Table 2.1. Synopsis of research on the prevalence/incidence of dysphagia since 1983

Investigator	Subject of Study	Setting/Sample Size	Population	Method	Results
Trupe et al. (1984) Paper presented at conference**	Overall prevalence	Nursing home population	All residents	Evaluated oral-pharyngeal problems via Questionnaire, chart review, and physical exam	74% with feeding disorders; 59%with oral/pharyngeal dysphagia
Groher (1980)**	Impression of staff	VA Hospital	All patients	Phone call to head nurse	6% with oral/pharyngeal dysphagia
Fleming (1985)**	Impression of staff	Hospitals	All patients and residents	Questionnaire to allied health workers, medical personnel	43% judged prevalence to be less than 15%; 16% judged more than 15%; rest did not know or could not judge
Winstein (1983)** Paper published	Prevalence in specific diagnostic category	Rehab. Hospital	Head injured	Retrospective chart review	25% consecutive admissions had dysphagia
Pannell et al. (1984)** Paper presented at conference	Prevalence in specific diagnostic category	Rehab. Institute	Neurogenic disorders	Physical exam and chart review	42% with dysphagia
Echelard et al. (1984)** Paper presented at conference	Prevalence in specific diagnostic category	Acute general hospital	Selected groups		Dysphagia in: 25% CVAs, 20% pneumonias, 50% head injuries, 30% head/neck resections

Investigator	Subject of Study	Setting/Sample Size	Population	Method	Results
Veis and Logemann(1985)** Paper presented at conference	Prevalence in specific diagnostic category	Acute general hospital	Post CVA	Chart review of admissions in 1 year	28% with dysphagia
Groher and Bukatman (1986) Paper published	Prevalence in specific hospital service Conducted over a 3 week period.	2 Acute hospitals (both with primary and secondary care, one with tertiary care as well) N=462 patients at one hospital and 610 at the other hospital with tertiary care	All patients except: psychiatry, pediatrics, neonatology, obstetrics, and inpatient substance abuse	Questionnaire (filled out with charge Nurse), Chart review and Cardex review	Overall: 12-13% incidence of dysphagia - Percentages of oral-pharyngeal dysphagia by service: 10-11% of general medicine patients (10-15% had esophageal dysphagia) 9-12% surgery patients 33-34% neurology and neurosurgery patients
Layne et al. (1989) Paper published	Overall prevalence Conducted during one day	Subjects: Inpatients at a 668 bed long-term, neuropsychiatric medical centre (primarily adult men) All patients screened (n=513)	All patients	Fleming Index Dysphagia (FID) (a screening instrument) was used on each patient, plus an interview with Nursing staff, and Medical chart review. The FID evaluated oral, pharyngeal and esophageal problems. Scores calculated from FID to indicate one of the following: Patient unlikely to have dysphagia, possibly has dysphagia, probably has dysphagia and should be further evaluated, or patient has definite dysphagia.	Overall (Entire Medical Center) = 18.32% received a rating of "possible" dysphagia,12.9% had "probable" dysphagia and 3.7% had "definite" dysphagia. 65.9% in the Nursing Home Care Unit was classified with (at least) "possible" dysphagia. Percentages of "possible" dysphagia by service: 30.3% general medicine patients 100% ventilator dependency unit 35% Physical Rehab. Unit 16.5% Psychiatry

Investigator	Subject of Study	Setting/Sample Size	Population	Method	Results
Carter-Young and Durant-Jones (1990)	Needs assessment was conducted. Those without dysphagia were compared to those with dysphagia for a selected number of variables.	Acute care teaching hospital	Random selection of all CVA patients discharged over a 3 year period meeting following: ≥ 18 years old, noncomatose, with no previous CVA, neurological disease or dysphagia. n=225	Chart review/ questionnaire	Incidence: 28% (65/225) showed symptoms of dysphagia based on operational definition

Table adapted from Groher and Bukatman (1986)
**As reported in Groher and Bukatman (1986)

2.1.2 Groups at Risk

Dysphagia has been associated with many medical conditions and external environmental factors. Dysphagia in the elderly is compounded by the following: medical conditions which cause or exacerbate dysphagia are more common in aged persons (Sonies, 1992); feeding dependency and use of medications, which are both associated with dysphagia, are common in the elderly; the elderly rarely seek medical attention for dysphagia (Bloem et al, 1990); and the elderly only complain of dysphagic symptoms when they are very painful or severe (Sonies, 1995). The following is an overview of factors affecting the presence of dysphagia.

- *Medical conditions*

The incidence of dysphagia increases in patients with dementia, movement disorders, such as Parkinson's Disease and Multiple Sclerosis, and with neurological impairment including Guillain Barré Syndrome, Amyotrophic Lateral Sclerosis, Myasthenia Gravis, Poliomyelitis, quadriplegia and cerebrovascular accidents (Sheth et al., 1988, Sonies, 1992, Brin and Younger, 1988). The incidence of swallowing problems also increases with head injuries, brain tumours, and hepatic encephalopathy (Sitzmann, 1990). Dysphagia has been associated with prolonged orotracheal intubation (>20

days)(De Vita et al., 1990). Other diseases or conditions associated with dysphagia are found in Table 2.2.

Table 2.2 Diseases and Conditions Associated with Dysphagia

- Neurogenic
  - Cerebrovascular Accidents
  - Strokes
  - Parkinson's Disease
  - Multiple Sclerosis
  - Neoplasms of the brainstem, meninges,etc.
  - Muscular Dystrophy
  - Amyotrophic Lateral Sclerosis
  - Huntington's Disease
  - Myasthenia Gravis
  - Mycpathy
    - Polymyositis
    - Dermatomyositis
    - Sarcoidosis
    - Myotonic dystrophy
    - Oculopharyngeal dystrophy
  - Cerebral Palsy
  - Poliomyelitis
  - Spinocerebellar degeneration
  - Progressive supranuclear palsy
  - Alzheimer's Disease
  - Head Injuries
- Systemic
  - Diabetes Mellitus
  - Rheumatoid Arthritis
  - Cancer (mouth, throat, esophagus)
  - Hyper/hypothyroidism
  - Cushing's Syndrome
- Structural lesions
  - Diverticula
  - Oropharyngeal tumours
  - Thyromegaly
  - Abcess
  - Webs and Rings
  - Cervical osteoarthritis
  - Vascular lesions (dysphagia aortica)
  - Peptic stricture
- Motility disorders
  - achalasia
  - esophageal spasm, scleroderma
- Iatrogenic conditions
  - medication induced injury
  - post-operative, post-radiation
  - chemotherapy
  - pharmacological effects
- Psychiatric
  - dementia
  - depression

- *Medications*

Psychotropic drugs, including neuroleptics, can also cause dysphagia or exacerbation of dysphagia (Stoschus and Allescher, 1993). This is due, in part, to extrapyramidal motor disturbances which lead to an impaired function of striated muscles of the oropharynx and esophagus. The use of these drugs in the aged population is quite prevalent. According to Stoschus and Allescher (1993), drug-induced dysphagia resulting from medication-induced esophageal injury, is most likely to be found in elderly patients.

Drugs which cause xerostomia, such as tricyclic antidepressants (TCA) and antipsychotics may also induce dysphagia. Both antipsychotics and TCAs

may produce extrapyramidal symptoms and have anticholinergic side effects. The resultant effect on the autonomic nervous system causes xerostomia by muscarinic cholinoceptor blockade (Katzung, 1989). The xerostomia exacerbates oropharyngeal or esophageal dysphagia. Oropharyngeal dysphagia results from impaired bolus formation and impaired transport secondary to dryness of the mouth. In this situation the patient is usually able to sense a swallowing problem. With esophageal dysphagia, xerostomia may indicate salivary gland hypofunction which leads to a decreased ability to neutralize acid produced via gastroesophageal reflux. This, in turn, may lead to esophagitis and esophageal dysphagia (Stoschus and Allescher, 1993).

■ *Feeding Dependency*

In a cross sectional study of 240 nursing home residents, with a mean age of 82 ± 9.5 (21% male; 79% female), Siebens et al.,(1986) investigated eating dependency and swallowing function. Data were collected via nursing questionnaires, chart review and physical exam by a physician and speech-language pathologist. A higher prevalence of abnormal oral-stage and pharyngeal-stage swallowing behaviours was reported in residents who were dependent eaters (depend on others for assistance during meal times) than in residents who were completely independent at meal times. Behavioral problems which indicated dysphagia in the oral stage of swallowing included spitting, choking, inability to chew, drooling, nasal regurgitation, pocketing of food, delayed swallow and putting excess food in the mouth. Abnormal pharyngeal function was characterized by coughing during meals and drinking, choking during meals and wet sounding voice. The authors reported that 61% of dependent eaters demonstrated abnormal oral stage behaviours whereas only 16% of independent eaters demonstrated these same problems ($p=0.0001$). As well, 39% of dependent eaters demonstrated abnormal pharyngeal stage behaviours, but only 20% independent eaters

demonstrated pharyngeal problems (p=0.001).

Using logistic regression analysis the authors concluded that the two best factors to predict eating dependency were oral stage dysphagia as observed by nursing staff (e.g. coughing with swallows of food/fluid) and dependency for mobility (i.e. bed-bound or geri-chair bound).

2.1.3 *Impact/Cost of Dysphagia on the Health Care System*

There are many monetary costs when dysphagia is unrecognized and/or untreated. These include increased money necessary for the treatment of malnutrition or pneumonia, increased nursing time with dysphagic patients, and increased food wastage because people with dysphagia voluntarily decrease the amount and types of food eaten. These are outlined below.

- *Medical Complications: Treatment Costs of Aspiration Pneumonia and Malnutrition*

In 1991, the cost of treating one episode of aspiration pneumonia in one patient was quoted as being in the order of $3,500. (Campbell-Taylor,1994) The cost has escalated since then. In 1995 at The General Hospital in St. John's, Newfoundland, the average length of stay for a patient with uncomplicated aspiration pneumonia was reported to be 6.6 days and for complicated pneumonia (i.e. pleurisy, effusions), the average length of stay was 9.4 days (Gillespie, 1995). The average cost of hospital stay including medical/surgical supplies, medications, plant upkeep, allied health staff wages, food, housekeeping, linen, laundry, etc., and excluding doctor's fees, x-rays, surgeries, etc. is twelve-hundred dollars per person, per day (Haire, 1995). Therefore, the extrapolated minimum cost for treatment of one episode of uncomplicated aspiration pneumonia, per person, is $7920.00 and for complicated aspiration pneumonia the minimum cost is $11,280.00.

With respect to malnutrition, Keller (1993) reported that 27.5% of long-term elderly patients were mildly to moderately malnourished. These individuals usually survive for many years with poor nutritional status and secondary complications such as repeated infections, anemia and poor wound healing. As a result, malnutrition and its sequelae place a burden on patients' health, and treatment of these problems contribute to increased costs for the health care system. Malnutrition can also alter pharmacokinetics and therefore drug action (Lamy, 1983). This may nessitate adjustment of dosages or more expensive drugs which lead to increased health care costs.

- *Costs Associated with Lack of Staff Training in the Management of Dysphagia*

Many nursing personnel have not received training to deal with and manage dysphagic patients. Nurses or other allied health personnel who are not able to identify dysphagic patients are not able to initiate treatment. Some nursing homes still feed dysphagic patients with a syringe. This violates every principle of a "safe swallow" and places the patient at increased risk for aspiration pneumonia (Logemann, 1995). If aspiration or other complications do develop, the cost of treating these problems will escalate.

- *Costs associated with Feeding Dependency*

The costs associated with a patient being dependent on nursing or other staff for eating is substantial. The prevalence of eating dependency is high in nursing homes. Siebens et al. (1986) completed a cross-sectional study to evaluate the functional eating status of 240 residents in a skilled nursing facility. They reported that 47% of residents were dependent on staff for eating and 32% of the total nursing home population required actual physical assistance with eating. Zimmer (1975) documented that 50% of skilled nursing facility residents required eating assistance. Costs of managing eating dependency have been reported to be the single most expensive care

area for total-care patients (Keller, 1993) and have been estimated to be approximately 25% of the total cost of caring for totally dependent individuals (Siebens et al., 1986).

Eating and/or feeding dependency can be identified as it is associated with the need for crushed medications, use of nutritional supplements, dependency on others for mobility, absence of teeth and/or dentures, abnormal oral-motor function and pharyngeal function (indicating a swallowing problem), impaired cognition, and problems with the functioning of the upper extremities. Eating dependency is not correlated with age, sex, weight changes, medications, or diagnosis of stroke, depression or dementia (Siebens et al., 1986).

- *Costs of Increased Nursing Time to Feed Patients with Dysphagia*

It has been estimated that it takes approximately 30-45 minutes of nursing time to feed the dysphagic patient (one-on-one) in order to provide adequate nutrition (Rudman and Feller ,1989). However, with use of correct diet textures and compensatory strategies to help facilitate a safe swallow, nursing time required to feed a nourishing meal may be reduced to 15 minutes (Campbell-Taylor, 1994). This is essential to overall health status because patients who are slow eaters or feeders, or take greater than 25 minutes to consume a meal are at risk for developing undernutrition (Keller, 1993). Reduction of time required for feeding and ensuring the provision of nutrient-dense foods is thus desirable to reduce malnutrition in dysphagic patients.

- *Costs Associated with Food Wastage*

Many patients with dysphagia voluntarily restrict their intake of the various food items and fluid consistencies which they have difficulty swallowing. In an institutionalized setting, where the patients themselves have little control

over food selection or texture selection, many trays are returned to dietetics departments with very little or nothing consumed. This cost of wasted food per year, secondary to the patients inability to eat, is in the range of millions of dollars (Campbell-Taylor,1994).

Management of dysphagia is possible. With correct management, the complications of dysphagia can be reduced and this will help counteract the impact associated with increased health care costs. Kasprisin et al. (1989) suggest that all dysphagic patients, whether they have mild or severe dysphagia, should be considered for enrollment into a management program. It is important to identify patients with dysphagia so that the risk of malnutrition, aspiration pneumonia and associated complications are lessened; individuals with dysphagia may regain independence with eating or require minimal assistance; and the cost of caring for a dysphagic individual is decreased (Siebens et al., 1986).

2.2 Normal Swallowing Physiology and Anatomy

It is necessary to understand normal swallowing physiology and have a basic understanding of anatomy pertinent to swallowing, so that problems occurring in each stage can be recognized. Anatomy of the oral and pharyngeal areas pertinent to swallowing is illustrated in Appendix 2.

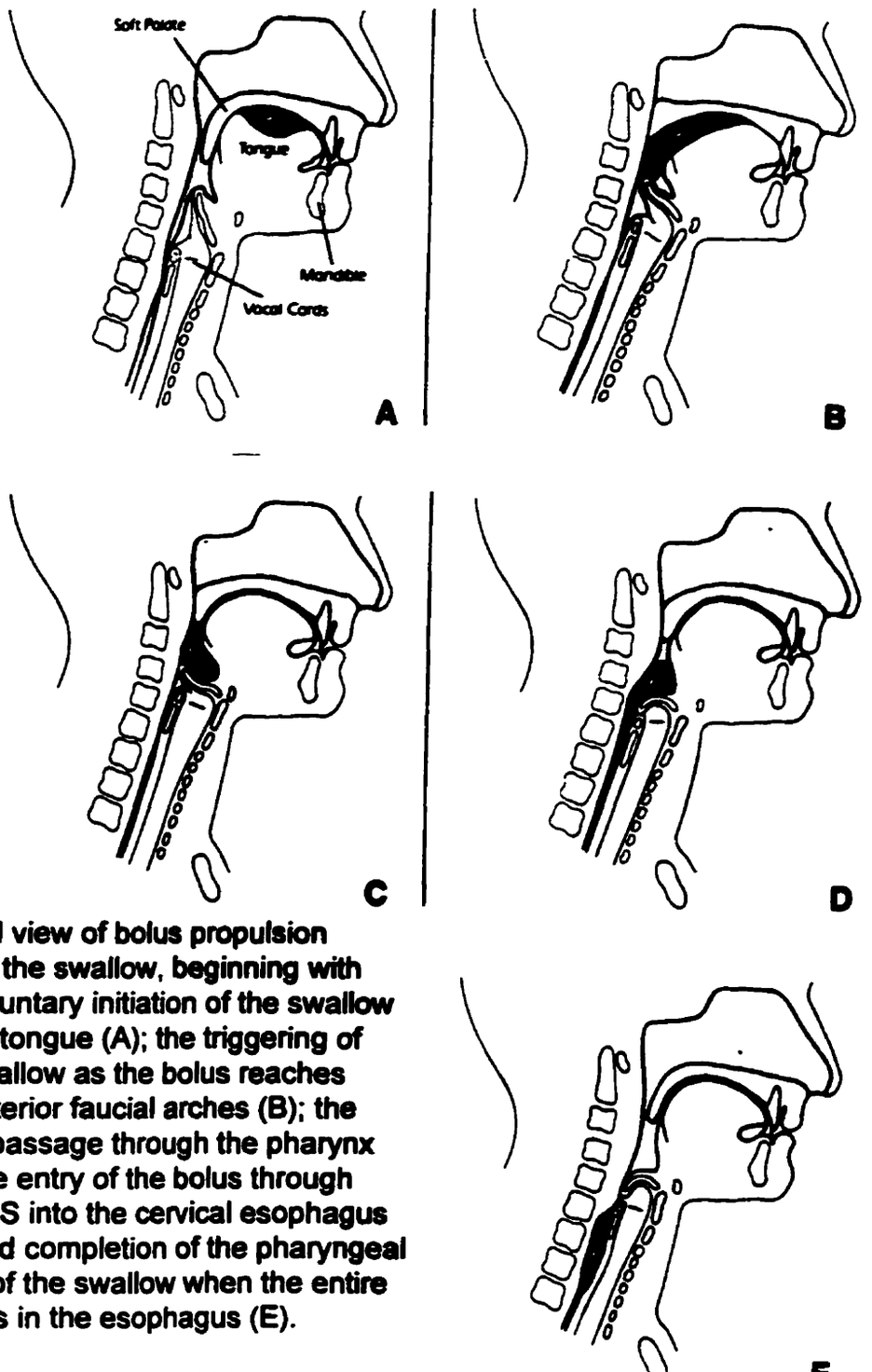
Normal deglutition, or swallowing, occurs sequentially in four distinct phases (Dodds et al., 1990b, Logemann, 1983, Dodds, 1989, Mendelsohn,1993) as illustrated in Figure 2.1:

- oral preparatory
- oral propulsive
- pharyngeal
- esophageal

As well, Logemann (1996) indicates that preswallow sensory input may stimulate the initiation of the oral swallow and subsequently, a timely pharyngeal swallow response. Such sensory input may include self placement of food in the mouth, or changes in bolus volume, viscosity, temperature, and taste. More research is required in this area.

A successful swallow requires the coordination of several nerves and numerous muscles of the mouth, larynx, pharynx and esophagus. Swallowing can be either voluntary, as evidenced when eating, or involuntary such as swallows which occur between meals or during sleep. Dodds et al. (1990b) report that spontaneous swallowing, which is initiated by saliva production, occurs at a rate of one swallow per minute in awake subjects leading to more than 1000 swallows per day. When complications occur in any phase of swallowing the impact on overall health and lifestyle can be substantial.

Figure 2.1 The Swallowing Process



Lateral view of bolus propulsion during the swallow, beginning with the voluntary initiation of the swallow by the tongue (A); the triggering of the swallow as the bolus reaches the anterior faucial arches (B); the bolus passage through the pharynx (C); the entry of the bolus through the UES into the cervical esophagus (D); and completion of the pharyngeal stage of the swallow when the entire bolus is in the esophagus (E).

Source: Logemann, 1983

Oral Preparatory Phase

This stage begins when food is placed in the mouth. At this stage, there is closure of the lips with an increase in facial tone to maintain the food inside the mouth. The base of the tongue contacts the soft palate or velum (the palatoglossal sphincter) to prevent posterior spillage of the bolus (i.e. food spillage over the base of the tongue) and possible aspiration of food into the trachea before the pharyngeal phase (Mendelsohn, 1993). Food is masticated with lateral and rotational jaw movements to an appropriate size and consistency. Rotary and lateral tongue movements mix the food with saliva by transferring the food around the cheeks, teeth, and gums. The soft palate is pulled anteriorly to contact the base of the tongue and a bolus, from either all the food, or part of the food, is formed at the tip of the tongue. When the food is ready for delivery into the pharynx, it is usually held between the tongue and the palate or sometimes in the anterior floor of the mouth (Dodds et al., 1990b). This phase is voluntary and normally lasts 1-3 seconds. In this phase, it is essential to have good tongue mobility for bolus preparation and transport and a functioning palatoglossal sphincter. This is necessary so that aspiration of food or liquid does not occur before the time at which the pharyngeal phase begins, in which case the swallow trigger mechanism closes and protects the airway (Mendelsohn, 1993). The larynx and pharynx are at rest during this phase of the swallowing process. Common problems occurring in this phase of swallowing are outlined in Appendix 3.

Oral Propulsive Phase

In this phase, the bolus is moved posteriorly to the back of the tongue. The bolus is sealed on the midline of the tongue as the tip of the tongue and lateral sides of the tongue maintain contact with the anterior and lateral

alveolar ridge (Logemann, 1995). A rolling tongue motion sequentially contracts, or squeezes, the bolus against the hard palate and, aided by gravity, it is propelled into the oropharynx (Dodds et al., 1990b, McConnel, 1988). The base of the tongue moves anteriorly so that the bolus can move into the pharynx. This phase of oral transit time is completed in 1 second in young persons or 1.5 seconds in the aged population (Logemann, 1995) and is voluntary. A normal voluntary swallow is necessary to elicit a strong swallow response during the pharyngeal phase.

Pharyngeal Phase

This is the most complex and critical phase of swallowing. According to Logemann (1995), the pharyngeal swallow is triggered in young people when the bolus head reaches the anterior faucial arches but is triggered in persons older than 60 years when the bolus reaches the area where the lower edge of the mandible crosses the tongue base. As the bolus passes into the pharynx the phase becomes involuntary, and this begins the start of the reflexive component of the swallow. This phase comprises a sequence of highly coordinated neuromuscular events causing pressure changes that are critical to bolus transport (Robbins, 1994). At this point, several processes occur simultaneously: the soft palate elevates, there is closure of the velopharyngeal port to prevent regurgitation of material into the nasal cavity, there is lingual thrust of the bolus, the hyoid bone and larynx is pulled upward and forward and the epiglottis lowers to aid in laryngeal closure (accomplished by anterior elevation of the hyoid bone and larynx and is facilitated by closure of the true and false vocal cords). This also assists with upper esophageal sphincter opening. These processes serve to protect the airway and respiration is halted. The swallow response is controlled by the medulla oblongata of the brain stem (Murdoch,1990).

Pharyngeal transit, which was initially thought to be due to pharyngeal peristalsis, is now known to occur in two stages. First, there is thrust of the bolus into the esophagus, which is accomplished by lingual propulsion, laryngeal elevation and gravity. Second, there is a mucosal clearance stage which occurs through the pharynx due to close contact between the anterior and posterior mucosal surfaces. When the bolus has passed through the pharynx, the upper esophageal sphincter (UES) (also called the cricopharyngeal sphincter) opens to allow the bolus to move into the esophagus. The UES opening is created by relaxation of the cricopharyngeus muscle and upward and forward movement of the larynx. As well, as the bolus enters the sphincter, it exerts pressure which causes a widening in the sphincter opening (Mendelsohn, 1993) and permits passage of food through the esophagus.

If residual food remains on the pharyngeal walls, sensory receptors are activated in the pharynx and a second swallow occurs to clear the residual material. Laryngo-tracheal sensory receptors respond to food entering the airway and produce a cough reflex. (Logemann, 1995, Jaradah, 1994, Mendelsohn, 1993, Boker, 1990). This phase is finished when the tail of the bolus passes into the esophagus (Mendelsohn, 1993). At this point, the airway valves open (i.e. the larynx and soft palate return to the resting position), the vocal cords open and the UES closes so that respiration can resume. This phase takes 1 second to complete in young persons and 1.3 seconds in the aged (Logemann, 1995). For the entire bolus to pass from the oral cavity into the esophagus, this normally takes less than two seconds (Logemann, 1983). Common problems occurring in this phase are outlined in Appendix 4.

Esophageal Phase

In this phase, the UES, which has closed so that respiration can resume, also is closed to prevent regurgitation of the bolus into the laryngopharynx. Peristalsis continues to move the bolus toward the stomach, the lower esophageal sphincter relaxes and the bolus passes into the stomach. This phase lasts 8 - 20 seconds (Logemann, 1995).

According to Logemann (1995) there are variations in normal swallowing physiology which occur with changes in volume and viscosity of the bolus. As the volume of the bolus increases, there is longer airway closure and longer UES opening, later movement of the tongue base, later onset of pharyngeal wall contraction and wider UES opening. With increased viscosity of the bolus, there is also wider UES opening for a longer period of time and increased electromyography (EMG) activity, which measures the timing of contraction of submandibular muscles and the thyrohyoid (laryngeal elevator) muscle.

2.3 The Abnormal Swallow

Most cases of chronic oropharyngeal dysphagia are neurogenic, which means they are caused by a neurological dysfunction (Buchholz, 1994). This impairment can cause loss of muscle function which propels the bolus and/or protects the airway during the swallow, resulting in penetration of the bolus into the nasopharynx or larynx. Many clinical signs can indicate difficulty swallowing in the oropharyngeal region and although dysphagia can be localized to the esophagus, it is less likely to be the source of clinical problems (Buchholz, 1994).

Identification of swallowing problems by a swallowing therapist and/or swallowing team focuses only on problems of the oral/pharyngeal phases of swallowing. Problems occurring in these stages respond to swallowing therapy, compensatory strategies and diet texture modification. Deglutition problems localized to the esophagus are assessed by a gastroenterologist and are managed with surgery and medications. [This research focuses only on oral and pharyngeal swallowing problems].

There are various problems which may occur in the first three phases of swallowing resulting in an abnormal swallow. A detailed review of common disorders in the oral preparatory and oral phases of swallowing, associated clinical symptoms and consequences is located in Appendix 3. A detailed review of common disorders in the pharyngeal phase of swallowing including symptoms, as observed via a modified barium swallow, and consequences is located in Appendix 4.

2.4 Relationship between Dysphagia and Aging

The aging process itself may provoke changes in the swallowing process but aging does not cause dysphagia (Sonies, 1995, Buchholz, 1994). Oropharyngeal dysphagia in the elderly is the result of a disease or illness that may occur more commonly in elderly persons (Sonies, 1992). Dysphagia may be caused by systemic, immunologic, neurologic, neuromuscular, psychiatric, environmental, or societal conditions (Sonies, 1992). Age-associated morphologic changes can result in specific complications such as slowed esophageal transit, increased gastroesophageal reflux, delayed pharyngeal clearance, and delayed cricopharyngeal opening (Sonies, 1992).

Shaker et al. (1993) reported that in the elderly there is an adaptation to age-induced structural changes in the upper esophageal sphincter that seem to have a more positive impact on overall swallowing capabilities than a negative one. Shaker's research showed there is preservation of the coordination between vocal fold adduction and UES function, no effect of bolus size or temperature on vocal fold adduction, and there is shorter duration of onset of glottal closure and UES relaxation for water swallows. These functions all provide airway protection in older persons.

2.4.1 Normal Changes with Aging that affect the Swallowing Process

There are many conditions that occur with aging that may affect swallowing. These include decreased taste and smell (Moeller, 1989), poor dentition, decrease in muscle mass and muscle strength (Ekberg and Feinberg, 1991), reduced muscle tension, slowed reaction times, and slowing of fine and gross motor tasks (Sonies, 1995). It is important to be able to distinguish an "abnormal swallow" from an "old swallow" as several changes occur with swallowing that are considered to be a normal physiological process.

According to Robbins (1994), despite the many structural and physiological changes that occur with aging, there is no interference in the ability to tolerate foods of various textures and consistencies in the elderly. However, some diseases, such as Parkinson's disease can advance the progression of normal changes in the swallowing process with aging (Beasley et al., 1976). Normal changes in the oropharyngeal phases of swallowing that occur with normal aging are outlined in Table 2.3.

To illustrate normal changes in swallowing with aging, Ekberg and Feinberg (1991) completed videofluoroscopy on 56 elderly patients (mean age = 83

years) who had no symptoms of dysphagia or difficulty in eating. They reported that what is considered to be an abnormal swallow in young persons may not be abnormal in elderly people. They noted that normal swallowing, as found in young persons, was present in only 16% of their subjects. "Abnormalities" in the oral, pharyngeal and esophageal phase of swallowing where found in 63%, 25%, and 36% of patients, respectively. Ekberg and Feinberg's research design and conclusions have, however, been criticized: almost half of the subjects in their study were neurologically impaired and no attempts were made to differentiate the results of those patients without neurologic disease compared to those with Parkinson's disease, stroke or dementia. In addition, no age-matched controls were used.

Table 2.3 Changes in the oropharyngeal phases of swallowing that occur with normal aging.

Changes in oral-motor function that occur with aging include:	**Changes in the pharyngeal phase of swallowing that occur with aging include:**
• An increase in the time required to prepare food for swallowing (Feldman et al., 1980) possibly due to decreased dentition and/or poor fitting dentures (Jaradeh, 1994). • A decrease in the average bolus size that people are willing to swallow (Feldman et al., 1980) but ingestion of boluses that are too large to swallow. As well, there is rapid ingestion times (Ekberg and Feinberg, 1991). • An increase in taste threshold and decrease in the perception of viscosity (Sonies, 1995). • There are changes in lip posture and changes in the function of muscles necessary for mastication (Baum et al., 1983, Logemann, 1990a). This includes an increase in fatty and connective tissue in the tongue (Jaradeh, 1994, Sonies, 1995). • There is decreased lingual strength (Sonies, 1995) and decreased pressure created between the tongue and the palate (Shaker et al., 1990). • There is generalized muscular weakness affecting swallowing (Jaradeh,1994, Ekberg and Feinberg, 1991) • There is an incoordination of oral sensorimotor skills resulting in the bolus being held in abnormal position or manipulated for a longer time before swallowing (Ekberg and Feinberg, 1991). • There is a decrease in oral transit time (Shaw et al., 1990). • The oropharyngeal phase is prolonged (Robbins, et al., 1992).	• Elevation of the larynx is less evident (Robbins et al., 1992). • The pharyngeal swallowing phase is prolonged with the change greater in women than in men (Sonies, 1988). • There is reduced efficiency in pharyngeal clearance (Cook et al., 1994). • <u>Pharyngeal "Peristalsis"</u> Recent research (Mendelsohn,1993, Logemann, 1995) has indicated that "peristalsis" does not occur in the pharynx, but instead there is pharyngeal movement. Castell (1995) found there was a decrease in pharyngeal contraction with aging. Previously, research findings regarding pharyngeal peristalsis conflicted: Tracy et al. (1989) found that pharyngeal "peristaltic" motion is slowed after the age of 60 and Shaker et al. (1993) found that pharyngeal "peristalsis" is preserved in subjects' with an average age of 76 years. Shaker et al. also found that, in the hypopharynx, the amplitude of the duration of the peristaltic pressure wave is greater in the elderly. As well, bolus volume and temperature do not alter peristalsis but boluses of increased viscosity increase the duration and amplitude of the peristaltic pressure wave. <u>Cricopharyngeal Muscle (Upper Esophageal Sphincter)</u> The following has been reported in the literature: • There is defective opening at the level of the cricopharyngeal muscle (Ekberg and Feinberg, 1991). Researchers found shortened (Tracy, 1989) and lengthened (Robbins, 1992) cricopharyngeal opening time. • There is a decrease in resting upper esophageal sphincter (UES) pressure (Castell, 1995, Shaker et al, 1993, Shaker and Lang, 1994) possibly due to a decrease in muscle fibers in the cricopharyngeal muscle with aging (Shaker et al, 1993). • There is an increase in UES residual pressure for all bolus types (Castell, 1995). • The UES swallowing pressure is maintained in the elderly (Shaker et al, 1993, Shaker and Lang, 1994). • The onset of glottal closure and UES relaxation is shortened to protect the airway in all ages (Shaker et al, 1993, Shaker and Lang, 1994).

2.4.2 Problems Secondary to Dysphagia

Many physiological and psychological complications may occur secondary to undiagnosed and/or untreated dysphagia. These include malnutrition, dehydration, aspiration, aspiration pneumonia, embarrassment, and fear of choking.

Malnutrition

Perhaps the most deleterious complication associated with dysphagia is that of malnutrition. Not only does dysphagia lead to malnutrition, but undernutrition itself has been estimated as high as 85% in long-term care facilities (Keller, 1993). Malnutrition in the elderly is correlated with an increased incidence of infection and increased death rate and is therefore of considerable concern in the geriatric population (Bienia et al., 1982). Not only does prior risk of malnutrition exist, but further malnutrition, secondary to dysphagia, is highly likely if the dysphagia is not therapeutically managed. This leads to increased hospitalizations, increased risk of immunocompromise (Curran and Groher, 1990), and increased morbidity and mortality (Keller, 1993). It also leads to a weakening of respiratory muscles and muscles needed for swallowing which, in turn, cause a downward spiral effect leading to increased risk for aspiration pneumonia and further malnutrition.

Keller (1993) completed a cross-sectional, observational study on 200 subjects with a mean age of 78.5 years in a long-term care hospital in Canada. Keller found that 18% of patients were severely undernourished and 28% were mildly or moderately undernourished. Classification of undernutrition in Keller's study was based on 7 specific measurements: weight, change in weight in 6 months, body mass index, skinfold tests, area

and circumference measurements, and percentage of body fat. Patients who had any three of these 7 criteria were deemed undernourished. A synopsis of Keller's findings include the following: 40% of all subjects were slow eaters (meal time >25 minutes); 19% had been diagnosed with dysphagia; and 5 patients were on tube feeds. Malnutrition was strongly associated with: positioning at meal times; feeding tubes; eating slowly; eating dependency; decreased appetite; feeding impairments; dysphagia; mental status; activity and communication levels; energy and protein intake; and total number of health problems. Malnutrition was not associated with sex, length of time in residence, number of medications, number of morbidity episodes, alcohol use, or acute illness.

Inadequate energy and protein intake leads to malnutrition. Rudman and Feller (1989) estimated that 30% of elderly patients consume less than the daily recommended protein intake of 0.8 grams per kilogram of body weight per day. This decrease may contribute to changes in taste with aging, medication use, and increased difficulty chewing and/or swallowing high protein foods such as meats (Keller, 1993). Keller stated that a primary diagnosis of progressive neurological disorders which were associated with dysphagia and dementia, have a negative effect on nutritional status and are correlated with undernutrition. Dementia itself has been associated with undernutrition and weight loss (Sandman et al., 1987, Dwyer et al., 1987) probably secondary to its effect on feeding behaviours such as forgetting to eat meals or portions of food with each meal, confusion during meal time and dysphagia.

Dysphagia is associated with malnutrition. In a study by Sitzmann (1990), all 90 dysphagic patients that were admitted to an acute-care hospital had a compromised nutritional status. Eighty percent of these patients had loss of somatic protein and fat (manifested as weight loss) which reflected a

chronic, dysphagia-induced starvation. Seventy percent of patients had visceral protein depletion (transferrin <200mg/day, albumin <3.5 mg/dl, or total lymphocyte count <1500) which suggested acute nutritional deprivation. Sitzmann recommends that not only does the dysphagia have to be managed, but also any accompanying malnutrition and that nutrition support programs should be started immediately and aggressively upon admission to hospital.

Fortunately, the feeding and eating problems that lead to malnutrition,such as dysphagia, feeding dependency, and feeding impairments may be managed or corrected with intervention. Other problems which lead to undernutrition, such as mental status and primary diagnosis, may not be manageable with intervention.

Dehydration

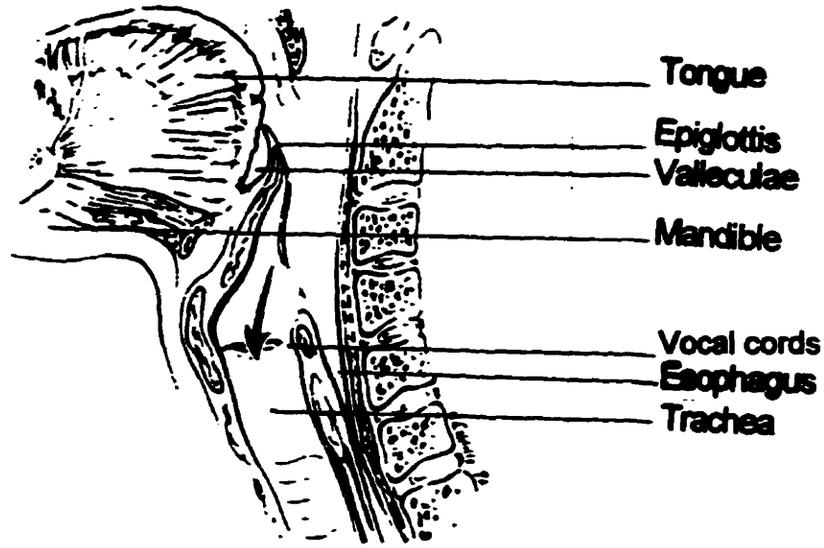
Dysphagia may lead to inadequate oral intake of fluids which can result in dehydration. Many dysphagic persons will voluntarily decrease their fluid intake if they realise that problems such as coughing on liquids is causing them distress during meals. This can often be corrected by thickening fluids to a viscosity that allows the person to have better control of the fluids in the oral phases of swallowing and/or prevents aspiration or penetration of the fluid.

Aspiration

The complication which is most noted in radiographic studies of the swallow is *aspiration*. Aspiration is defined as the passage of material below the level of the vocal cords into the larynx and trachea (Mendelsohn, 1993, Feinberg, 1993, Rosenbek et al., 1996) as illustrated in Figure 2.3.1.

Figure 2.3.1 Aspiration

Aspiration is defined as food or fluid which passes below the level of the vocal cords into the larynx and trachea.



Source: Mendelsohn, 1993

Aspiration is defined as overt (elicits a cough reflex) or silent (does not elicit a cough or choking sensation). Silent aspiration has been reported to occur in up to 40% of patients with dysphagia (Mendelsohn, 1988, Logemann, 1983). Aspiration is classified into three types: prandial, salivary and reflux aspiration. It is important to identify the type of aspiration that occurs so that correct treatment modalities can be initiated, however, different types of aspiration may co-exist (Mendelsohn, 1993). A synopsis of each type of aspiration is outlined in Table 2.4.

Penetration, as distinguished from aspiration, is defined as entry of the bolus into the laryngeal vestibule (i.e. the cavity situated at the entry of the larynx) (Mendelsohn, 1993) or to the level of the laryngeal vestibule (Feinberg, 1993) but not below the vocal folds (Rosenbek et al., 1996). In the elderly, one episode of penetration may prevent the larynx from completely protecting the airway on subsequent swallows (Feinberg, 1993) leading to aspiration.

Table 2.4 Types of Aspiration

Salivary Aspiration: Aspiration of saliva is less common than aspiration of food. Aspiration of saliva produces bacterial infections, therefore, if this occurs over a prolonged period of time, therapy will be required to prevent pneumonia. This does not respond to cessation of oral intake.

Prandial Aspiration: Prandial aspiration, or aspiration of food or liquids during deglutition, may occur before, during, or after the pharyngeal phase of swallowing. It is during the pharyngeal phase of swallowing that the airway is protected via laryngeal elevation, laryngeal closure (which includes closure of the true and false vocal cords and closure of the aryepiglottic folds) and downward movement of the epiglottis. If this mechanism is defective *during* the pharyngeal phase of swallowing, aspiration will occur (this is the least common of all three).

- If the bolus is misdirected towards the larynx *before* the pharyngeal phase of swallowing is initiated aspiration will also occur. This may result from premature spillage of the bolus over the base of the tongue through the palatoglossal sphincter and into the airway. This usually occurs with thin liquids, which are difficult to manage. As well, if the bolus has been correctly propelled from the oral phase, but the pharyngeal phase does not immediately follow, the airway may remain open and cause aspiration/choking. This can also occur if the UES is obstructed, in which case, the bolus is propelled through the larynx instead of the UES.
- Aspiration *after* the pharyngeal phase of the swallow can occur if there is bolus residue in the hypopharynx near the entrance to the larynx (on the posterior pharyngeal wall). This may also result if there was spillage of accumulated material from the pyriform sinuses or valleculae.

This type of aspiration usually leads to bacterial infections and does respond to cessation of oral intake and/or diet texture modification. The amount of prandial aspiration that causes aspiration pneumonia is unknown (Feinberg et al., 1990) (Refer to Appendix 5 for classification of prandial aspiration)

Reflux Aspiration: Reflux aspiration refers to aspiration of gastroesophageal contents. Aspiration of gastric reflux may cause destruction of lung tissue due to its acidity or it may lead to bacterial infections. If reflux aspiration is not treated, recurrent pneumonia that does not respond to antibiotics may occur. Treatment of gastroesophageal reflux should be initiated in individuals with dysphagia.

Source: Abstracted from Mendelsohn (1993)

Aspiration Pneumonia

Aspiration pneumonia is another major complication associated with dysphagia and in the United States, pneumonia is the leading cause of morbidity and mortality in frail elderly patients (Neiderman, 1986).

Although aspiration of saliva occurs in 45% of normal adults during sleep, pneumonia does not develop if the pulmonary defense mechanisms, such as the ability to cough aspirated materials, are intact (Huxley et al., 1978). However, if food, liquid or oral secretions that contain bacteria pass into the trachea and proliferate in the lungs over a period of time, aspiration pneumonia can occur (Sonies, 1992). Groher (1994a) outlined the parameters to identify those at risk for developing aspiration pneumonia. These include the presence of a feeding tube, poor mental status, advanced age, history of aspiration pneumonia, malnutrition, feeding dependency and immobility. Groher explains that these parameters are different from those used to identify the risk of aspirating. Based on a clinical exam, the signs that will indicate a person is at risk for aspiration include a poor voluntary cough, abnormal gag reflex, wet voice quality, dysphonia, abnormal posture and inability to manage saliva.

Langmore et al. (1996) also reported the risk factors associated with the development of pneumonia. These included presence of multiple medical problems, aspiration of food or liquid, delay initiating the swallow, residue after the swallow, presence of a feeding tube, bedbound, requiring oral care, dependent for feeding and xerostomia.

The ability to clear aspirated material may become more difficult with aging due to alterations in respiratory status. These include a deterioration in lung performance caused by a combination of decreased elasticity and lung

muscle strength, as well as increased chest wall stiffness (Bozymski and Isaacs, 1991). This in turn leads to decreased vital capacity, impairment in expiratory flow, and decreased cough reflex all of which affect the protective measures necessary to clear aspirated oral secretions (Mahler et al., 1986). Hence, for elderly persons with compromised respiratory status, the ability to clear aspirated materials may be more difficult and development of pneumonia is more likely to occur.

Feinberg et al. (1996), unlike Langmore et al. (1996), asserted there is little evidence to demonstrate that prandial aspiration affects the lungs and leads to the development of pneumonia. In this study the authors concluded that aspiration of liquids during meals should not be assumed to be the cause of pneumonia in nursing home residents but that aspiration of gastroesophageal contents must be also considered. According to this study, the volume and frequency of aspiration necessary to cause pneumonia are unknown; moreover, artificial feeding may not be successful in preventing aspiration pneumonia in patients with dysphagia.

Psychosocial Aspects

Dysphagia can also lead to psychosocial problems, such as social isolation and embarrassment (Emick-Herring and Wood, 1990), which may reduce quality of life (Emick-Herring and Wood, 1990, Tibbling and Gustafsson, 1991). In a study by Tibbling and Gustafsson (1991), 50% of subjects with dysphagia experience anxiety at meal times. The dysphagic person is often reluctant to eat meals with other people because of embarrassment and/or fear of choking. Many dysphagic individuals retreat to their rooms during meal times which may be the main source of social interaction within a long-term care facility. Treatment modalities such as placement of feeding tubes may also significantly reduce the quality of life.

2.5 Diagnosing Dysphagia

There are several approaches to diagnosing dysphagia. The signs and symptoms of dysphagia are usually the first indication of a swallowing problem. In the hospital/nursing home setting, these are usually identified by nursing staff, the dietitian, or the attending physician.

2.5.1 Clinical Signs and Symptoms of Dysphagia

Many signs and symptoms of dysphagia can be identified which will serve as a screen and aid in determining if a patient is having difficulty swallowing. These are reviewed in Table 2.5. However, Ekberg (1991) states that significant dysfunction can be seen in elderly patients who do not present with any signs or symptoms of swallowing problems. Therefore, careful assessment of swallowing function is necessary in this group.

Table 2.5 Signs and Symptoms of Dysphagia

Sign or Symptom	Indications
choking during meals	abnormal oro-pharyngeal swallow; possible aspiration (Siebens, 1986, Groher, 1992, Robbins, 1994)
drooling during meals	decreased oral-motor strength;decreased lip closure secondary to decreased tone, poor sensation; oral-pharyngeal dysfunction (Buchholz,1994, Robbins, 1994); sensory impairments (Groher, 1992)
gurgly sounding voice during meals	pharyngeal stage dysfunction (Linden, 1983); food/fluids have penetrated the larynx
coughing during meals (spontaneous coughs after swallows of food or fluid)	oral-pharyngeal dysfunction (Gilbody, 1991, Buchholz,1994); possible laryngeal penetration (Siebens et al., 1986); possible aspiration (Groher, 1992)
absent swallow (material enters pharynx but no swallow is triggered)	oral-pharyngeal dysfunction
reduced gag reflex	May indicate weakened pharyngeal musculature or may indicate dysphagia (Buchholz, 1994). However, Logemann (1988) states the presence of a gag reflex is not related to the safety of the swallow or the prevention of aspiration. Many physicians still use this criterion to identify swallowing abnormalities.
pocketing food in lateral buccal area (cheeks)	oral-motor dysfunction (Groher, 1992); poor tongue control for lateralization and/or tipping; decreased tone in cheeks, poor sensation
food spilling out of mouth while eating	oral-motor dysfunction; decreased lip closure; poor bolus formation
food residue in mouth after swallowing	oral-motor dysfunction (Groher, 1992, Robbins, 1994)
spitting/expectorating food during meals	oral-motor dysfunction/oropharyngeal dysfunction (Robbins, 1994)
excessive or thick saliva/ unable to manage secretions	oral-pharyngeal dysfunction (Groher, 1992, Buchholz,1994)
nasal or oral regurgitation during meals	reduced velopharyngeal closure, pharyngeal muscle weakness or mechanical obstruction (Buchholz,1994, Logemann, 1995, Groher, 1992)
difficulty chewing	oral-motor dysfunction/oropharyngeal dysfunction (Robbins, 1994); poor rotary jaw movement secondary to increased tone or apraxia, reduced tongue lateralization or reduced range of motion of the jaw (Logemann, 1995, Groher, 1992)
refusal to eat / does not accept food	patient may be aware a problem exists and is fearful of choking;oropharyngeal dysfunction (Robbins, 1994)
feeling of lump in throat during meals	oral-pharyngeal dysfunction (Buchholz,1994, Robbins, 1994) or esophageal motility problem
chest pain when swallowing	esophageal motility problem; esophageal dysphagia (Robbins, 1994, Groher, 1992)

meal time greater than 25 minutes	poor oral-motor control; inability to propel bolus to back of throat; slowed oral transit time; see next entry (Groher, 1992)
diet texture modification, elimination of difficult to swallow foods, and/or changing eating habits such as chewing more thoroughly, washing solids down with liquids, double swallowing, throat clearing during meals	unable to chew and/or swallow regular texture food items and as such compensates by voluntarily altering food texture or eating habits to reduce dysphagia symptoms (Groher, 1992, Buchholz,1994)
history of aspiration pneumonia, chronic upper respiratory tract infections	chronic aspiration/penetration of foods/fluids at level of vocal cords. May be associated with neuromuscular incoordination or weakness of the oropharyngeal mechanism (Groher, 1992)
slurred or laboured speech	deficits in oral-pharyngeal-laryngeal function with possible effect on swallowing (Siebens et al., 1986, Groher, 1992)

Other clinical signs and symptoms include weight loss, poor nutritional status, dehydration and use of alternate feeding routes. In a study by Bloem et al. (1990) age, sex and mental status were not found to be related to dysphagia. Symptoms of dysphagia in aging that can be observed via videofluoroscopy include aspiration, laryngeal penetration, pharyngeal/lingual stasis, impaired lingual motion, impaired velar elevation, pharyngeal pooling of bolus, pharyngeal paralysis, vocal cord paralysis, delayed hyoid movement, and impaired epiglottic lowering (Sonies, 1995).

In many cases, neurogenic dysphagia may be too subtle to notice clinically. This occurs when the person voluntarily compensates for swallowing problems (e.g. throat clears during eating, avoids foods which are difficult to swallow), or when involuntary compensations occur such as automatic adaptation in oropharyngeal motor performance to minimize functional impairment (Buchholz, 1994). As well, if the laryngeal cough reflex is decreased, laryngeal penetration or aspiration of food or fluids may occur without eliciting choke or cough episode (i.e. *silent aspiration* occurs – see section 2.4.3). The cough reflex may be diminished because of decreased laryngeal sensation, chronic laryngeal stimulation (e.g. chronic aspiration),

endotracheal intubation, tracheostomy, medications applied to the upper airway, and decreased level of consciousness (Buchholz, 1994).

Siebens et al. (1986) conducted a study on eating dependency in nursing home residents with an average age of 82 ± 9.5 years (also discussed in section 2.1.2). The authors found that significant correlations were found between abnormalities in the oral stage of swallow, as observed by nursing staff, and the following: abnormal oral-motor examination, as assessed by the speech language pathologist ($p<0.0001$); modified consistency diets ($p<0.0001$); use of crushed medications ($p<0.0001$); absence of teeth/dentures on examination ($p<0.003$); and impaired attention ($p<0.02$). Impaired attention did not correlate with pharyngeal swallowing behaviours. Nurses' observations of signs of pharyngeal dysphagia and physician's observations of coughing, during test swallows of apple sauce, water from a cup and water from a straw, were highly correlated ($P=.0262$). The level of assistance required at meal time was found to be highly associated with presence of dysphagia.

2.5.2 Evaluation of Swallowing Disorders

Evaluation of dysphagia has been described in detail by a number of researchers (Buchholz, 1994, Feinberg, 1993, Logemann, 1983, Dodds et al., 1990a) and usually involves an interdisciplinary approach. Evaluation of dysphagia normally includes medical history, neurological examination, medication review, physical exam, bedside swallowing assessment, videofluoroscopy of swallowing, and nutritional assessment.

Bedside Swallowing Assessment

The bedside swallowing assessment (BSA) is conducted by the swallowing therapist who evaluates oro-pharyngeal motor function, signs and symptoms of dysphagia and tolerance to various food and fluid consistencies. The patients is usually in the upright position. The BSA is unable to detect aspiration approximately 40% of the time due to silent aspiration (Logemann, 1983, Mendelsohn, 1988) and therefore further examination via videofluoroscopy may be necessary. The BSA is described in detail by Logemann (1983,1993).

Modified Barium Swallow (MBS)

The modified barium swallow (MBS) has been accepted clinically as the most comprehensive, widely available and easily interpreted exam of swallowing function (Bastian, 1993). The MBS is an oropharyngeal radiographic evaluation of the patient's anatomical and physiological swallow which is recorded using a videotape. It is considered the reference standard for dysphagia examinations (Elliott, 1988) and is the most accurate technique for detecting aspiration and its causes (Feinberg, 1990). The MBS is also referred to as the "modified cookie swallow" and videofluoroscopy study.

The results of the MBS are used to identify absence/presence of dysphagia, etiology and percentage of aspiration, efficiency of swallow, efficacy of various compensatory or therapeutic strategies and the most appropriate diet texture. Recently, a Penetration-Aspiration Scale was developed to describe aspiration and penetration during the MBS in an attempt to improve communication among professionals and provide a reference by which treatment effectiveness can be assessed (Rosenbek et al., 1996).

The MBS is conducted by a radiologist (in the radiology suite) in conjunction with the swallowing therapist. The patient must be in a supine position to conduct the evaluation and a barium solution is used as a contrast medium for all test substances. Usually, the patient is presented with a range of measured volumes of barium liquid from 1 to 10 mL and a cup of fluid. There are also several food consistencies evaluated such as pudding, banana, and a cookie. If the patient has dysphagia for a specific food, that food will also be mixed with barium and evaluated via MBS. For the videofluoroscopy to provide pertinent data on the patients swallowing ability, the viscosity and texture of the food being tested must be adaptable and related to the patient's diet (Robertson et al., 1993). The MBS is explained in detail by Logemann (1993).

According to Feinberg (1993), indications for conducting a videofluoroscopic exam of the swallow include signs and symptoms of swallowing impairment, to rule out prandial aspiration for an otherwise unexplained respiratory disease, chronic cough or hoarseness, or unexplained weight loss in elderly or institutionalized persons. Contraindications for performing the study occur when management decisions or patient outcome will not be altered despite the studies result. Feinberg (1993) notes that in the elderly or neurologically impaired, a videofluoroscopic exam may be a very confusing and threatening experience and attempts to minimize these problems should be undertaken.

Other techniques for imaging the swallow response include endoscopy, ultrasound, scintigraphy, nasolaryngoscopy, and manofluorography. Manometry and electromyography (EMG) are used to measure swallow activity without imaging the swallow. Manometry is used to measure pressures in the esophagus and provides quantitative information on muscle strength and coordination. Abnormality in swallows is classified in two broad categories: pressure abnormalities and timing abnormalities. Details on this

technique are described by Castell (1995). EMG examines timing of muscle activity and can provide information on the timing of the swallow and laryngeal elevation (Logemann, 1995).

Nutritional Assessment

Nutritional assessment is based on a thorough medical chart review (including past medical history, medication use, and known risk factors) biochemical indices, anthropometric data, diet history, weight status, and nutritional history. This indepth nutritional assessment is best completed by a registered clinical dietitian however, screening of malnutrition may be accomplished by any member of the health care team. Nutritional assessment for elderly patients has been described in detail by Ciocon (1990), Chernoff (1994) Curran (1990), Ganger and Craig (1990), Granieri (1990), Kersletter et al. (1993) and Mobarhan and Trumbore (1991). Regular monitoring of nutritional status, hydration status, acceptance of diet, enteral/parenteral nutritional support, and swallowing ability is essential to optimize patient outcome.

2.6 Treatment / Management of Dysphagia

2.6.1 The Interdisciplinary Team Approach

Since patients with dysphagia have many associated complications and may have complex medical problems, they benefit greatly when assessed and managed using an interdisciplinary team approach (Martens, 1990, Carter-Young and Durant-Jones, 1990, Logemann, 1994, Thresher and Kehoe, 1992). Treatment is dependant on the individual and is usually client-

focused. For some individuals it is important to identify the etiology of the dysphagia so that it may be treated appropriately. For others, identification of diet/fluid textures that the patient can safely swallow may be all that is necessary. Some patients may be treated for a psychological illness and labelled as having psychogenic dysphagia if the cause of dysphagia is not obvious (i.e. they do not present with a neurological condition, head/neck cancer, etc.). In this case, an indepth evaluation by a dysphagia team, to rule out a physiological cause, is extremely important (Logemann, 1994). To date, there have been no studies published which evaluate the cost of dysphagia care with and without interdisciplinary team management. There are only a few studies which support the effectiveness of interdisciplinary management (Logemann, 1994) including one which specifically evaluated neurologically impaired patients (Martens et al., 1990). Thus, further studies are necessary in this area. Despite these shortcomings, interdisciplinary management is widely accepted as best care for the dysphagic patient.

The type and etiology of dysphagia influences the management and treatment. Treatment teams depend on whether the dysphagia is oropharyngeal, which is managed by a swallowing team, or gastroesophageal, which is primarily assessed and managed by a gastroenterologist and associated allied health professionals.

Team members vary depending on the institution, the professionals' level of interest and the professionals' level of training. Usually there is a *core team* which consists of the swallowing therapist, clinical dietitian, primary care nurse and primary care physician. All these professionals work closely together to optimize patient outcome. Logemann (1994) states that it may not be necessary for all team members to see every dysphagic patient, but gives examples that imply it is necessary for the swallowing therapist to see every dysphagic patient. What she fails to mention is that it is also essential

for the dietitian to see every dysphagic patient, for if the patient has difficulty swallowing, the patient is considered high risk for developing malnutrition.

Thresher and Kehoe (1992) have provided an excellent review of interdisciplinary management of dysphagia. Appendix 6 provides an overview of possible roles of various dysphagia team members. These role statement are not meant to be exhaustive as job function and responsibility is highly dependant on the institution.

2.6.2 Compensatory Strategies

Compensatory strategies are implemented so that when a person swallows, the risk of aspiration and/or penetration of a bolus into the lungs is reduced or prevented, in an effort to prevent the complications of dysphagia. These techniques are usually attempted during the modified barium swallow study so that efficacy of results can be observed radiographically. Compensatory strategies may include seating position, chewing on the strong side of the mouth, chin tuck and head turn to assist closure of airway, backwards head tilt to assist oral transit, application of pressure to the affected side to decrease pocketing of food in cheeks, encouragement of lip closure during chewing and swallowing to prevent spillage of food and assist with bolus formation, and encouragement of coughing to control aspiration. These compensatory strategies are discussed in detail by Thresher and Kehoe (1993) and Hutchings (1991). Compensatory strategies also include diet texture modification (see section 2.6.5 on Nutritional Therapy).

2.6.3 Swallowing Maneuvers

Swallowing maneuvers are designed to alter the timing of various neuromuscular components of the pharyngeal phase of swallowing (Lazarus, 1993). These include the supraglottic swallow, the super-supraglottic swallow, effortful swallow and the Mendelsohn maneuver.

The Supraglottic Swallow: This maneuver is designed to close the vocal cords prior to and during the swallow so as to prevent the risk of aspiration before, during, or after the swallow. The patient is told to hold her breath before and during the swallow (to close the airway), and to cough immediately after the swallow in an attempt to clear any residual bolus from the entrance into the trachea. In the process of holding the breath prior to the swallow there is mild vocal cord adduction. This is used in patients with delayed or reduced airway closure, delayed pharyngeal swallow, and poor oral control of liquids which results in premature loss of the bolus into the pharynx (Logemann, 1995).

The Super-Supraglottic Swallow: This is designed to close the airway entrance above the level of the true vocal cords, by increasing the anterior tilt of the arytenoid and retracting the base of the tongue. This is applied to those patients exhibiting penetration and aspiration into the airway after the swallow has occurred (Logemann, 1995). The patient is told to inhale, hold breath very tightly (bearing down), continue to hold the breath during the swallow, and cough immediately following the swallow (to clear residual material).

Effortful Swallow: This strategy improves retraction of the base of the tongue and reduces residue in the valleculae after the swallow. The effortful swallow is used for patients who have bolus residue in the valliculae after the swallow. The patient is instructed to squeeze together the tongue and the throat, very hard, throughout the swallow. When performed correctly, effort should be visualized in the neck during the swallow (Logemann, 1995).

Mendelsohn Maneuver: This strategy increases the extent and duration of the cricopharyngeal opening by prolonging laryngeal elevation. It can also be used as an exercise to improve laryngeal elevation during the swallow.

The Mendelsohn maneuver is used in patients exhibiting a reduction in laryngeal movement which then results in reduced cricopharyngeal opening. The patient is instructed to swallow and when the larynx (i.e. adam's apple) elevates upward, he/she is told to hold the larynx in the uppermost position with his/her neck muscles during the swallow (Logemann, 1995).

2.6.4 Therapy Exercises

Many therapy exercises have been designed to improve swallowing. These include exercises for: reduced labial closure, bolus formation, buccal tension, range of mandibular movement, tongue elevation, front-to-back tongue movement, and reduced tongue lateralization; delayed pharyngeal swallow response; poor gag reflex; and reduction in velar elevation or in the ability to close the velopharyngeal port. These exercises have been described by Hutchings (1991) and Thresher and Kehoe (1993). Other exercises are as follows:

Tactile/"Thermal" Stimulation: This exercise, designed to improve the timing between the oral and pharyngeal stages of swallowing, is completed by lightly touching or stroking the anterior faucial arches with a #00 laryngeal mirror, five to ten times, three times per day. Originally it was thought that the mirror needed to be iced as cold was thought to best stimulate a swallow. Research now indicates that cold does not stimulate the swallow any better than other temperatures and the mirror does not need to be iced (Logemann, 1995).

Adduction Exercises: These exercises increase the strength of laryngeal closure and are necessary when there is a weakness in laryngeal closure. The patient is instructed to make a vowel sound while pushing, lifting,

increasing phonation effort, then holding breath, coughing and clearing the throat (Logemann, 1995).

2.6.5 Nutritional Therapy

Patients with dysphagia are considered high risk for nutritional problems. Nutritional therapy begins with a nutritional assessment in conjunction with results from a swallowing assessment. Nutritional therapy and management is critical in the overall treatment plan and is a reliable factor in predicting patient outcome (Curran and Groher, 1990). To provide sufficient nutrients to maintain or achieve a normal nutritional status, nutritional therapy may involve any, or combinations of, the following: alteration in food texture to mechanical soft, minced, chopped or pureed-type diets; alteration in fluid viscosity from regular fluids to nectar, honey or pudding consistencies; and/or use of alternate feeding routes (nasogastric, nasoduodenal, gastrostomy, duodenostomy, jejunostomy or total parenteral nutrition). Nutritional status, tolerance to feeding methods and acceptance of diet texture modifications should be evaluated on a regular basis (Ciocon, 1990).

Ethical Consideration for Feeding the Dysphagic Patient

The decision to start enteral or parenteral nutrition rather than oral feeding, or the decision to withhold nutrition altogether, is considered an ethical issue for the long term care population, especially in the chronic and terminally ill. When making decisions regarding feeding routes, the following circumstances must be taken into consideration: the person's right to determine for her/himself, which may be accomplished via a "living will" containing documented advanced health care directives, medical evidence

demonstrating the need for such intervention, and analysis of the risk to benefit ratio for oral versus alternate feeding routes (Groher, 1990b).

Determination of the risks and benefits of oral feedings has been reviewed in detail by Groher (1994b). The decision as to whether or not patients who are known to be aspirating will continue with oral feedings is usually made by the swallowing team, but criteria on which decisions are made varies from one institution to another. This is usually dependent upon how often aspiration or tracheal penetration occurs and the amount of food/fluids that is aspirated. For example, the odds ratio for aspirating stroke patients to develop pneumonia was 7.5 times greater for those who aspirated any material regardless of consistency (Schmidt et al.,1994). It is important to realize, that even if aspiration does occur, the clinical development of aspiration pneumonia is co-dependent on other circumstances. This includes the frequency of aspiration, volume of aspirate, character of the aspirate (eg.saliva, acidic foods, gastroesophageal reflux, etc.), and immune function, state of consciousness, prior aspiration history, nutritional status, mobility, and ability to clear aspirated materials.

Quantity and quality of life must be considered if oral feeding is to be stopped since placement of a long-term feeding tube may have detrimental consequences to the persons perceived quality of life. One must also consider whether or not the patient or family can learn the skills necessary to self-administer enteral feeds. As well, the risks associated with the use of various enteral and parenteral routes should be evaluated. For example, Ciocon et al. (1988) found the incidence of aspiration with nasogastric tube feeding in a chronic care setting to be 47% and Feinberg (1996) reported that pneumonia frequency was higher during months of artificial feeding ($p<0.0001$). Feinberg (1989) also reported a higher frequency of pneumonia in patients on non-oral feeds than those persons with major aspiration but

treated with dietary manipulations. Most recently, Langmore et al. (1996) found that the presence of a feeding tube was significantly associated with the development of pneumonia. Even if a feeding tube is placed, re-evaluation of the swallowing function is important. Many persons may be able to resume safe oral intake, at which time there is a staged transition from non-oral to oral feeding (DeBonde, 1991, Logemann, 1990b).

When all the above factors have been considered, the options and the benefits and risks associated with each option, should be reviewed with the patient or patient's family. In this way, the patient and or family is able to make an informed decision regarding the route of nutritional support (i.e. oral, enteral, parenteral) or if nutritional support will be in accordance with the patients natural ability to ingest food or fluids (eg. the patient realises oral intake is not safe, but wishes to continue oral intake as tolerated). As well, each institution should have policy guidelines regarding initiating and withholding oral or alternate nutritional support. Issues regarding non-oral versus oral feeding have been discussed in detail by Boyd (1994), Ciocon (1990), Groher (1990b) and Serradura-Russell (1992).

Oral versus Non-Oral Feeding Routes in the Elderly

There is evidence that feeding tubes do not protect the patient from developing aspiration (Croghan et al., 1994). The incidence of aspiration with enteral feeding via the nasoenteric or gastrostomy route has been estimated to be from 7.6% (Roubenoff et al., 1987) to 28.5% (Moghissi and Teasdale, 1980) to 47% (Ciocon, 1988). If non-oral feeding is to commence in dysphagic individuals, choosing the correct route of administration is crucial. Lazarus et al. (1990) critically analysed literature published from 1978-1989, regarding the association of aspiration with gastrostomies and

jejunostomies. The authors concluded that studies during that time period did not support the preferential use of either feeding site. Feinberg (1996) also reported that studies of nursing home patients have shown that neither a gastrostomy or jejunostomy protects against aspiration.

Sitzmann (1990) investigated the implications, methods and complications of nutritional support in 90 dysphagic individuals. Forty-eight percent and 52% of patients had dysphagia secondary to central neurologic disease or local mechanical dysfunction such as esophageal cancer, esophagitis, or achalasia, respectively. All 90 patients were placed on either enteral or parenteral nutrition secondary to malnutrition. Twenty-seven percent of all patients experienced complications. Sitzmann found that nasoenteric or gastrostomy tube placement was associated with increased risk for developing aspiration pneumonia ($p<0.01$). Patients with neurologic-based dysphagia experienced twice as many problems as those with mechanical dysphagia. As well, there was a 30% mortality rate in patients receiving nasoenteric tubes versus 10% in gastrostomy or jejunostomy feeds and 8% with total parenteral nutrition (TPN)($p <0.05$). Mortality was related to respiratory failure secondary to pneumonia.

It has been recommended that prior to start of either route, patients should be evaluated via cineradiography for risk of compromised airway protection and gastroesophageal reflux as these place the patient at increased risk for aspiration. As well, level of consciousness, functional status, and patient positioning should be evaluated. The initiation of upper gastrointestinal intubation is discouraged if problems exist which increase the risk of aspiration. Until the dysphagia resolves, jejunal tube feeding or TPN should be used as the primary route for nutritional support (Lazarus, 1990, Sitzmann, 1990).

Diet Texture Modification

The purpose of modifying the texture of foods and/or the viscosity of fluids for a dysphagic patient is to reduce the risks of aspiration and choking and maintain normal nutritional and hydration status. Many researchers have described ideal diet textures and fluid viscosity for dysphagic patients. Generally, standard hospital diets are not appropriate for dysphagic patients (Mendelsohn, 1993) because even though these textures may be easy to chew they may not be easy to swallow (Martin, 1991). The following must be taken into consideration when developing a dysphagia diet: cohesiveness, viscosity, density and shape, moisture content, nutritive value and taste of the food items. Cold boluses do not affect or improve swallowing ability as it was once thought but certain bolus characteristics such as volume and taste (sour) have been shown to cause changes in the onset of the oral and pharyngeal stages of swallowing (Logemann, 1996).

Guidelines for selecting food consistencies have been described in detail by Thresher and Kehoe (1992) and are based on the severity and type of dysphagia. Generally, there are three or four different texture gradients: pureed, pureed/mechanical soft and mechanical soft. Depending on the researcher, these diet textures may have different names (refer to Appendix 7 for a summary of recent research on dysphagia diet textures) and include/exclude various menu items. The common point among all researchers is that the diet is highly individualized, is progressive and may change as does the person's swallowing capabilities. The rationale for selecting various diet textures is based on the specific swallowing problem as outlined in Appendix 7.

Pardoe (1993) outlines food production considerations, menu development and training issues for staff when implementing a dysphagia diet. Curran

and Groher (1990) review the development of a diet to reduce the risk of aspiration and Hotaling (1992) reviews the nutritional considerations for the pureed diet texture for elderly residents, focusing on nutritional density, flavour, and presentation of pureed menu items to facilitate optimal intake.

Altering the viscosity of the bolus can help compensate for a dysfunctional swallow. Often, a liquid bolus cannot be formed and liquid is lost over the base of the tongue and slips into the unprotected airway causing aspiration. Neurologically impaired patients have more trouble with water or thin liquids than with thicker fluids such as honey and pudding (Robertson et al., 1993, Elliott, 1988) for this reason. If smooth, viscous, adhesive foods are given in small volumes the patient will be able to form a bolus and when swallowed, the material is less likely to enter the open airway. Highly viscous foods tend to increase peristaltic pump activity (Robertson et al., 1993). Other patients require less viscous fluids such as patients in which the cricopharyngeal sphincter does not relax to promote bolus passage into the esophagus (Elliot, 1988). Mirro and Patey (1991) classify the diet into two levels: one level containing pureed and thick fluids, the other containing a modification of the regular diet with thick liquids and chopped/ground meats. Martin (1991) provides a detailed classification of the diet into four levels, also grouping fluids with solids. However, the ability to swallow liquids has no connection to the ability to swallow solids (Pardoe, 1993) and both, individually, exist on a continuum from most restrictive to least restrictive.

Fluids may be thickened to the desired consistency with commercially available thickening agents such as Thick-it®, Nutra-Thick®, Thick'N Easy® or products such as baby rice cereal, potato flakes, corn starch, flour, applesauce, etc. Fluid viscosity is dependent upon temperature of the fluid and each thickening agent has advantages and disadvantages. These have been discussed by Stanek et al. (1992).

3.0 METHODOLOGY

Objectives

This study was designed to determine the following in a long-term care facility in St. John's, Newfoundland: 1) the prevalence of dysphagia, 2) the severity of dysphagia based on associated complications, and 3) the characteristics of the dysphagic population. Other objectives of this research were to determine medical diagnoses and conditions associated with dysphagia, to assess the extent of complications secondary to dysphagia and to document current management techniques.

This study was conducted by completing a retrospective medical record review, or chart review, over a seven month period, and a nursing questionnaire. The chart review was supplemented with information from a questionnaire filled out by nursing and nursing assistant staff in order to avoid missing valuable information which may not have been recorded in the chart. Data collected from both instruments were combined to obtain the desired information. Both instruments were first pretested in a pilot study. The best method for determining the prevalence of dysphagia in a long-term care setting is via a comprehensive chart review. This was the research procedure used by Siebens et al. (1986), Groher and Bukatman (1986) and Carter-Young and Durant-Jones (1990) in similar studies.

Ethical Review

Full approval was granted from the Human Investigation Committee (HIC), Faculty of Medicine, The Health Science Centre (Reference # 94 117), Memorial University of Newfoundland on November 25, 1994 to complete this study (Appendix 8 contains letter of approval from HIC). Approval was granted from the Ethics Committees at the pilot institution and the study institution (Appendix 9 contains a copy of the consent form for use of medical charts in this study).

3.1 Development of Instruments

A chart review form and a nursing questionnaire were developed. The Chart Review Form (Appendix 10) was developed to obtain pertinent information from the resident's medical chart and cardex (a centralized filing system for nurses to record information on residents) which would indicate a possible swallowing problem. This was developed by the primary researcher and based on chart audit forms developed by Carter-Young and Durant-Jones (1990) and Groher and Bukatman (1986).

The Nursing Questionnaire (Appendix 11) was developed to be used as a supplement to the medical chart to aid in the identification of possible problems in the oral, pharyngeal, or esophageal stages of swallow which may not have been recorded in the medical chart. It was designed to be completed by nurses or nursing assistants who were primarily involved with the residents during feeding and meal times.

3.1.1 Development of Chart Review Form

The chart review form was developed to collect information so that the following could be identified:

- various signs and symptoms of dysphagia in the oral and pharyngeal stages of swallowing
- primary diagnosis, past medical history and associated problems which could affect nutritional intake or dysphagic symptoms. Such problems included nausea and vomiting, seizure activity, chronic constipation, chronic laxative use, and depression.
- characteristics of the dysphagic population such as gender, age, medication/vitamin/mineral use, eating dependency, vision, diet

modifications, food/fluid intake, and mental status.

- number of days throughout each month that the resident had inadequate oral intake
- skin integrity and weight status
- current management techniques for dysphagia such as feeding guidelines placed in chart, use of thickened fluids, and/or consultations with gastrointestinal specialists, dietitian, swallowing therapists, etc..

3.1.2 Development of Nursing Staff Questionnaire

The nursing questionnaire consisted of 17 multiple choice or yes-no questions and was reviewed for content by a Swallowing Therapist. Questions were added or reworded where appropriate and a total of three drafts was made to ensure the content was specific enough to obtain the desired information.

The questionnaire was designed to collect information on the following:

- resident's ability to self feed and/or requirement of supervision during meal times
- type of assistance required at meal time
- time required to feed residents who required total assistance at meal time
- resident's mental status during meal time
- signs of difficulty with oral intake such as signs of choking, coughing, drooling, pocketing of food, etc. during meal times
- type of diet or NPO (nothing by mouth) status
- requirement of a texture-modified and/or fluid modified diet
- use of nutritional supplements
- use of alternate nutritional support such as enteral of parenteral

nutrition

- weight loss and amount of weight loss over a six month period
- history of aspiration pneumonia, dehydration, chronic upper respiratory tract infections
- Nursing staff's perception of existence of a swallowing problem and
- Nursing staff's type of training in swallowing problems

Based on information collected from the retrospective chart review in conjunction with information from the nursing questionnaire:

- subjects were classified as dysphagic or non-dysphagic and
- dysphagia was classified as being mild, moderate or severe.

3.2 Pretest of Instruments

The chart review form and the nursing questionnaire were pretested in an institution with a similar residential population. Nursing staff completed the questionnaire on 20 randomly selected residents. Nursing staff were asked to provide comments on the layout, readability and content of the questionnaire. They were also encouraged to ask questions regarding the clarity/readability of any questions. The primary researcher (KBC) completed chart reviews on these 20 randomly selected residents.

Nursing staff provided very few comments on the content or design of the questionnaire and no changes were made to the wording or ordering of questions on the questionnaire. Only one question (question #12) was added to the final draft of the questionnaire regarding the *amount* of weight loss during the past six months The final format of the questionnaire is presented in Appendix 11.

The main changes made to the chart review form involved reorganizing the order of items on the form. Questions were reordered to better reflect the ordering of information in the chart. Additional changes regarding the ordering sequence of items were made after the main study was started.

One question was deleted from the chart review form. Information was not available for changes in weight status over time since routine weight measurements were only conducted once per year. The question pertaining to changes in weight status over the seven month period preceding the chart review was deleted from the chart review form. In an attempt to obtain this missing information, the question was added to the nursing questionnaire.

It was not expected that information regarding the adequacy of oral intake would be available for the main study since this was not available for the pilot study. However, information regarding the quantity of meals consumed on a daily basis was recorded in the medical charts. Therefore data on the number of meals that were fully and/or partially consumed per day by each resident were incorporated into the chart review form for the main study.

Other questions were also added to the chart review form. These included use of vitamin/mineral supplementation, use of anticholinergic, antipsychotic, and tricyclic antidepressant medications, reports of visual problems, and reports of medical problems secondary to dysphagia. The final format of the chart review form is shown in Appendix 10.

3.3 Pilot Study

A pilot study was conducted in a smaller institution with a similar residential population. The main goals of the pilot study were to pretest the following for clarity, accuracy and logistics:

- chart review form,
- nursing questionnaire,
- the operational definition of dysphagia,
- the operational definition for the severity of dysphagia, and
- the proposed analysis procedure using Epi Info 6.04.

The pilot study was also used to assess the feasibility of conducting the main study.

Operational Definition of Dysphagia - Pilot Study

The operational definition of dysphagia for the pilot study is outlined below:

Dysphagia was considered to exist if the resident met one of three criteria:

i. The resident had at any time *one* problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally (e.g. reported signs of choking, drooling, inability to complete an attempted swallow)

ii. There was a history of aspiration pneumonia with a diagnosis of a neuromuscular disease

iii. Dysphagia was documented in the chart by the physician, dietitian, nurse, or occupational therapist.

In ambiguous cases where the researcher was unable to determine if dysphagia existed, the expertise of a Swallowing Therapist (in this case, a Speech-Language Pathologist) was consulted to review each individual subject file.

The only change made to the operational definition of dysphagia for the main study was that the resident had to have *two* problems in the oral/pharyngeal phase of swallowing, not *one* problem, as outlined above. Two oral/pharyngeal problems were chosen, rather than only one problem

because it was felt that one problem by itself was insufficient to label the subject as dysphagic.

Operational Definition for the Severity of Dysphagia - Pilot Study

Dysphagia was classified as being mild, moderate or severe based on associated complications or conditions as outlined in Table 3.1. This definition was altered for the main study (refer to Table 3.5) after consultation with a Speech-Language Pathologist with expertise in dysphagia diagnosis and management. It was determined that the former definition could not classify the severity of all subjects with dysphagia.

The changes that were made to the operational definition for severity of dysphagia included the following: for all severity levels, "the subject had one problem in the oral or pharyngeal stage of swallowing" was changed to "the subject has dysphagia as per the operational definition", weight loss was omitted, and for moderate and severe dysphagia, "neuromuscular disease and/or dehydration" was changed to "neurological impairment and/or dehydration, aspiration pneumonia, chest congestion, upper respiratory tract infection, fever, and aspiration of food and/or fluids".

Table 3.1 Operational Definition for the Severity of Dysphagia - Pilot Study

Mild Dysphagia:
The subject
- had at least one problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally
- presented with or without weight loss
- was on pureed, mechanical soft, or some other texture/fluid modification

Moderate Dysphagia:
The subject
- had at least one problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally
- presented with or without weight loss
- was on pureed, mechanical soft, or some other texture/fluid modification
- had a neuromuscular disease and/or dehydration

Severe Dysphagia:
The subject
- had at least one problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally
- presented with or without weight loss
- was on pureed, mechanical soft, or some other texture/fluid modification
- had a neuromuscular disease and/or dehydration
- required total enteral nutrition (TEN) or total parenteral nutrition (TPN) and/or suctioning of food or fluids secondary to dysphagia

Results of the Pilot Study: A synopsis

There were 146 residents (15 males, 131 females) in the institution, however only 28 patients (19%) met the inclusion criteria for the study. The inclusion criteria for the pilot study were identical to that of the main study. Twenty residents were randomly selected as subjects and questionnaires were filled out by nursing staff who worked with the subject for no less than one month. The chart review was completed for the six month period preceding the completion of the questionnaires.

The results of the pilot study are summarized below and discussed in detail in Appendix 12:

•There were a total of 20 subjects (19 females/1 male) with a mean age of

92 years. Sixty percent of subjects were between the ages of 75 and 94 with approximately one-third of the subjects 95 years of age or older.
•Sixty percent of subjects had dysphagia; 40% of subjects did not have any identifiable signs of dysphagia.
•Nursing staff indicated that only 10% of subjects had a swallowing problem, and 65% of subjects did not have a swallowing problem (this was not recorded for five patients).
•Using the operational definitions as indicated in Table 3.3.1, 75% (n=9) of the dysphagic subjects had mild dysphagia with the remaining subjects having moderate (n=2) or severe dysphagia (n=1).
•Seventy-five percent (n=9) of dysphagic subjects were on oral nutritional supplementation.
•Forty-two percent of subjects with dysphagia were reported as losing weight whereas only 25% of those without dysphagia lost weight.
•Length of time required for feeding subjects with dysphagia was not recorded for two-thirds of the subjects. For three subjects it took up to 15 minutes and for one subject it took between 16 and 25 minutes.
•Only five subjects were on a texture modified diet.

After completion of the pilot study, it was decided to review the chart for the six month period preceding completion of the questionnaire plus the month when the questionnaire was completed. It was decided that even though data on a number of variables was not routinely available, the main study was still feasible since the pilot study indicated there was a 60% prevalence rate of dysphagia. As well, there were significant problems associated with swallowing in long term care residents.

3.4 Current Study

3.4.1 Selection and Description of Research Institution

A tertiary-level, extended care/chronic care facility in the St. John's area was chosen for completion of this study. This facility, which consists of two separate buildings with similar residential populations, has a total of 407 residents and is one of the ten largest long-term care facilities in Canada.

One of the two buildings was chosen as the research site as both had similar populations with respect to age, sex, medical conditions, and level of nursing care required. This institution consists of seven units and had a total of 236 residents when the study began. A description of units and the residential population in the research site is outlined in Table 3.2. The institution did not employ a speech-language pathologist. There were two clinical dietitians on staff and an occupational therapist working on a contractual basis. None of these professionals had been formally trained in completing swallowing assessments.

3.4.2 Selection of Study Population (Inclusion / Exclusion Criteria)

Based on the literature review, it was estimated that a swallowing problem would exist in 40-60% of the population older than 65 years plus a additional small percentage in subjects less than 65 years of age. Sixty percent of subjects in the pilot study had dysphagia. Since the estimated prevalence was high, the entire population (n=236) was considered for inclusion into the study rather than randomly selecting subjects in different age groups.

Inclusion Criteria

All subjects meeting the following criteria were included in the study:

- •medical charts were complete and available for review
- •nursing questionnaires were completed on the subject during the assigned two week period in February, 1996:
- • the subject had resided in the institution for longer than six months
- • the subject ate in an area supervised by nursing staff and/or nursing assistants

A six month time frame was chosen so that nursing staff would have had the opportunity to observe the residents at meal times (for an extended period of time) and could therefore accurately fill out the nursing questionnaire.

Exclusion Criteria

All subjects meeting the following criteria were excluded from the study:

- • resided in the institution for less than six months at the time the nursing questionnaire was completed
- • ate independently (e.g. in dining rooms) and were unsupervised and
- • had charts that were either incomplete or unavailable for review.

If subjects were unsupervised at meal times, it was not possible for the nursing staff to have the knowledge necessary to complete the questionnaires on dysphagia.

A total of 193 out of 236 subjects were eligible for inclusion in the study. Fifteen subjects had to be excluded because nursing questionnaires were not completed within the study period. Three subjects were excluded because complete charts could not be located. Twenty-five subjects were

excluded because they either ate independently or were living in the nursing home for less than six months.

Table 3.2 Description of Nursing Units and Residential Population at Research Institution

Nursing Unit	Total Number of Residents on Unit	Number of Residents in Study meeting Inclusion Criteria	Description/Level of Care
Personal Care Unit	25	20 - 2 (charts could not be located) =18	Alzheimers Patients; Level III
West One	34	32	Level II and III - all female
East One	32	28	Level II and III
North One	41	31	Level III
West Two	36	33	Level II and III - all female
East Two	32	25	Well Elderly; Level I and II
North Two	36	27 - 1 (chart could not be located) =26	Young Disabled; Level II and III
TOTAL	236	N=193	

3.4.3. Study Procedure/Data Collection

This study commenced on February 13, 1995 at which time the questionnaire was completed over a two-week period on all subjects meeting the inclusion criteria. Data collection continued until April 30, 1996, during which time the retrospective chart review/cardex review on all subjects was completed.

Completion of Questionnaire and Training

Prior to commencing this study, the facility had designed and presented a dysphagia training course for nursing and nursing assistant staff which was conducted by nursing staff. Approximately 100 workers had completed this course at the time of the study.

Prior to completion of the questionnaires, a meeting was conducted with the Resident Care Managers and the Team Leaders of each of the seven nursing units in the study. This meeting reviewed the objectives and the importance of the study and how to complete the questionnaire. The Team Leaders were responsible for assigning nursing/nursing assistant staff to complete the questionnaires. Two 20-minute presentations for nursing and nursing assistant staff was also conducted. All questions on the questionnaire were reviewed individually to stimulate discussion and clarify any concerns or issues.

In the last two weeks of February, 1995, nursing staff were requested to fill out questionnaires on all residents who they believed met the inclusion criteria. Nursing staff must have worked with the resident for a period of no less than one month prior to completing the questionnaire so that they had sufficient information and knowledge to fill out the questionnaires accurately (modeled after research conducted by Siebens et al.,1986). The questionnaires were filled out on the nursing units.

Completion of Chart Review

The retrospective medical chart review and cardex review was completed on all the residents for a seven-month period prior to and during the completion

of nursing questionnaires (August 1, 1994 to February 28, 1995). Medical charts and cardexes were reviewed on the nursing unit. Nursing Care Flowsheets, which were located in the medical chart (see Appendix 13) were also reviewed for all months during the data collection period. These flowsheets are filled out on a daily basis and records the portion of the meal consumed at breakfast, dinner and supper. Meal consumption is recorded as full meal consumed(F), partial meal consumed(P), fluids only consumed(FL), or meal refused(R). For meals in which FL was recorded, it was assumed that the full meal was consumed and it was in fluid form.

Portions of the chart which had been thinned (i.e. removed) were obtained from medical records. Medical charts belonging to subjects who had died prior to the chart being reviewed on the nursing unit were obtained from medical records. In every circumstance, all efforts were made to obtain complete charts.

The chart and cardex review was completed by two researchers (the primary investigator and another clinical dietitian). Each chart review took approximately 30-minutes to complete. Both researchers had extensive experience in an acute care facility working with dysphagic patients and had completed introductory and advanced course work on the diagnosis and management of dysphagia. The primary researcher (KBC) completed 149 out of the 193 chart reviews and the second researcher (LP) completed 54 out of the 193 chart reviews.

Interobserver Agreement for Chart Review

To test for interobserver agreement on the collection of chart review data, ten randomly selected charts were reviewed separately by each researcher. All items (n=80) on the chart review form were assessed independently .

- For 60 items, total agreement was reached by the two researchers.

- For 10 items, agreement was reached for 9 out of 10 charts. These items were: absent swallow, refusal to eat/won't open mouth, chewing difficulty, hearing, hydration, reports of nourishment, reports of drinking/fluid intake, confusion, aphasia, and upper respiratory tract infection.
- For 4 items, agreement was reached for 8 out of 10 charts. These items were: associated problem list, number of medications, skin integrity, and reports of encouragement to drink/eat. For the associated problem list (in all four cases where disagreement occurred), one of the researchers failed to report one problem only.
- For 6 items, agreement was reached for 7 out of 10 charts. These items were: past medical history, weight status, vision, assistance with feeding, dementia, congestion. For the past medical history (in all six cases where disagreement occurred), one of the researchers failed to report one problem only. For dementia, one researcher consistently did not record this problem on the chart review form if dementia or Alzheimers disease was listed as a diagnosis as it was assumed that dementia was present.

Medications

Medications that have been implicated in causing or exacerbating dysphagia were identified via the chart review. Prior to conducting the study, a Psychiatrist (Craig, 1994) was consulted to identify antipsychotic, tricyclic antidepressants, and various other drugs which are commonly prescribed in Newfoundland institutions that may cause dysphagia. These were recorded during the chart review. These medications are outlined in Table 3.3.

Table 3.3 Drugs implicated in causing or exacerbating dysphagia.

Antipsychotic (X)	Tricyclic Antidepressant	Other Medications	Classification of Other Medications
Acetophenazine	Amitriptyline	Astemizole	Antihistaminic(X)
Chlorpromazine	Amoxapine	Atropine	Anticholinergic(X)
Flupenthixol	Clomipramine	Captopril	ACE inhibitor
Fluphenazine	Desipramine	Clonidine	Antihypertensive(X)
Fluspirone	Doxepin	Diisopyramide	Antiarrhythmic(X)
Haloperidol	Imipramine	Dimenhydrinate	Antiemetic (X)
Loxapine	Maprotiline	Guanfacine	Antihypertensive(X)
Mesoridazine	Nortriptyline	Hydroxyzine	Anxiolytic (X)
Methotrimeprazine	Protriptyline	Ipratropium bromide	Anticholinergic(X)
Pericyacine	Trimipramine	Lorazepam	Anxiolytic
Perphenazine		Mexiletine	Antiarrhythmic(X)
Pimozide		N-butylscopolamine	Anticholinergic(X)
Piperacetazine		Odansetron	Antiemetic(X),5HT$_3$blocker
Pipotiazine		Phenelzine Sulfate	Antidepressant,MAOI
Prochlorperazine		Pirenzepine	Anticholinergic(X)
Promazine		Scopolamine	Anticholinergic(X)
Reserpine (X)		Terazosin	Antihypertensive(X)
Risperidone		Tranylcypromine	MAOI
Thioridazine			
Thiothixene			
Trifluoperazine			
Triflupromazine			

(X) = causes xerostomia

3.5 Operational Definitions

Operational definitions were developed and were based on the data obtained from both the chart review and the nursing questionnaire. Definitions were developed to identify those subjects with dysphagia, to assess the severity of the dysphagia, and to determine the adequacy of oral intake. These and other operational definitions are described below.

3.5.1 Dysphagia

The operational definition of dysphagia was expanded from a similar definition used by Groher and Bukatman (1986) and Carter-Young et al.

(1990).

Dysphagia was considered to exist if the subject met at least one of the following three criteria:

1. *Oropharyngeal Problem or Thickened Fluids*

The resident had, at any time, any two or more problems associated with oral or pharyngeal stage dysphagia that affected the resident's ability to feed or be fed orally (listed in Table 3.4) **or** the resident was consuming thickened fluids. With the necessity for thickened fluids it was assumed that a swallowing problem had been determined previously by staff. Chest pain provoked by swallowing, which indicates esophageal dysphagia, was recorded but not included in determining the existence of dysphagia.

Table 3.4 Problems indicative of oral/pharyngeal stage dysphagia

- inability to complete an attempted swallow
- choking during meals
- drooling during meals
- pocketing food in lateral buccal area (checks)
- food spilling out of mouth while eating
- food residue in mouth after swallowing
- spitting during meals
- excessive or thick saliva
- nasal or oral regurgitation during meals
- refusal to eat/not opening mouth
- meal time greater than 25 minutes
- diet texture modification
- trouble drinking fluids
- subjective patient complaint of swallowing difficulty
- feeling of a lump in throat during meals
- gurgly sounding voice during meals
- coughing during meals
- absent swallow
- reduced gag reflex, and
- slurred or laboured speech.

2. *Aspiration Pneumonia and a Neurological Impairment*

The resident had a history of aspiration pneumonia with a diagnosis of a neurological disease or neurological impairment.

3. *Dysphagia Documented*

Dysphagia was documented in the chart by the physician, dietitian, nurse, occupational therapist, or speech-language pathologist.

3.5.2 Severity of Dysphagia

The operational definition for the severity of dysphagia (detailed in Table 3.5) was based on information collected from the chart review and questionnaire.

Table 3.5 Operation Definition for the Severity of Dysphagia

MILD Dysphagia	MODERATE Dysphagia	SEVERE Dysphagia
# 1, 2 or 3 as outlined for operational definition of dysphagia	# 1,2 or 3 as outlined for operational definition of dysphagia	# 1,2 or 3 as outlined for operational definition for dysphagia
Texture modification (e.g. pureed, minced, mechanical soft diet or thickened fluids)	Texture modification	Texture modification or on Alternate nutritional support or NPO
	Neurological impairment (may or may not be present)	Neurological impairment
	At least ONE of the following during the data collection period (i.e. not in the past medical history): - aspiration pneumonia - dehydration - chest congestion or upper respiratory tract infection - fever (for ≥ 3 days) - aspiration of food and/or fluids	May or may not have any of the following during the data collection period (i.e. not in the past medical history): - aspiration pneumonia - dehydration - chest congestion or upper respiratory tract infection - fever (for ≥ 3 days) - aspiration of food and/or fluids
		On Enteral (or Parenteral) feeds and/or requires suctioning of food or saliva

3.5.3 Inadequate Oral Intake

To determine the adequacy of oral intake the Nursing Care Flowsheets (see Appendix 13) were reviewed for each day of every month during the data collection period. Based on these flowsheets, oral intake for the day was deemed nutritionally inadequate if the resident missed greater than or equal to two meals per day or ate only two or three partial meals per day. The total number of days throughout each month with inadequate oral intake was tabulated. From this number, the total number of days during the entire study period was determined.

The percentage of days with inadequate oral intake for all seven months (i.e. the entire data collection period) was determined. If the resident had daily inadequate oral intake for greater than or equal to 25% of the days of the study period, it was assumed he/she had overall inadequate oral intake and was therefore not meeting nutritional requirements.

3.5.4 Nausea and vomiting

Nausea and/or vomiting was only recorded if it occurred for 3 or more consecutive days. If nausea and/or vomiting occurred over a shorter time sequence, but more often (e.g. nausea on four days throughout the month) it was recorded in the associated problem list.

3.5.5 Fever

Fever was defined as a temperature greater than 37 degrees Celsius and was only recorded if occurred for 3 or more consecutive days.

3.5.6 Weight

If actual weights were recorded in the chart, weight was considered stable if there was no change in weight or if the subject had gained or lost only 1-2 pounds per year. Weight loss was recorded if the subject lost more than 2 pounds per year and weight gain was recorded if the subject gained more than 2 pounds per year. Weight was usually reported via yearly Nursing Reports which subjectively reported the subjects' yearly weight status as loss, gain, stable or fluctuating.

3.5.7 Skin Integrity

Poor skin integrity was considered to exist if skin breakdown had occurred or if the subject was at risk for skin breakdown. Good skin integrity was skin that was described as good, firm or intact.

3.5.8 Feeding Dependency/Assistance with Feeding

From the Chart Review, assistance with feeding during meals, or feeding dependency, was based on yearly nursing reports. This was reported in two different formats as follows:

The subject could be classified according to LEVEL of assistance required with feeding: Level 1 (no assistance required), Level 2 (partial assistance required), or Level 3 (total assistance required or subject on enteral feeds).

The subject could also be classified by FEEDING DEPENDENCY: the subject was either independent or dependent on nursing staff. Independent eaters were classified as those who were completely independent at meal

time, those who were independent with physical aids in place, and those who ate independently but required supervision. Dependent eaters were classified as those who were fed by nursing staff, those who required partial assistance at meal time, and those who required total assistance at meal time.

3.5.9 Medications

To determine the maximum number of medications taken by subjects during the study period at any one time, the highest number of medications documented for any month during the study was recorded. Medications did not include standing orders, eyedrops, or topical creams or ointments.

3.5.10 Decubitus Ulcers

These were considered to be present only if it was recorded in the chart as such. For charts in which ulcers were not recorded, it was assumed that they did not exist.

The following variables were recorded as they appeared in the medical chart: chewing ability, vision and hearing status, and use of special utensils at meal time.

3.6 Data Management

When the data collection was completed, the following was determined using operational definitions: the presence of dysphagia (yes or no), the severity of dysphagia (mild, moderate or severe) and the adequacy of oral intake. These were determined for each subject by individually reviewing and combining the data obtained from the chart review form and the nursing

questionnaire. This was completed by hand and the final results were entered into the computer along with other data.

3.7. Data Analysis

All data were entered into the computer and analysed using the software program Epi Info 6.04 (Dean, 1994). Descriptive statistics were obtained for all variables. The following was assessed:

1. Prevalence of dysphagia during a seven month period.
2. Prevalence of dysphagia in different age groups.
3. Classification of dysphagia according to level of severity.
4. Comparison between those with dysphagia and those without dysphagia for the following:
    - medical diagnosis
    - medication use
    - medical/nutritional complications
    - skin integrity, decubitus ulcers
    - age
    - length of time required for feeding
    - percentage of days with inadequate oral intake
    - weight loss/gain, diet texture, alternate feeding routes
    - feeding dependency (i.e. assistance required at meal times)
5. Level of severity of the dysphagia and the association with the following:
    - medical/nutritional complications secondary to dysphagia such as dehydration, aspiration, chest congestion, upper respiratory tract infections, etc.
    - skin integrity
    - age
    - length of time required for feeding

- percentage of days with inadequate oral intake

6. Comparison of the level of severity as assessed by nursing staff and that assigned by the chart review and operational definition. This was compared to staff's level of training prior to start of study.

4.0 RESULTS

Subjects

There were 236 subjects in the institution at the onset of the study. A total of 193 subjects met the inclusion criteria. Nursing staff completed questionnaires on 196 subjects. However, complete medical records could not be located for three of these subjects and they were subsequently excluded from the study leaving 193 subjects. Two people died in the last week of the data collection period but were still included in the data analysis. These deaths were secondary to respiratory arrest (76 year old male, with severe dysphagia) and pneumonia (82 year old male, with mild dysphagia).

Demographics

- Age

There was a total of 138 female and 55 male residents with a mean age of 75.6 years. The mean female age was 79.5 years and mean male age was 65.7 years. The frequencies of the various age groups are given in Table 4.1.

Table 4.1 Frequencies by age and sex (N=193)

Age (years)	FREQUENCY			TOTAL PERCENTAGE
	Males	Females	Total	
≤44	5	3	8	4.1%
45 - 54	11	7	18	9.3%
55 - 64	12	9	21	10.9%
65 - 74	7	12	19	9.8%
75 - 84	11	50	61	31.6%
85 - 94	8	49	57	29.5%
95 -104	1	8	9	4.7%

standard deviation = 15.6 years; range = 24 to 102 years

- Residency

One hundred and twenty subjects (62.2%) had lived at the nursing home for less than 5 years. Seventy-three residents had lived there for less than three years. Only 35 residents (18%) had lived at the home for more than 9 years. The number of years in which residents lived at the nursing home is outlined in Table 4.2.

Table 4.2 Length of residency (N=193)

YEARS of RESIDENCE	Frequency	Percentage (%)
<1yr	19	9.8
1 - <3 yrs.	54	28.0
3 - <5 yrs.	47	24.4
5 - <9 yrs.	37	19.2
>9 yrs.	35	18.1
not recorded	1	0.5

Results of Nursing Questionnaire

- Feeding Dependency (N=193)

Ninety-one subjects (47.2%) ate in a supervised dining room setting all the time and 60 subjects (31.1%) ate meals in their rooms. One hundred and twenty-nine subjects (66.8%) either fed themselves all the time or occasionally fed themselves. Sixty-one subjects never fed themselves and had to be fed by nursing staff. Of those subjects who must be fed, the usual length of time spent feeding the resident is less than 20 minutes. Some form of assistance (i.e. positioning, tray set-up, supervision, etc.) during meals was required by 148 subjects (70%). Data for feeding dependency according the nursing questionnaire is outlined in Table 4.3.

Table 4.3 Feeding dependency as per nursing questionnaire (N=193)

1. Does this resident self feed?
60.6% (117/193) feed themselves
6.2% (12/193) occasionally feed themselves
31.6% (61/193) don't feed themselves
1.6% (3/193) information not recorded

2. Does this resident eat in the dining room?
47.2% (91/193) eat in dining room
31.1% (60/193) don't eat in dining room
20.7% (40/193) occasionally eat in dining room
1% (2/193) information not recorded

3. Does this resident require assistance at meal time?
69.8% (132/189) required assistance
8.4% (16/189) required assistance occasionally
21.7% (41/189) did not require assistance
This was not recorded for 4/193 subjects

4. Of those that required assistance, the form of assistance most frequently required was:
48.7% (94/193) - required tray set up
18.7% (36/193) - required positioning
2.5% (5/193) - constant supervision, doesn't need to be fed
14.5% (28/193) - occasional supervision, doesn't need to be fed
34% (66/193) - must be fed
1% (2/193) - needs to be fed sometimes

5. How much time is spent feeding a resident per meal excluding time for positioning, tray set up, etc.?
56% (46/82) require 0-15 minutes
37.8% (31/82) require 16-20 minutes
4.8% (4/82) require 26-35 minutes
1.2% (1/82) require 36-45 minutes
This was not recorded for 111/193 subjects

- Use of Nutritional Supplements (N=193)

As reported via the questionnaire, only 32 (17%) subjects consumed nutritional supplements.

- Alternate Nutritional Support (N=193)

Four subjects were on alternate nutritional support: three were on nasogastric feeds and one was on intravenous feeds. This information was

not recorded for the remaining subjects.

- Weight Loss (N=193)

Twenty-four subjects lost weight and 152 subjects did not lose weight in the six months prior to completion of the questionnaire. Weight loss was not reported for 7 subjects and for 10 subjects the nurse was unsure if weight loss had occurred. Of the 24 subjects who did lose weight, the amount of weight loss was reported for only 18 subjects. This is illustrated in Table 4.4.

Table 4.4 Approximate amount of weight loss over a seven month period (n=24)

Amount of Weight Loss	Frequency
≤ 5 lbs.	4
6-10 lbs.	9
11-15 lbs.	2
16-20 lbs.	2
>20 lbs.	1
not recorded	6

- History of Dehydration (N=193)

Only three subjects had a history of dehydration as reported in the questionnaire. This was not recorded for 12 subjects.

- Existing Problems (N=193)

Three subjects had chronic upper respiratory tract infection, 21 subjects had slurred speech and 5 subjects had a history of aspiration pneumonia. Problems of chronic upper respiratory tract infections, slurred speech, and a

past history of aspiration pneumonia was not reported for 164 subjects.

- Nurses Training in Dysphagia (N=193)

For eighty-three subjects (43%), the nurse who completed the questionnaire had received training in dysphagia. For 103 subjects, the nurse completing the questionnaire had not received training in dysphagia. This was not recorded for 7 subjects. Training in dysphagia was obtained via inservices (n=23), courses (n=11), work experience (n=14) or combinations of these techniques (n=42).

Results of the Medical Record Review

Primary Diagnosis

The primary diagnosis for 96 subjects (50%) was a psychiatric disorder. Fifty-two subjects (27%) presented with a neurogenic problem as the primary diagnosis.

Alzheimer's disease was the most frequent primary diagnosis with 62 subjects (31%) having this disease. Stroke was the second most frequent diagnosis afflicting 21 (11%) subjects. Frequencies of primary diagnoses are given in Table 4.5.

Table 4.5. Frequencies of primary diagnoses (N=193)

PRIMARY DIAGNOSIS	FREQ. (n)	% N	TOTAL Freq. (% N)
Primary Diagnosis not Recorded	14	7.2	14 (7%)
Systemic			
Osteoarthritis/Arthritis/Rheumatoid Arthritis	4	2.1	
Cancer	2	1.0	
COPD - Chronic Obstructive Pulmonary Disease	1	0.5	
Diabetes/glucose intolerance	6	3.1	
Hypertension	2	1.0	15 (8%)
Neurological			
CVA -right sided	10	5.1	
CVA -left sided	6	3.1	
CVA -site of lesion not specified	5	2.6	
Head Injury	8	4.1	29 (15%)
Physical Problems			
Paraplegia/Quadriplegia	5	2.6	
Physical Disability	1	0.5	6 (3%)
Psychiatric			
Dementia/Senility	18	9.3	
Alzheimer's Disease/Dementia	62	31.2	
Organic Brain Syndrome	4	2.1	
Mental Retardation/Developmentally Delayed	6	3.1	
Depression	4	2.1	
Schizophrenia/Paranoia	2	1.0	96(50%)
Vascular Diseases			
Peripheral Vascular Disease	1	0.5	
Ischemic Heart Disease	2	1.0	
Cerebrovascular Disease	1	0.5	4 (2%)
Progressive Neurological			
Parkinson's Disease	2	1.0	
Multiple Sclerosis	3	1.6	
Muscular Dystrophy	1	0.5	
Friedreick's Ataxia	1	0.5	
Degenerative CNS Disorder	1	0.5	
Huntingtons Chorea	2	1.0	
Cerebral Palsy	10	5.2	
Bulbar Palsy	1	0.5	
Poliomyelitis	1	0.5	
Hydrocephaly	1	0.5	23 (12%)

OTHER			
B12 deficiency (Pernicious anemia)	1	0.5	
Obesity	1	0.5	
Bilateral Femoral Arthroplasty	1	0.5	
Cervical Injury	1	0.5	
Fractured Hip	2	1.0	6 (3%)
TOTAL	193	100%	100%

- Vision and Hearing (N=193)

Normal vision was reported for 125 (65%) of all subjects. Poor vision was reported for 43 (22%) subjects and blindness was reported for 10 (5%) subjects. Vision was not reported for 15 (7%) subjects.

Normal hearing was reported for 124 (64%) of all subjects. Poor hearing was reported for 36 (19%) subjects and deafness was reported for 8 (4%) subjects. Hearing was not reported for 25 (13%) subjects.

- Body Mass Index (N=193)

Body Mass Index [BMI=weight in kilograms divided by height in meters squared] was unavailable for 164 subjects (85%). This was because weights and/or heights were not recorded in charts. Most of the heights that were available were estimated by the dietitian and therefore only estimates of the true BMI could be calculated.

- Weight Status (N=193)

A weight loss was reported for 47 subjects and a weight gain for 30 subjects. Weight was reported to be stable for 87 subjects and fluctuating for 7 subjects. Weight status was not reported for 22 subjects.

- Chewing Ability (N=193)

146 subjects had no difficulty chewing. 36 subjects did have difficulty chewing. This was not recorded for 11 subjects.

- Skin Integrity (N=193)

Reports of skin integrity was recorded for 175 subjects. Fifty-seven subjects were "at risk" for skin breakdown, 61 subjects had skin breakdown (i.e. broken areas) and 57 subjects had intact skin (i.e. skin was classified as good or firm).

A total of 17 subjects (8%) had decubitus ulcers. For the remaining subjects it was not recorded that they had decubitus ulcers.

- Use of Nutritional Supplements

As recorded in the chart, 53 (30%) subjects received supplements.

- Use of Special Utensils

The necessity if special utensils at meal times was recorded for 10 subjects (5.2%). For 132 (68%) subjects the use of special utensils for meals was not mentioned in the chart and therefore, it was assumed was not required.

- Assistance with Feeding/Feeding Dependency

Assistance with feeding during meals, or feeding dependency, was based on yearly nursing reports. This was reported in two ways in the chart: by levels of feeding and by dependency on nurses during meal time (i.e. whether the subject was dependent or independent).

Sixty subjects (31%) were classified as Level 1, 65 subjects (34%) were Level 2 and 60 subjects (31%) were Level 3. This was not recorded for 8

subjects (4%). Refer to Table 4.21 for details.

Feeding dependency on nurses during meal time was only recorded for 130 out of the total 193 subjects. Sixty-eight (52%) subjects ate independently. For 62 subjects (48%), they were dependent upon nursing staff at meal time. These results are given in Table 4.6.

Table 4.6 Feeding dependency as per chart review (N=193)

Feeding Dependency as per Chart Review	Frequency	Percentage* (n=130)
Independent	31	23.8%
Independent with Physical Aids	4	3.1%
Requires Supervision but feeds self	33	25.4%
Needs 1 person assistance with some aspects	14	10.8%
Needs total assistance of 1 person	37	28.5%
Is fed but not specified	11	8.5%
Information not available	63	
Total	193	100%

* Calculation of percentages was based on the number of subjects for whom feeding dependency was recorded (i.e. 193-63=130).

- Signs and Symptoms of Dysphagia

All of the signs and symptoms of dysphagia, as listed in Table A, Appendix 14, were significantly associated with the presence of dysphagia except for the following: difficulty swallowing medications; subjective patient complaints of feeling of a lump in the throat, chest pain when swallowing, and not hungry; the necessity of suctioning saliva; and the necessity of nursing staff to encourage the subject to eat.

PREVALENCE OF DYSPHAGIA

Eighty-eight subjects or 45.5% of the entire population were classified as having dysphagia. The highest number of subjects with dysphagia were between the ages of 75 and 84 (n=33) and in this age group 54% of subjects had dysphagia. The percentage of dysphagic subjects within each age group increases steadily from 8% in the 45-54 year old group to 37.5% in the 75-84 year old group. It then declines slightly to 29.5% in those subjects older than 85 years (refer to Table 4.7)

Forty-eight subjects were classified as having dysphagia because they had two or more oro-pharyngeal problems documented in the chart and/or reported via the questionnaire. Dysphagia was documented in the chart for only 19 subjects (21.5%) (refer to Table 4.8).

Table 4.7 Distribution of dysphagic subjects by age groups (n=88)

Age Group	Frequency of subjects in age group	Frequency of subjects with dysphagia	Percentage of subjects with dysphagia in the entire population
≤34	2	1	1%
35-44	6	3	3.4%
45-54	18	7	7.9%
55-64	21	8	9.1%
65-74	19	10	11.4%
75-84	61	33	37.5%
≥85	66	26	29.5%
TOTAL PERCENTAGE	193	88	100%

Table 4.8 Frequencies of criteria for which dysphagia was defined (n=88)

Dysphagia as Defined by Operational Definition	Freq.	Percent
Dysphagia documented in chart		
1. By itself	4	4.5%
2. + ≥2 problems* evident	11	12.5%
3. + pureed, minced or mech. soft diet + one problem*	2	2%
4. + Subject on thickened fluids	2	2%
2 or more problems* documented or reported through questionnaire	48	54.5%
Pureed, minced or mechanical soft diet + one problem*	16	18%
Thickened fluids + pureed, minced or mech. soft diet + one problem*	2	2%
Hx of aspiration pneumonia + a neurological disease + 2 or more problems*	3	3%

*problems in oro-pharyngeal phase of swallow

Refer to Appendix 14, Table B, for information on the frequency of dysphagia according to past medical history or diagnosis.

- Severity of Dysphagia (n=88)

Of all the subjects with dysphagia, MILD dysphagia was evident in 49 subjects (55.6%), MODERATE dysphagia was evident in 34 subjects (38.6%) and SEVERE dysphagia was evident in five subjects (5.6%). This is illustrated in Table 4.9.

Refer to Appendix 14, Tables C and D, for information on the severity of dysphagia and past medical history and associated medical problems.

Table 4.9 Frequencies of mild, moderate and severe dysphagia in different age groups (n=88)

Age Group	MILD DYSPHAGIA	MODERATE DYSPHAGIA	SEVERE DYSPHAGIA
≤54	5	4	2
55-64	5	2	1
65-74	7	2	1
75-84	18	14	1
≥85	14	12	0
TOTAL	49	34	5

- Medical Complications affected by Swallowing Status

Of the medical complications that may occur secondary to dysphagia, there were no complications that were significantly associated with the presence of dysphagia. Refer to Table 4.10.

Table 4.10 Frequencies of complications in subjects with and withoutdysphagia (N=193)

Complication	Dysphagia Absent (n=105)	Dysphagia Present (n=88)	p-value*	Odds Ratio
Suspected Aspiration	2	1	0.5662	1.69
Suspected Pneumonia	4	4	0.5381	0.83
Pneumonia	1	2	0.4337	0.41
Aspiration Pneumonia	0	1	0.4560	0.00
Respiratory Distress	1	0	0.5440	undefined
Upper Respiratory Tract Infection	18	19	0.4343	0.75
Gastro-Esophageal Reflux	3	1	0.3797	2.56
Dehydration	0	3	0.0930	0.00
Malnutrition	0	1	0.4559	0.00
Increased Temperature (>3days)	8	13	0.1119	0.48
Congestion	19	20	0.4248	0.75
Other	2 (symptoms of URTI, Emesis following N/G feeds)	2 (Wheezing during meals, aspiration of food as per SLP)	0.6203	0.83

*1-tailed p-value for Fisher's exact test

- Age and Presence of Dysphagia

Fifty-nine dysphagic subjects were older than 75 years. The relationship between increasing age and the presence of dysphagia was not statistically significant (refer to Table 4.11).

Table 4.11 Distribution by age and presence of dysphagia

	DYSPHAGIA (+) = present (-) = absent			
AGE GROUP	+	-	TOTAL number of subjects in age group	Percentage of subjects in age group with Dysphagia
≤ 54	11	15	26	42%
55-64	8	13	21	38%
65-74	10	9	19	53%
75-84	33	28	61	54%
≥ 85	26	40	66	39%
TOTAL	88	105	193	46%

chi square=3.77; df=4; p-value=0.44

- Sex and Presence of Dysphagia

The relationship between sex and the presence of dysphagia was not statistically significant (refer to Table 4.12). The odds ratio for sex and the presence of dysphagia was 0.99, indicating sex does not have an effect on the presence of dysphagia.

Table 4.12 Distribution by sex and presence of dysphagia

	Female	Male	TOTAL
Dysphagia Absent	75	30	105
Dysphagia Present	63	25	88
TOTAL	138	55	193

Odds Ratio = 0.99; Chi square= 0.00; p-value = 0.98

- Skin Integrity

The following data applies to subjects for whom data on skin integrity were available. Poor skin integrity included skin that was at risk for breakdown or skin in which breakdown had occurred.

Fifty-six of the non-dysphagic subjects (60%) had poor skin integrity. Of those with dysphagia 62 subjects (76%) had poor skin integrity. The association between dysphagia and skin integrity is statistically significant (p-value=0.05) as shown in Table 4.13a.

Of the subjects with mild dysphagia (n=48), 39 (81%) had poor skin integrity and only 9 subjects had good skin integrity. Of the subjects with moderate or severe dysphagia (n=34) 23 (68%) had poor skin integrity and 11 subjects had good skin integrity (refer to Table 4.13b). There is no association between severity of dysphagia and skin integrity (p=0.1017).

Table 4.13a Skin integrity for those with and without dysphagia (N=175*)

Dysphagia	At Risk for Breakdown	Skin Breakdown (Broken areas)	Skin Intact Good/Firm	TOTAL*
Dysphagia Absent	24	32	37	93
Dysphagia Present	33	29	20	82
Totals	57	61	57	175

*data on skin integrity was not available for 18 subjects
chi square = 5.97; df = 2; p value=0.05

Table 4.13b Skin integrity of those with dysphagia (N=88)

Severity of Dysphagia	At Risk for Skin Breakdown Freq (%)*	Skin Breakdown had occurred Freq (%)	Skin was Intact (firm/good) Freq (%)	data not available	TOTAL
Mild Dysphagia	23 (48%)	16 (33%)	9 (19%)	1	49
Moderate Dysphagia	7 (23%)	12 (40%)	11 (37%)	4	34
Severe Dysphagia	3 (75%)	1 (25%)	0	1	5
TOTALS	33	29	20	6	88

*Charts for which data were not available were not used in the calculation of percentages. Percentages reported are the percentages within each classification of dysphagia. p=0.1017

Decubitus ulcer formation was documented for 7 subjects with dysphagia (7%) and for 10 subjects without dysphagia (11%). As illustrated in Table 4.13c, there was no significant association between dysphagia and presence of decubitus ulcers (p=0.25).

Table 4.13c Frequency of decubitus ulcers in subjects with and without dysphagia

Dysphagia	No Decubitus Ulcers	Decubitus Ulcers Present	TOTALS
Dysphagia Absent	98	7	105
Dysphagia Present	78	10	88
TOTALS	176	17	193

chi-square =1.31; df=1; p-value = 0.2515; OR = 1.79

- Chewing Ability

Chewing ability and swallowing function are significantly associated (p-value<0.001) with an odds ratio of 9.31. Refer to Table 4.14.

Table 4.14 Chewing ability and swallowing status

	Subject has no difficulty chewing	Subject has difficulty chewing	Total**
Dysphagia Absent	95	6	101
Dysphagia Present	51	30	81
Total	146	36	182

**data not available or not applicable for 11 subjects
chi square=27.39; df=1; p value <0.0001; OR=9.31 (3.41<OR<26.84)

Length of Time Required for Nursing Staff to Feed Dysphagic versus Non-dysphagic Subjects

The length of time required for subjects to be fed a meal was recorded for 82 subjects. Thirty-five dysphagic subjects (55%) were fed within 15 minutes, compared to 11 of the non-dysphagic subjects (61%). There is no association between presence of dysphagia and length of time required to feed (p-value= 0.6275). This is outlined in Table 4.15.

Table 4.15 Time required to feed dysphagic versus non-dysphagic subjects

TIME REQUIRED TO FEED PATIENT

DYSPHAGIA	0 - 15 min.	≥ 16 min.	TOTAL*
ABSENT	11	7	18
PRESENT	35	29	64
TOTAL	46	36	82

*Refers only to those subjects requiring to be fed by Nursing Staff
chi square=0.24;df=1;p-value=0.6275

Amount of Time Required to Feed Subjects according to Severity of Dysphagia

All subjects with severe dysphagia took longer than 15 minutes to be fed each meal. Thirty-five percent of those with moderate dysphagia required more than 15 minutes to be fed and 50% of those with mild dysphagia required more than 15 minutes to be fed by nursing staff. This is outlined in Table 4.16.

Table 4.16 Amount of time required to feed subjects with varying severities of dysphagia

Severity of Dysphagia	0 - 15 min.	> 16 min.
MILD	18	18
MODERATE	17	6
SEVERE	0	5

Weight status for Dysphagic versus Non-Dysphagic Subjects

Eighteen subjects (17%) without dysphagia gained weight and 12 subjects (14%) with dysphagia gained weight. Twenty-one subjects (20%) without dysphagia lost weight and 12 subjects (14%) with dysphagia lost weight. Weight was stable for 52 (50%) subjects without dysphagia and for 35 (40%) subjects with dysphagia. The results indicate no association between weight status and dysphagia (p=0.1673). Further details are located in Table 4.17.

Table 4.17 Distribution by weight and presence of dysphagia

Weight Status	Dysphagia Absent	Dysphagia Present
Fluctuating	2	5
Gain	18	12
Loss	21	26
Stable	52	35
Data not available*	12	10
Total	105	88

*not included in analysis; Distribution by overall status and dysphagia: chi square=5.86;df=3;p-value=0.1673

Diet Texture and Fluid Consistency Modifications

Fluid Modifications (N=193)

Twenty out of 88 (23%) dysphagic subjects were on a fluid modified diet as per medical chart review. Fourteen subjects received thick fluids, two received nectar-consistency fluids and 4 subjects received gelled fluids. One subject without dysphagia received nectar consistency fluids. Fluid consistency was not recorded for 164(85%) subjects and therefore it was assumed these subjects were on regular fluids (Refer to table 4.18). There was a significant association between being on a fluid modified diet and having dysphagia ($p<0.0001$).

For all subjects on a fluid modified diet this was implemented due to difficulty swallowing regular fluids, except for one subject whereby the reported rationale was to ensure adequate hydration status.

It was documented that fluid modifications were recommended by various health care professionals for 13 out of the 20 dysphagic subjects. Thick fluids were recommended once each by the doctor, nurse, and speech-language pathologist, three times by the dietitian, and in 7 charts, thick fluids were recommended but it was not specified by whom.

Table 4.18 Frequencies of Fluid Modifications for those With and Without Dysphagia as per Medical Chart Review (N=193)

Dysphagia	Modified Fluids	Regular Fluid or Consistency of Fluids not recorded	N/A*	TOTAL
Absent	1	103	1	105
Present	20	65	3	88
TOTAL	21	168	4	193

*not applicable–four subjects were on enteral feeds
Yates corrected chi square=21.89;df=1;$p<0.0001$

Texture Modifications

Thirty percent (26/86) of non-dysphagic subjects compared to 84% (70/83) of dysphagic subjects were on a texture modified diet. As illustrated in Table 4.19, this association is statistically significant ($p<0.0001$) with an odds ratio of 12.43

Table 4.19 Distribution by texture modification and absence/presence of dysphagia

	No Texture Modifications	Texture Modifications: Mechanical Soft Minced Pureed Full Fluid	Total**
Dysphagia Absent	60	26	86
Dysphagia Present	13	70	83
Totals	73	96	169

**Texture Modification not applicable to 4 subjects (on enteral feeds) and data not available for 20 subjects

chi square=50.39;df=1;p-value<0.0001;OR=12.43 (5.54<OR<28.38)

Diet Texture Modifications and Level of Severity

A regular diet was prescribed for 5 (10%)subjects with mild dysphagia, 8 (24%) subjects with moderate dysphagia and no subjects with severe dysphagia. A texture modification (mechanical soft, minced, pureed or full fluids) was ordered for 43(88%) subjects with mild dysphagia, 25 (74%) with moderate dysphagia, and 2 (40%) subjects with severe dysphagia. There is no significant association between texture modification and level of severity of dysphagia ($p=0.20$). Further details are located in Table E, Appendix 14.

Feeding Dependency / Assistance Required at Meal Time

Feeding Dependency at Meal Time and Presence of Dysphagia as per Nursing Questionnaire

As per the questionnaire, Nursing staff recorded whether or not a subject required assistance at meal time. Of the subjects with dysphagia, 91% (77/85) were dependent on nursing staff at meal times (i.e. required assistance either all the time or on occasion). Of those without dysphagia, 68% (71/104) were dependent on nursing staff at meal time. Table 4.20a illustrates that the association between dysphagia and feeding dependency is statistically significant (p=0.0002).

Table 4.20a Feeding dependency at meal time and presence of dysphagia (as per nursing questionnaire) (n=189)

	Number of subjects not requiring assistance at meal times (Independent)	Number of subjects requiring assistance either all the time or on occasion (Dependent)	Total*
Dysphagia Absent	33	71	104
Dysphagia Present	8	77	85
Total	41	148	189

*data not available for four subjects

chi-square=13.72;df=1;p-value=0.0002; OR= 4.47 (1.83<OR<11.31)

Feeding Dependency at Meal Time and Presence of Dysphagia as per Medical Chart Review

From the medical record review, feeding dependency or type of assistance required at meal times was also recorded. Subjects were classified as being independent or dependent on nursing staff at meal times. With this classification, presence of dysphagia was significantly associated with feeding dependency. As shown in Table 4.20b, 25% of those without dysphagia were dependent on nursing staff at meal times, whereas 70% of those with dysphagia were dependent on nursing staff (p=<0.0001).

Table 4.20b Feeding dependency at meal time and presence of dysphagia (as per medical chart review) (N=193)

Dysphagia	Frequency of Subjects Independent at Meal Time (independent, independent with physical aids in place, or requiring supervision but feeding themselves)	Frequency of Subjects Dependent at Meal Time (requiring one-person assistance with either all or some aspects during meal time)	Data not available*	Total*
Dysphagia Absent	48	16	41	105
Dysphagia Present	20	46	22	88
Total	68	62	63	193

*not recorded in analysis; chi-square=26.02;df=1;p-value=0.0000003; OR=6.9 (2.99<OR<16.17)

Level of Assistance Required at Meal Time and Presence of Dysphagia as per Medical Chart Review

There were 12.5% of dysphagic subjects who were classified as requiring Level 1 assistance at meal time and 46% of non-dysphagic subjects requiring Level 1. As well, 53% of all dysphagic subjects were classified as Level 3 whereas only 12.3% of non-dysphagic subjects were Level 3. Thirty percent of dysphagic subjects were classified as level 2 and 37% of non-dysphagic subjects were Level 2. This data is illustrated in Table 4.21. The presence of dysphagia and the level of assistance required at meal time is statistically significant ($p<0.001$) based on the categorization of feeding dependency into different levels. If a resident had dysphagia, they were more likely to require assistance at meal times.

Table 4.21 Distribution by level of feeding dependency and presence of dysphagia (medical chart review) (N=193)

Level of Feeding Dependency	Dysphagia Absent	Dysphagia Present (frequencies of those with mild, moderate or severe dysphagia)	TOTAL
Level 1 (no assistance required)	49	11 (5 mild and 6 moderate)	60
Level 2 (partial assistance required)	39	26 (14 mild, 11 moderate, and 1 severe)	65
Level 3 (total assistance required or subject on enteral feeds)	13	47 (27 mild, 16 moderate, and 4 severe)	60
Level not recorded	4	4 (3 mild and 1 moderate)	8
TOTAL	105	88	193

chi square=44.78;df=3;p-value<0.0001

Assistance Required at Meal Time and Vision

Poor vision was not significantly related to the assistance required during meal time. Refer to Table 4.22.

Table 4.22 Distribution by poor vision and necessity of assistance with meals.

Assistance required during Meals	Good vision	Poor Vision or Blind	Total**
Subject required No assistance during meals	28	11	39
Subject required assistance or occasional assistance during meals	97	42	139
TOTAL	125	53	178

**not recorded for 15 subjects

OR=1.10; chi square=0.06, df=1; p-value=0.81

Assistance Required at Meal Time and Diet Texture

Of those subjects requiring no assistance with meals, 25 (78%) were on a regular diet as compared to those requiring total or occasional assistance at meal time in which 48 (32%) were on a regular diet. Details are given in Table 4.23. There is a significant association between diet texture modification and assistance required at meal time (p=0.0001).

Table 4.23 Distribution by diet texture modification and assistance required at meal time

Assistance Required at Meal Time	No Texture Modifications	Texture Modifications: Mechanical Soft Minced Pureed Full Fluid	Total**
No Assistance	25	7	32
Total or Occasional Assistance Required	48	86	134
Total	73	93	166

**Texture Modification not applicable for 4 subjects (on enteral feeds) and data not available for 23 subjects chi square=18.76;df=1;p-value=0.000148

Nutritional Support

Use of Nutritional Supplements

There was a discrepancy in the frequency of nutritional supplement use as reported in the questionnaire and as documented in the chart. From the questionnaire, only 32 (17%) subjects were identified as consuming nutritional supplements. However, as recorded in the chart, 53 (30%) subjects were identified as receiving supplements. This difference may be due to differing data collection periods. Information from the chart review was collected over a seven month period while the questionnaire was collected over a two week period. There appears to be no agreement between documentation and nurses recall in the questionnaire for use of nutritional supplements (cohen's kappa = 0.345) (refer to Table M, Appendix 14).

According to the medical chart, 41(47%) dysphagic subjects received nutritional supplements whereas only 12 (11%) non-dysphagic subjects

received supplements. As per questionnaire data, 25 (28%) dysphagic and 7(6%) non-dysphagic subjects received supplements. Despite the differences between the two instruments, a similar trend was noted with respect to nutritional supplementation. That is, the subjects with dysphagia were more likely to receive nutritional supplementation. There was an association between presence of dysphagia and nutritional supplement use ($p<0.0001$ for both the chart and the questionnaire) as evidenced by an odds ratios of 8.74 (chart data) and 5.44 (questionnaire data). Refer to Tables 4.24a and 4.24b.

Table 4.24a: Presence of dysphagia and nutritional supplement use as per chart review data.

	Subject did not receive Nutritional Supplements	Subject received Nutritional Supplements	Data on Nutritional Supplementation Not Available*	Total
Dysphagia Absent	87	12	6	105
Dysphagia Present	34	41	13	88
Total	121	53	19	193

*not included in analysis

p-value<0.0001; chi-square=36.47;df=1;OR=8.74 (3.88<OR<20.06)

Table 4.24b: Presence of dysphagia and nutritional supplement use as per questionnaire data.

	Subject did not receive Nutritional Supplements	Subject received Nutritional Supplements	Data on Nutritional Supplementation Not Available*	Total
Dysphagia Absent	96	7	2	105
Dysphagia Present	63	25	0	88
Total	159	32	2	193

*not included in analysis
p-value<0.0001; chi-square=15.89;df=1;OR=5.44 (2.08<OR<14.79)

Adequacy of Oral Intake

For 186 (96%) subjects, daily oral intake was recorded in the medical record. For two subjects, this data was not applicable because they were on enteral feeds and for five subjects, this data was not available.

For 121 subjects (65%), oral intake was judged as inadequate for less than 25% of the days during the study period (i.e. oral intake was adequate for more than 75% of the days). These subjects were assumed to have overall adequate intake and therefore met their nutritional requirements. For 65 subjects (34%) oral intake was inadequate for more than 25% of the days throughout the study period (i.e. oral intake was adequate for less than 75% of the days). These subjects were assumed to have overall inadequate nutritional intake and did not meet their nutritional requirements. Refer to Tables F and G in Appendix 14.

Of those with dysphagia, 36 subjects (42%) did not meet their nutritional requirements compared with only 29 (29%) subjects in the non-dysphagic group who did not meet their nutritional requirements. Despite these

differences in the dysphagic versus non-dysphagic group, the results indicate there is no significant association with the inability to consume adequate nutrition and the presence of dysphagia (p-value= 0.0519). Refer to Table 4.25a.

Table 4.25a Presence of dysphagia and inadequate consumption of food for < 25% or ≥ 25% of days during the 7 month period

Percentage of days throughout study with inadequate oral intake	Dysphagia Absent	Dysphagia Present	Totals
< 25% = Nutritional Requirements met	72	49 (29 mild,19 moderate, and 1 severe)	121
≥ 25% = Nutritional Requirements NOT met	29	36 (19 mild, 15 moderate, and 2 severe)	65
Totals	101	85	186

OR=1.82 (0.95<OR<3.51)
chi square=3.78; df=1; p-value=0.0519

Of the data available, 50% of mildly dysphagic subjects, 44% of moderately dysphagic subjects and 66% of severely dysphagic subjects were unable to consume adequate nutrition. There is no significant association between the severity of dysphagia and the inability to consume adequate nutrition (p-value= 0.556). Refer to Table 4.25b.

Table 4.25b Severity of dysphagia and inadequate consumption of food for < 25% or ≥ 25% of days during the 7 month period.

Percentage of days throughout study with inadequate oral intake	MILD Dysphagia	MODERATE or SEVERE Dysphagia	Total*
< 25% = Nutritional Requirements met	29	20 (19 mod; 1 sev)	49
≥ 25% = Nutritional Requirements NOT met	19	17 (15 mod; 2 sev)	36
Totals	48	37	85

*percentage of intake not available for three subjects with dysphagia
p-value= 0.556

Nurses Subjective Reports of "Well Nourished" versus Documented Oral Intake

As part of yearly nursing assessments, nurses subjectively comment on whether or not a resident is "Well Nourished". This was compared with objective measures indicating the subject met their nutritional requirements which was an inadequate for less than 25% of the days during the study period. For 38 subjects, data which reported whether or not the subject was "well nourished" were not available and for 7 subjects objective records of oral intake were not available. For 95 subjects who were, objectively, considered to have met their nutritional requirements, nursing reported the subject was "well nourished". Nurses' ability to identify those subjects as being well nourished is significantly associated with objective reports of adequate nourishment (p=0.01). This is outlined in Table 4.26.

Table 4.26: Association between objective documented oral intake and subjective nursing reports of a resident being "well nourished".

Percentage of days with inadequate oral intake	Nursing Reports state that resident is Well Nourished	Nursing Reports state that resident is NOT Well Nourished	Nursing Reports do not indicate nourishment status**	TOTAL
< 25% [nutritional requirements met]	95	2	24	121
≥ 25% [nutritional requirements not met]	47	7	11	65
TOTAL	142	9	38	186

**not included in statistical analysis; Fisher Exact 1-tailed p=0.0105530; Yule's Q=+0.75

Nurses reports regarding whether or not a resident is "well-nourished" is also significantly related to reports of appetite status (good versus not good)($p<0.0001$). This is outlined in table 4.27.

Table 4.27 Association between nurses reports of resident being "well nourished" and nurses reports of appetite status

Subjective Reports of Subject's Appetite Status	Nursing Reports state that resident is Well Nourished	Nursing Reports state that resident is NOT Well Nourished	Nursing Reports not indicating nourishment status**	Total
Good Appetite	101	0	19	120
Poor, Fair or Fluctuating Appetite	43	9	14	66
Not Recorded	2	0	5	7
Total	146	9	38	193

**not included in statistical analysis
Fisher Exact 1-tailed p=0.0000369; chi-square=15.58;df=1

Level of Assistance Required at Meal Time and Adequacy of Oral Intake

From the medical chart review, data on the level of assistance required at meal time, or feeding dependency, and the percentage of oral intake were available for only 178 subjects. Of all subjects requiring Level 1 care 20 (34%) had inadequate oral intake. Among all subjects requiring Level 2 care 25 (40%) had inadequate oral intake and among subjects requiring Level 3 care 17 (30%) had inadequate oral intake. There was no association between level of feeding dependency required and adequacy of oral intake (p=0.557) as illustrated in Table 4.28.

Table 4.28 Association between feeding dependency and percentage of days with inadequate oral intake

Percentage of days with inadequate oral intake	Frequency of subjects in Level 1	Frequency of subjects in Level 2	Frequency of subjects in Level 3	Total*
< 25% [Nutritional requirements met]	39	38	39	116
≥ 25% [Nutritional requirements NOT met]	20	25	17	62
TOTAL	59	63	56	178

*data was not available for 15 subjects; not included in analysis
chi square=1.17; df=2;p-value=0.557

Nursing Reports of Hydration Status and Nourishment Status and Presence of Dysphagia

Hydration status was reported by nursing staff in yearly nursing reports as either adequate or inadequate. For non-dysphagic subjects, 82 subjects (99%) had an adequate hydration status and for dysphagic subjects, 65

subjects (88%) had an adequate hydration status. There is a significant association between presence of dysphagia and hydration status (p=0.0052) as evidenced by an odds ratio of 11.35. Data is located in Table 4.29a.

The nutrition status of subjects was reported by nursing staff in yearly nursing reports as either "well nourished" or "not well nourished". For non-dysphagic subjects, 84 subjects (98%) were "well nourished". For dysphagic subjects, 62 subjects (90%) were "well nourished". There is a significant association between presence of dysphagia and nurses documentation of nourishment status (p=0.0420). Data is located in Table 4.29b.

Table 4.29a Documentation of hydration status and presence of dysphagia

	Hydration Status Recorded to be Adequate	Hydration Status Recorded to be Inadequate	Data on Hydration Status Not Available*	Total
Dysphagia Absent	82	1	22	105
Dysphagia Present	65	9	14	88
Total	147	10	36	193

*not included in analysis

corrected chi-square=6.15;df=1; Fisher Exact: 1-tailed p-value=0.0052; OR=11.35

Table 4.29b Documentation of nourishment status and presence of dysphagia

	Nutrition Status Recorded as "Well Nourished"	Nutrition Status Recorded as "Not Well Nourished"	Data on Nutrition Status Not Available*	Total
Dysphagia Absent	84	2	19	105
Dysphagia Present	62	7	19	88
Total	146	9	38	193

*not included in analysis

Fisher Exact 1-tailed p-value=0.0420; chi-square=4.28;df=1; OR=4.74

Medication Use (N=193)

The mean number of medications taken at one time during the study period was 6.54. There were 108 subjects (56%) taking 5 or less medications at any one time (refer to Table 4.30a). Data on medication use was not available for 4 subjects. There were 51 prescriptions written for vitamins and/or minerals however, this was not for 51 different individuals as some individuals required more than one supplement (Refer to Table H, Appendix 14 for details on vitamin supplementation).

Table 4.30a Number of medications taken in any one month during study period

Maximum Number of Meds Taken At Any Time During Study Period.	Frequency	Percentage
0-2	26	13.4%
3-5	82	42%
6-8	46	23.84%
9-11	25	12.95%
12-14	10	5.18%
data not available	4	1.0%
Total	193	

Mean = 6.54; Median = 5.0; Mode = 4.0; Q_3 = 7.0; Q_1 = 3.0

Use of Crushed Medications

Data on the way in which subjects consumed their medications was available for only 159 subjects. Medications had to be crushed for 19 (23%) non-dysphagic subjects and 41 (54%) dysphagic subjects. The need for crushed medications was significantly associated with presence of dysphagia as evidenced by an OR=4.52 (p-value$\leq$ 0.0001). Refer to Table 4.30b.

Table 4.30b Association between need for crushed medications and presence of dysphagia

		Crushed Medications		
		Crushed	Whole	Total
Dysphagia	Absent	19	64	83
	Present	41	35	76
	Total	60	99	159

Uncorrected chi square = 20.37; p value = 0.0000064
OR = 4.52 (2.19<OR<9.41)

Antipsychotic and Tricyclic Antidepressant Medication Use

Data on medication use was not available for 4 subjects. One hundred and forty-six subjects (77%) did not take antipsychotic medications. Thirty-eight subjects (20%) took one antipsychotic medication and five subjects (3%) took two antipsychotic medications (refer to Table I, Appendix 14). The presence of dysphagia was not associated with the use of antipsychotic medications (p=0.6137). This illustrated in Table 4.30c.

Table 4.30c Relationship between antipsychotic medication use and presence of dysphagia

	No use of antipsychotic meds	Use of antipsychotic meds	TOTAL*
Dysphagia Absent	81	22	103
Dysphagia Present	65	21	86
TOTAL	146	43	189

*not recorded for 4 subjects.
OR = 1.19; chi square = 0.25;p value = 0.6173

The number of subjects taking tricyclic antidepressants was 17 (9%)(refer to Table J, Appendix 14). The presence of dysphagia was not associated with use of these medications (p=0.3756). This is illustrated in Table 4.30d. Other medications which may cause or exacerbate dysphagia (ativan, ipatropium bromide, gravol, captopril, or combinations of these) was taken by 47 subjects (24.8%)(refer to Table K, Appendix 14). As with the TCAs and antipsychotics, the presence of dysphagia was not significantly associated with the use of these medications (p=0.0578) (Refer to Table L, Appendix 14).

Table 4.30d Relationship between tricyclic antidepressant (TCA) use and presence of dysphagia

	No use of TCA meds	Use of TCA meds	TOTAL*
Dysphagia Absent	92	11	103
Dysphagia Present	80	6	86
TOTAL	172	17	189

*not recorded for 4 subjects.
OR = 0.63;chi square = 0.79;p value = 0.3756

Management of Dysphagic Subjects

For only 8% (7) of dysphagic subjects were consultations requested for a health professional regarding the assessment of the dysphagia. The doctor was consulted for four subjects, a speech-language pathologist was consulted for two subjects, and for the remaining subject both the doctor and dietitian were consulted. Three of these consultations were recommended by a doctor, one by a nurse and for the remaining consults, the originator of the consult was not recorded.

A bedside swallowing assessment was completed on only 3 out of the 88 dysphagic subjects (one by the dietitian, two by the speech-pathologist) and a modified barium swallow was completed for two subjects. Feeding instructions were placed in the chart for 14% (12) of all dysphagic subjects. Nursing staff wrote these instructions for seven subjects, the speech-language pathologist and doctor wrote this for two subjects each, and a nurse and dietitian wrote feeding instructions for one subject.

Nurses Ability to Identify Subjects with Dysphagia

The number of subjects with dysphagia was 88. Nurses identified only 34 of the 88 subjects (39%) as having dysphagia and indicated that 53 of the dysphagic subjects did not have dysphagia. Nurses correctly identified 101 of the 105 subjects (96%) without dysphagia (Refer to Table 4.31a).

Table 4.31a Agreement on the presence of dysphagia between nurses' perception and the operational definition of dysphagia

		Dysphagia as assessed by nurse			
		Present	Absent	Not recorded	
Dysphagia as assessed by researcher using operational definition	Present	34	53	1	88
	Absent	0	101	4	105
	TOTALS	34	154	5	193

chi square=45.58;df=1;p<0.0001
Sensitivity=39%;Specificity=100%

Nursing staff identified 19 of the subjects with mild dysphagia (39%), 11 of the subjects with moderate dysphagia (33%) and 4 of the subjects with

severe dysphagia (80%) as having dysphagia. The ability of nursing staff to identify subjects as being dysphagic was not associated with the severity of dysphagia (p=0.1369).

Eighty-one (42%) of the nursing personnel who filled out questionnaires had received training in dysphagia either through course work or inservice training. There were 105 untrained Nurses. Training was not recorded for 7 out of the 193 questionnaires.

Of the trained nurses, 10 (32%) correctly identified those subjects with dysphagia and 50 (100%) correctly identified subjects without dysphagia (Refer to Table 4.31b). Of the untrained nurses, 24 (44%) correctly identified subjects with dysphagia and 49 (100%) correctly identified subjects without dysphagia (Refer to Table 4.31c).

Table 4.31b Distribution by trained nurses' ability to correctly identify subjects with dysphagia

		Dysphagia as assessed by TRAINED Nurses (n=81)	
	Present	Absent	Total
Dysphagia as assessed by researcher using operational definition: Present	10	21	31
Absent	0	50	50
TOTALS	10	71	81

chi square=18.40;df=1;p<0.0001
Sensitivity=32%; Specificity=100%

Table 4.31c :Distribution by untrained nurses' ability to correctly identify subjects with dysphagia

Dysphagia as assessed by researcher using operational definition	Dysphagia as assessed by UNTRAINED Nurses (n=105)	
	Present	Absent
Present	24	31
Absent	0	49
TOTALS	24	80

Total
55
49
104*

*data not reported for one nurse
chi square=25.39;df=1;p<0.0001
Sensitivity=44%; Specificity=100%

The trained nurses were less accurate than untrained nurses in their ability to identify those subjects with dysphagia. As a result, a comparison between nurses' training and the ability to identify subjects with dysphagia was made. There was no association between nurses' level of training and the abilty to correctly identify subjects with dysphagia. Refer to Table 4.31d.

Table 4.31d Distribution by nurses' abilty to correctly identify subjects with dysphagia as per the operational definition and the nurses' level of training.

Nurses' Level of Training	Frequency of Dysphagic Subjects that Nurses' were able to Correctly Identify as per the Operational definition.	
	Present	Absent
Trained Nurses	10	21
Untrained Nurses	24	31
TOTALS	34	52

Total
31
55
86

chi square=1.07;df=1;p-value=0.3001

5.0 DISCUSSION

The Prevalence of Dysphagia

Among long-term care residents in this study, the prevalence of dysphagia was found to be 45.5%. This was slightly below that reported by other researchers for long-term care facilities. Trupe et al. (1984) reported a prevalence of 59% in a nursing home facility and Layne et al. (1989) reported a prevalence of 66% in a long-term neuropsychiatric institution. These differences may be due to varying methodologies. Nonetheless, the current study still demonstrates that approximately one-half of all residents have swallowing difficulties. Since the proportion of aged persons in the population is growing very rapidly, the prevalence of dysphagia is expected to increase.

Trupe et al. (1984) used a physical exam in addition to a chart review and questionnaire and therefore may have identified subjects who were not demonstrating overt signs of dysphagia. Layne et al. (1989) used the Fleming Index of Dysphagia (Appendix 1) to determine those with "possible dysphagia". This tool evaluated esophageal dysphagia as well as oro-pharyngeal dysphagia, which the current study and Trupe's study did not. Layne et al. also included a sign of "possible dysphagia" as being on a diet that restricted whole meats and raw vegetables and fruits. This diet may have been prescribed for gastrointestinal problems and may not have been a sign of dysphagia. As well, they included edentulous states or ill-fitting dentures as a sign of dysphagia which may inhibit food intake but may have no effect on swallowing ability. These two problems were the most common in the entire population. However, the association between swallowing and absence of teeth may be justified. The current study demonstrated a positive association between chewing ability and dysphagia. Subjects with dysphagia were nine times more likely to have chewing problems than those

with out dysphagia (see Table 4.14). As well, a study by Siebens et al. (1986) demonstrated a correlation between observed oral stage difficulties and absence of teeth/dentures ($p<0.003$). The reported prevalence in Layne's study may be an overestimate for the geriatric population since many elders have problems with dentition and eating raw fruits and vegetables and tough meats. Layne et al. also reported the prevalence for only one day whereas this study reported the prevalence for a seven month period and Layne's study consisted of 513 subjects who were primarily men while in the current study population only 28% of the subjects were male.

Keller (1993) completed a Canadian investigation on malnutrition in 200 institutionalized elderly with a mean age of 78.5 years and reported a six month prevalence rate of dysphagia to be 19%. In this study, a swallowing assessment by the multidisciplinary team had to be noted in the medical chart in order for the patient to be classified as having dysphagia. However, using this classification, patients who do not exhibit consistent signs of dysphagia or those who did not report swallowing difficulties may not have been identified as having a swallowing problem. As such, the multidisciplinary team would not have been consulted and therefore, these patients would not have been included in Keller's prevalence rate. On the other hand, this form of assessment would rule out false positives.

Estimates of prevalence rates reported for acute care facilities ranged from 6% to 50% (Gordon et al, 1987, Veis and Logemann, 1985, Kuhlemeier, 1994, Groher and Bukatman, 1986). Usually these were reported as disease specific prevalence rates and not as institution specific. As well, there were many differences in study populations with respect to age, illness, and severity of illness. One would expect acute and long-term care populations to have different prevalence rates.

In the current study, the estimated prevalence rate for the pilot study was 60%. The prevalence rates of the pilot study as compared to the main study may be different due to differences in number of subjects (20 vs 193), selection of subjects (random vs all subjects), mean age (92 years old vs 76 years old), operational definitions of dysphagia (one oro-pharyngeal problem vs two oro-pharyngeal problems), and differences in institutions.

According to Buchholz (1994), without the completion of a modified barium swallow, the reported prevalence for any study will be an underestimate of the true prevalence. This may occur for the following reasons: patients with oropharyngeal dysphagia may compensate for swallowing problems by adjusting their feeding habits (e.g. changing the diet texture or washing down solids with liquids) to cope with a dysfunction or patients may have a decreased laryngeal cough reflex resulting in silent aspiration or penetration. The elderly only complain of swallowing difficulties when symptoms are severe or painful (Sonies, 1995). Therefore, self-reported dysphagia also may not be reliable in indicating the true prevalence of dysphagia.

The problems inherent in retrospective studies may also contribute to errors in estimates of the true prevalence of dysphagia. The main problem in the current study was incomplete documentation. When information on a specific problem was incomplete or missing from the medical record, it was assumed to have not existed. The aim of the nursing questionnaire was to help alleviate the problem of incomplete documentation in the medical record. Problems with nurses ability to recall information may have been a factor in inaccurate data collection. Nonetheless, the prevalence of dysphagia was high.

The Severity of Dysphagia

The majority of dysphagic subjects (56%) had mild dysphagia, 39% had moderate dysphagia and very few, only 6%, had severe dysphagia. Since the majority of subjects were mildly dysphagic, this indicates the importance of early detection and intervention to prevent progression of the problem.

The numbers of subjects with severe dysphagia were too small to make associations with age, however, moderate dysphagia occurred more frequently with aging. The trend appears to be that as age increases the severity of dysphagia increases. Of the dysphagic subjects between 65 and 74 years of age, 20% had moderate dysphagia whereas, of the dysphagic subjects older than 85 years of age, 46% had moderate dysphagia. This may be because with increased age there is greater chance of developing more diseases or conditions that exacerbate dysphagia. The severity of dysphagia will vary with the severity and nature of specific disease processes (Sonies, 1992).

Ability to Recognize Dysphagic Subjects

Unfortunately, nursing staff were not able to identify 61% of the subjects who had dysphagia. Nursing management staff had developed and presented inservices to Nursing and Nursing Assistant staff on dysphagia. Only 42% of the nursing personnel filling out questionnaires for the current study had received training in dysphagia. Whether or not the nurses were trained in dysphagia had no influence on their ability to identify subjects with dysphagia ($p=0.3001$) (Table 4.31d). This may indicate that although nursing staff can identify the signs and symptoms of swallowing difficulties, they may not recognize that these symptoms represent dysphagia. The opportunity to intervene at the first signs and symptoms of dysphagia in order to prevent the complications associated with dysphagia may be missed. Groher (1990a) alludes to the fact that managing dysphagia or intervening with

residents who are prone to poor dietary intake is complicated by poorly trained staff. These results suggest that further training needs to be conducted and that the training program needs to be evaluated and possibly restructured. The importance of early diagnosis and treatment of dysphagia needs to be impressed upon all nursing personnel.

Nursing staff are usually the front line professionals when it comes to recognizing problems with residents. Therefore, another problem stemming from nursings' inability to identify dysphagic residents is that the clinical dietitian is not being notified of such persons. Prompt management of the resident's feeding, swallowing and nutritional status may not occur. This places the resident at risk for malnutrition, aspiration and associated sequelae.

On the other hand, all nurses were able to correctly identify subjects without dysphagia all the time. The results of this study showed that while there were no false positives, there were 53 false negatives. It appears that subjects with a swallowing problem may not be identified 39% of the time.

Dysphagia itself was documented in the medical record for only 22% of all dysphagic subjects. For the majority of subjects, the dysphagia was identified by overt signs and symptoms of dysphagia which were either documented in the chart or identified by nurses via the questionnaire. Despite the subject demonstrating these signs, "dysphagia" was still not documented as a problem. This indicates that dysphagia is not being identified as a medical concern by nursing, medical or allied health staff. This reinforces the need for further education to nursing and medical staff regarding the signs and symptoms and the health implications of dysphagia as it is a significant medical problem.

The Dysphagic Population

The group of subjects with the highest rate of dysphagia were between the ages of 75 and 84. As age increased it appears that the prevalence of dysphagia in each age group increases steadily until the age of 85 (Table 4.7). Conclusions regarding dysphagia in subjects ≤ 44 years old and > 95 years old could not be made because the numbers were too small. However, age was not significantly associated with the presence of dysphagia ($p=0.44$). This supports the findings of several reports which state that aging itself is not a cause of dysphagia but, instead, it is the diseases and disorders which accompany aging that cause the dysphagia.

The prevalence of dysphagia in males and females in the current study was identical (46%). This is in contrast to Sonies's (1992) report that the prevalence is of dysphagia is higher in males over the age of 60 and findings by Carter-Young et al. (1990) which indicated that twice as many male than female subjects with stroke where dysphagic. Carter-Young et al. reported the frequency of males and females with dysphagia but did not specify what percentage of the study population was male and female. These findings may be misinterpreted becase there may have been more males than females in the study population. Gordon et al. (1987) reported a higher incidence of dysphagia in female subjects. In the current study, dysphagia was not associated with gender.

Diagnosis/Medical History

Data on the association between diagnosis and past medical history with the presence of dysphagia could not be assessed. The analysis did not take into account confounding variables which would influence the prevalence of dysphagia for each specify disease entity. These include co-existing disease states or complications, past medical history, medication use, diet textures, or level of assistance required at meal time. Therefore reported prevalences

for different disease states would not represent the true prevalence of dysphagia.

Nonetheless, various trends were noted. Of those with Alzheimers disease as the primary medical diagnosis or as part of the past medical history 52% had dysphagia. Fifty percent of those with dementia or senility had dysphagia. Psychiatric disorders have been speculated to exacerbate dysphagia due to the potential for drug-induced extrapyramidal symptoms (Layne, 1989). Of all the stroke subjects, 47% were dysphagic. Echelard et al (1984) reported that 25% of patients with CVA were dysphagic, Veis and Logemann (1985) reported a prevalence of 28% and Groher and Bukatman (1986) reported a prevalence of 33-34% in neurology and neurosurgery subjects (those with CVA's were not specifically determined). Kuhlemeier (1994) reported prevelences ranging from 16 to 45% however the prevalence of dysphagia in CVA patients varies considerably with patient population and the length of time post-stroke that the study was completed. All of the subjects with Myastenia Gravis had swallowing problems. Forty percent of subjects with Cerebral Palsy had dysphagia. Kuhlemeier (1994) reported a prevalence of 27% in patients with Cerebral Palsy in one study. Of those subjects with diabetes (type I and type II), 38% had swallowing problems. Reports of swallowing problems in patients with diabetes have been documented (Kuhlemeier, 1994) but the prevalence had not yet been determined. The percentage of dysphagia for in subjects with diseases such as Parkinson's disease, and Multiple Sclerosis could not be determined as the numbers were too small.

Complications Associated with Dysphagia

Medical complications associated with dysphagia were difficult to assess in the current study as the numbers of subjects having these complications were too small to have significant findings. Such complications include

suspected aspiration, aspiration pneumonia, fever, and respiratory distress. Carter-Young and Durant-Jones (1990) completed a chart review on 225 CVA patients and reported that the frequency of suspected aspiration, aspiration pneumonia, fever, and respiratory distress was significantly higher in stroke patients with dysphagia then in a control group. Similar trends were noted in the current study. Dysphagic subjects had more frequent fever (15% vs 7%), upper respiratory tract infection (22% vs 17%) and chest congestion (23% vs 18%) than those without dysphagia.

Texture/Fluid Modifications

In the current study, dysphagic subjects were more likely to be on a modified fluid diet ($p<0.001$) and a texture modified diet ($p<0.0001$) than those without dysphagia. In fact, those with dysphagia were 12 times more likely to be on a texture modification then those without dysphagia. Thirty percent of dysphagic subjects were on a pureed diet. This is similar to proportions of such diets found by Carter-Young and Durant-Jones (1990).

Results of the current study must be interpreted with caution. It was assumed that subjects who were on a fluid or texture modified diet were on this diet because of dysphagia and therefore this was used as part of the operational definition in helping identify dysphagic subjects. Fifty-seven percent of all subjects were on a texture modified diet but the reason for placement on the alternative diet was not investigated. It was assumed they had feeding and/or swallowing difficulties with a regular texture. However, for some charts it was mentioned the subject refused to wear his/her dentures which necessitated a texture change. Groher and McKaig (1993) completed a study in a 740 bed skilled nursing facility which did not have a dysphagia team or had limited speech pathology or dietetic consults. They found that 36% of all patients were on a texture modified diet and the mean length of time on the diet was between 3.4 and 12.6 years. Reasons for

placement on the diet included choking, refusal to eat, transferred on diet, esophageal problems, feeding dependency, dentition and patient preference. After their evaluation, however, 91% of patients were able to tolerate a diet at a higher texture level. Therefore, it may be that not all of the subjects in the current study required a texture modified diet as strict as the one on which they were placed. Although it is highly likely that subjects may have been placed on the textured modified diet for one of these reasons, as Groher and McNeil stated, there is need for continued reevaluation of patients placed on a texture-modified diet.

Nutritional Intake

Dysphagic subjects overall had poorer nutritional and hydration status than those without dysphagia. Dysphagic subjects were less likely to meet their nutritional requirements than non-dysphagic subjects as judged from objective nursing reports of missed or partially eaten meals throughout the seven month period. The results indicate that 42% of dysphagic subjects had inadequate nutritional intake whereas only 29% of non-dysphagic subjects had inadequate nutritional intake. However, these results were not statistically significant ($p=0.0519$).

Similar results were indicated by Rudman and Feller (1989) who estimated that 30% of institutionalized elderly patients had inadequate protein intake (less than 0.8g/kg/day). Keller (1993) reported that 32% of long-term care elderly consumed less than 100% of their energy requirements and 54% consumed less than 100% of protein requirements for maintenance. The energy intake in the current study could not be broken into specific macronutrients as food intake records were not completed during the study. Although the inadequate nutrition may be due to inability to swallow, confounding variables such as incorrect diet/fluid texture modification, poor appetite, ill-health, missing teeth/dentures can not be overlooked. It may

also be due to the prolonged length of time required to adequately feed dysphagic subjects.

There was no significant difference between dysphagic and non-dysphagic individuals and the length of time it took nurses to feed these subjects. One must therefore question if the dysphagic subject is given enough time to eat or be fed a nutritionally adequate meal. For example, 55% of dysphagic subjects were fed in less than 15 minutes. Nursing staff did, however, feed four times as many dysphagic subjects as compared to non-dysphagic subjects for a period of time that took longer than 15 minutes. Although there was limited data on the time required for feeding, the results showed that 78% of the subjects fed by nursing staff were dysphagic (Table 4.15).

According to Keller (1993) the requirement of more than 25 minutes to consume an adequate meal is associated with undernourishment and in her study, 40% of elderly residents were considered to be "slow eaters". Data on meal time greater than 25 minutes were not available for the current study, however, similar results are evident. Fourty-four percent of residents fed by nursing staff took longer than 16 minutes to be fed. It can be argued that if meal time is less than 15 minutes for most dysphagic subjects and most dysphagic subjects do not consume adequate meals, then the meal time needs to be lengthened or, alternatively, a dysphagia management program should be implemented to deal with effective ways to feed the dysphagic resident in less time. As estimated by Rudman and Feller (1989) it takes at least 30 minutes to 45 minutes of nursing time to feed a dependent person a nutritionally adequate meal.

It appears that dysphagic subjects receive more nutritional supplements than non-dysphagic subjects. Those with dysphagia were 9 times more likely to receive nutritional supplements according to data in the chart. This

indicates that for someone with a swallowing difficulty nursing home staff are more likely to prescribe a supplement secondary to the residents inability to consume adequate amounts of food at meal time. This is an effective way to provide nutrient dense foods when regular meals are insuffient to meet nutritional requirements.

Dysphagic subjects were 11 times more likely to have an inadequate hydration status documented by nursing staff compared to those without dysphagia. Recall bias may alter the true hydration status of subjects. It must be noted that this information is subjective in nature and not based on biochemistry results or physical assessment by a physician. It may be based on criteria such as the decreased fluid intake or presence of urinary tract infections throughout the year. As well, this data was only reported in the chart as part of a yearly nursing assessment and may not accurately reflect the subjects' hydration status at the time of the study.

Yearly nursing reports indicated whether or not a subject was "well nourished". The status of "not well nourished" was associated with the presence of dysphagia. Although this association was significant, the proportion of subjects "not well nourished" in the dysphagia group was much less than one would expect. Based on these subjective nursing reports, only 10% of dysphagic subjects were "not well nourished" (Table 4.29b). Based on objective reports of daily oral intake, 42% of dysphagic subjects did not meet their nutritional requirements (Table 4.25a).

Despite these differences, nursing staff's ability to subjectively report a residents nutritional status as being "well nourished" was significantly associated with the objective measurements of adequate oral intake (via objective reports of meals fully or partially consumed) ($p=0.01$). As well, nursing reports of "good appetite" were significantly related to reports of

being "well nourished" (or "poor appetite" to "NOT well nourished")($p<0.0001$).

Based on these correlations, yearly nursing reports on whether or not a resident is "well nourished" should be useful in predicting the true nutritional intake of subjects. However, they may be too subjective and not completed enough times throughout the year to be of any practical use in helping identify those residents with or without swallowing difficulties. Ideally, a detailed nutritional assessment should be completed on all residents by a registered dietitian at least twice a year. This assessment could also incorporate a dysphagia screen and swallowing assessment where necessary. Unfortunately, the registered dietitian on staff was only seeing subjects on an "as needs" basis or as part of a yearly assessment. Since nursing staff did not identify 61% of those subjects with dysphagia, the dietitian was very seldom involved with these subjects. Early intervention is crucial to prevent the complications associated with dysphagia.

Of all the complications associated with dysphagia, malnutrition is perhaps the most threatening complication in the geriatric population. Malnutrition itself is highly prevalent in the elderly but this is more likely to occur if the person has dysphagia which is not therapeutically managed. The decrease in nutritional intake and hydration status in dysphagic subjects puts them at increased risk for malnutrition and dehydration. In turn, this may lead to increased hospitalizations, risk of immunocompromise, increased incidence of infection, weakening of respiratory muscles, loss of lean body mass and increased morbidity and mortality (Bienia et al., 1982, Keller, 1993).

Skin Integrity

The presence of dysphagia was significantly associated with poor skin integrity ($p=0.05$) (Table 4.13a) and almost twice as many people without

dysphagia had good skin integrity compared to those with dysphagia. This may be related to adequacy of oral intake as there was a significant association between presence of dysphagia and inability to meet nutritional requirements via oral intake. The rationale for the association between presence of dysphagia and poor skin integrity is related to its association with poor oral intake. Inability to meet energy, protein, fat and micronutrient requirements may lead to malnutrition, protein catabolism, skin breakdown, breakdown of adipose tissue and poor wound healing. All of these may contribute to poor skin conditions. Decubitus ulcer formation did not differ significantly between dysphagic and non-dysphagic individuals ($p=0.2515$). Since ulcer formation is dependent upon many conditions such as loss of pain and pressure sensations, thinness of muscle and fat padding, disuse atrophy, malnutrition, anemia, infection, moisture (eg. from incontinence) and pressure which impairs circulation (Berkow, 1987) it is difficult to isolate the contributing factors which could affect either group of subjects.

Crushed Medications

Subjects with dysphagia were four and a half times more likely to require crushed medications then those without dysphagia ($p<0.0001$). Siebens et al (1986) found the same association in those with oral phase dysphagia.

Chewing Ability

Subjects with dysphagia were nine times more likely to have chewing problems then subjects without dysphagia. In a study on eating dependency in institutionalized elderly by Siebens et al. (1986), the authors found that observed difficulties in the oral phase of swallowing were significantly related to absence or presence of teeth on exam.

Feeding Dependency

Results of feeding dependency as recorded in the chart audit differ from

those reported by nursing staff in the questionnaire. A possible explanation for this discrepancy is that in the questionnaire the nurses were asked to record the type of assistance *most frequently* required. However, in many cases, more than one answer was checked, so the category which best described the subject could not be determined accurately.

Seventy-eight percent of the study population was dependent at meal time according to the nursing questionnaire and 65% was dependent as per data collected from the chart. This difference may be due to the different data collection periods for the questionnaire and the chart review. Despite the differences shown in the two instruments, both sets of data demonstrated that there is a significant association between presence of dysphagia and being dependent on nursing staff at meal times. According to data collected from the questionnaire, subjects with dysphagia were 4.5 times more likely to require assistance at meals (or be dependent on nursing staff at meal times) than non-dysphagic subjects. According to data from the chart review, dysphagic subjects were 7 times more likely to require assistance at meal times.

Keller (1993) and Siebens et al. (1986) also reported frequencies for feeding dependency; these studies however indicated a lower level of feeding dependency. Keller's study, which had a similar Canadian residential population as the current study, found that 41% of elderly long-term care residents were dependent on nursing staff for feeding with 25% of total population being totally dependent and 16% requiring some assistance. Keller did not specify her operational definition for feeding dependency nor did she make any associations regarding the presence or absence of dysphagia. Siebens' study, which was conducted in an American nursing home had results similar to Keller's: 47% of the population were dependent with 16% of the total population being totally dependent and 31% requiring

some assistance. Siebens' classification of a dependent feeder included those residents who required supervision but were otherwise unassisted whereas the current study classified these subjects as independent feeders. If this more liberal operational definition for feeding dependency by Siebens et al., were applied to the current study, the number of dependent feeders would actually increase. Like the current study, Siebens et al. also demonstrated that feeding dependency is associated with both oral stage dysphagia and pharyngeal stage dysphagia.

The current study demonstrates that dysphagia is associated with feeding dependency and inability to consume adequate nutrition. Keller (1993) showed that malnutrition was associated with feeding dependency and dysphagia. Obviously, dysphagia, feeding dependency and nutritional status are all interrelated and to properly prevent complications from either condition all variables must be taken into consideration.

Level of Assistance Required at Meal Time

Dysphagic subjects required more assistance at meal time. The level of assistance required at meal time was recorded as Level 1 (no assistance), Level 2 (partial assistance) or Level 3 (total assistance). There were almost four times as many non-dysphagic subjects in Level 1 as compared to those subjects with dysphagia. The converse is true of those in Level 3 in that there were four times as many dysphagic subjects in Level 3 compared to non-dysphagic subjects. There was roughly the same percentage of dysphagic to non-dysphagic subjects in Level 2. This indicates that those subjects with dysphagia require more assistance at meal time than those without dysphagia. Yet, the amount of time the nurses reported they spend feeding dysphagic versus non-dysphagic subjects did not differ statistically. This may indicate more time is spent in positioning the subject, preparing the tray, or supervising the subject during meals in the non-dysphagic subjects.

Siebens et al. (1986) demonstrated that abnormal oral-motor function was the characteristic most common in their subjects with a feeding dependency and that dependency was more common in residents who were edentulous and lacked dentures. In their study, feeding dependency was also significantly associated with modified consistency diets as well as other variables. Most of the variables in Seibens' study were not evaluated in the current study and as such no comparisons can be made. However, the current study did demonstrate a significant association between the need for a texture modified diet and the need for either total or occasional assistance at meal time. Subjects on a texture modified diet require more assistance at meal time than those on a regular diet.

The level of assistance required at meal time was not associated with vision or the ability to consume adequate nutrition. The percentage of subjects with poor vision (or blindness) and good vision who required assistance at meal time was essentially the same (79% vs 78%). Decreased vision would not be as much of a problem at meal time in the nursing home as it would in the free living elderly as food is prepared for nursing home residents. Regardless of the level of assistance required at meal time, roughly the same numbers of subjects in each group did not eat enough to meet their nutritional requirements. Of subjects in Level 1, 2, and 3, 34%, 40% and 30%, respectively, failed to consume adequate nutrition (Table 4.28). This implies that subjects in Level 3, who were totally dependent on nursing staff at meal time, were able to consume the most nutrition. However, overall, extra assistance from nursing staff did not increase the subjects ability to consume adequate nutrition.

Complaints of chest pain or feeling a lump in the throat when swallowing were not associated with the presence of dysphagia. However, if these problems were noticed by subjects they may not have voiced the problem or

it may not have been recorded. Overall, only 8% of the dysphagic subjects had chart notations indicating that they complained of swallowing difficulties. Carter-Young et al (1990) had similar findings in that only 15% of their acute care populations had documentation of patient complaint. Bloem, Lagaay et al. (1990) and Kuhlemeier (1994) reported that most elderly people do not complain of swallowing difficulties as they may accept it as a part of aging. The current research supports these findings. Reports of not being hungry were more frequent in those without dysphagia. This only reinforces the understanding that the appetite decreases as we age (Abbasi et al., 1994). A simple explanation as to why difficulty in swallowing medications was not associated with dysphagia is that most dysphagic subjects received crushed medications and therefore swallowing pills was not a concern.

The data on weight status was not reliable because objective weights and heights were not recorded regularly. Most of the weights that were available were estimated by the clinical dietitian. Weight status as it is reported here is subjective data from the chart which the nurse recorded yearly if the weight was lost, gained, fluctuated or stable. With this limited data, weight status was not associated with the presence of dysphagia. In fact, 14% of those with dysphagia actually gained weight. Other researchers (Tibbling and Gustafsson, 1991) reported a weight gain in one-third of dysphagic subjects. The weight gain may be secondary to consumption of energy-dense foods.

Ninety-one percent of subjects did not develop decubitus ulcers and the association of ulcer formation with dysphagia was not significant. A possible explanation for this is that skin integrity is routinely monitored by nursing staff and therefore at the first signs of reddened areas, breakdown, etc., measures are taken to relieve pressure or counteract the potential problems that cause poor skin integrity.

The mean number of medications taken by subjects in the study was 6.5. This was less than the number reported by Keller (1994) in a similar institution in Ontario. She determined residents were on an average of 10 medications. The use of antipsychotic or tricyclic antidepressant medications was not associated with the presence of dysphagia. The numbers of subjects prescribed these classes of medications was small and therefore statistical association is difficult to determine.

Severity of Dysphagia

For all of the severly dysphagic subjects meal time was greater than 15 minutes. This group included subjects on enteral feeds and this may explain why nursing staff spent more time feeding these subjects. Only twenty-five percent of the moderately dysphagic subjects were fed for more than 15 minutes and 50% of the mildly dysphagic subjects were fed for more than 15 minutes. A reason why less time may have been spent feeding subjects with moderate dysphagia, as compared to those with mild dysphagia, may be that overall, nursing staff were unable to identify subjects with dysphagia (sensitivity=39%). As well, they were more likely to identify those with severe dysphagia as opposed to mild or moderate dysphagia. Therefore, they would not have identified the need to take more time to feed subjects who were moderately dysphagic. It may be possible that subjects' inability to consume adequate nutrition was secondary to short feeding periods. Many dysphagic patients require additional time during the feeding process especially if correct feeding guidelines are not implemented. Short feeding times may also be due to staffing shortages and insuffient time allotted for feeding residents. Data on the time to feed was missing for 28% of dysphagic subjects and three of those with severe dysphagia were on enteral nutrition. Therefore, these results must be interpreted with caution. Although feeding times were recorded for those on enteral feeds, this is a

different sub-population and nursing time requirements is different.

Severity of dysphagia was not statistically associated with skin integrity although a trend was noted. Over three-quarters (81%) of subjects with mild dysphagia had poor skin integrity, all of those with severe dysphagia had poor skin integrity, but only two-thirds (63%) of subjects with moderate dysphagia had poor skin integrity. One would think that this would coincide with nurses ability to recognize more subjects with moderate or severe dysphagia which would lead to longer feeding times and better nutritional intakes of protein, energy and vitamins essential to good skin integrity and therefore less skin breakdown. However, this was not the case. Nurses were unable to identify the moderately dysphagic subjects any better than they were able to identify the mildly dysphagic subjects. They were able to identify the severe cases of dysphagia but these were the subjects on tube feeds for the most part. Those subjects with severe dysphagia were usually sicker, debilitated, and bedridden and as such were at increased risk for skin breakdown due to pressure sores. Severity of dysphagia was not associated with an inability to consume adequate nutrition ($p=0.556$). However, as one would expect, the mildly dysphagic subjects, who had the highest percentage of poor skin integrity, was also the group with the highest percentage of inadequate oral intake (inability to meet nutritional requirements). The severely dysphagic subjects were excluded from this analysis as the numbers were too small. This demonstrates that poor skin integrity is related to nutritional intake.

Severity of dysphagia was not associated with the necessity of a texture modified diet ($p=0.20$). There was no overall difference in the number of mildly or moderately dysphagic subjects who were prescribed minced, pureed or mechanical soft diets. The severity of dysphagia could not be correlated with the frequencies of medical complications as the numbers

were too small and as such, this was only reported for overall dysphagia.

Current Management Techniques

Multidisciplinary management of dysphagia is essential to prevent complications associated with dysphagia as other researchers have indicated (Martens, 1990, Carter-Young and Durant-Jones, 1990, Logemann, 1994, Thresher and Kehoe, 1992). It is obvious that with only eight percent of dysphagic subjects being referred to a health professional (doctor, dietitian, speech-language pathologist) many dysphagic individuals are not being properly assessed or treated. Only three bedside swallowing assessments were completed in the study population. Although there were no swallowing therapists on staff to routinely complete these assessments, one could be consulted from an acute care institution as required. In the future to decrease costs to the institution, the clinical dietitian could be trained to become the swallowing therapist. The clinical dietitian is the most logical professional as she/he must be involved to complete a nutritional assessment, which is also essential for all dysphagic individuals.

Feeding instructions were rarely written in the chart or cardex. Nursing staff were able to identify 34 of the 88 subjects with dysphagia, yet only a mere 12 subjects had feeding instructions placed in the chart. This may allow for potential mistakes in diet orders, positioning of residents, feeding aids, ensuring mouth care is completed etc. A number of contraindicated feeding instructions/methods were noted in the chart. One in particular was monitoring the "gag reflex" prior to "syringe feeding" the resident. Absence of a gag reflex does not mean that a patient is unable to swallow or protect the airway, and conversely, the presence of a gag reflex does not mean a patient is able to swallow (Linden and Siebens, 1983). As well, syringe feeding should only be used when it has been proven radiographically that the patient is not at risk for aspiration. The results suggest that all of the

health care professionals involved in the feeding of residents should receive more intensive education in the assessment, treatment, and management of dysphagia.

In conclusion, dysphagia was significantly associated with a number of factors related to diet and nutrition. These included the following: need for a fluid modified diet; need for a texture modified diet; poor hydration status; nursing reports of subjects being "not well nourished"; nutritional supplement use, poor skin integrity; the need for crushed medications; chewing ability; feeding dependency; and level of assistance required at meal time.

Dysphagia was not significantly associated with the following: age; sex; difficulty swallowing medications; inability to consume adequate nutrition; subject complaints of feeling a lump in the throat, chest pain with swallowing and reports of not being hungry; needing encouragement to eat; requirement of suctioning of saliva; presence of decubitus ulcers, length of time required for feeding by nursing staff; weight loss or weight gain; and use of antipsychotic or TCA medications.

Approximately one-half of the long-term care population had dysphagia. This was only an estimate of the true prevalence as bedside swallowing assessments and modified barium swallows were not completed. Nonetheless, this prevalence is expected to increase because the population is aging. It is essential to identify and treat dysphagic individuals as early as possible so that complications such as malnutrition can be prevented. Since the majority of dysphagic individuals in this study had mild dysphagia, early treatment may prevent the dysphagia from becoming worse. To accomplish these goals health care professionals working in the long-term setting need to be extremely knowledgeable about dysphagia and the seriousness of this problem.

6.0 CONCLUSION AND RECOMMENDATIONS

The prevalence of dysphagia was estimated to be 45.5% for residents in a long-term care facility. With almost one-half of the entire population having dysphagia, this is a serious problem. Prompt and effective assessments of all persons with dysphagia is warranted and this should be implemented immediately. Epidemiologists agree that the elderly population is the fasting growing segment of the population and therefore, administrators in long-term care facilities should be aware that the number of dysphagic individuals will also increase. Unless a concentrated effort is taken to identify and treat dysphagic residents, they will be at increased risk for malnutrition, dehydration, aspiration pneumonia, and psychosocial problems such as social isolation and embarrassment. These problems in turn may lead to a reduction in the quality of life, depression, increased medical problems, immune and respiratory compromise, and increased morbidity and mortality.

For residents with swallowing problems, it is very challenging to provide adequate nutrition to meet Canadian nutritional standards. Very often nursing staff are overworked, due to prolonged feeding times, or become frustrated as residents may not understand the necessity of a diet texture modification. As Groher (1990a) explains, residents may view feeding times, which should be a pleasurable experience, as an interruption in their daily routine. Maintaining adequate nutritional intakes and hydration status is essential for optimal quality of life for the residents. This is also important in order to ensure a good working environment for nursing and allied health staff as they will have to manage residents who are less sick.

The identification of dysphagic residents will only result if further training on dysphagia assessment and treatment is provided to all nursing staff by a health professional with expertise in swallowing disorders. As well, a

reliable dysphagia screen should be implemented on a regular basis with all residents. Continuity in the screening process is essential as medical, nutritional and swallowing conditions may change over time. As indicated by many researchers, a formalized interdisciplinary team approach is essential to the successful management of dysphagia.

Monetary implications to the health care system must also be controlled. These include increased costs of hospitalizations secondary to the complications of dysphagia such as malnutrition and aspiration pneumonia. In 1996, to treat one episode of aspiration pneumonia, per person, it cost between 8 and 11 thousand dollars. As well, the time associated with feeding dependency, crushing medications, and providing daily nutritional supplements will increase health care costs. Costs also increase with the treatment of poor skin integrity and with food wastage. For every resident who do not meet their nutritional requirements because they refuse meals or only consume partial meals (42% of dysphagic subjects and 29% of non-dysphagic subjects), food is wasted which contributes to the overall cost of client care.

The results of this study should be used to help develop and establish a comprehensive program for the management of dysphagic individuals in Long-Term Care, Nursing and Senior Citizens Homes in Newfoundland as well as for the free living elderly in the community setting.

Consideration should be given to the following recommendations:

- Protocol and policies for the assessment and management of dysphagic patients in Nursing Homes in Newfoundland should be developed at the provincial government level and implemented all across the province. These guidelines could be adapted for community-based intervention programs.

- An information resource package and series of workshops should be developed and presented to all long-term care facilities across the province. The workshop should be conducted by health care professionals with an expertise in dysphagia. This package should be designed for institutions for which appropriate professionals (e.g. Clinical Dietitians and/or Swallowing Therapists) involved in the management of dysphagia are not employed. Such a kit would include principles of dysphagia management including a screening tool (signs and symptoms), feeding techniques, texture/fluid modification guidelines, positioning techniques, mouth care, safety considerations, etc.
- A screening tool should be developed so that nursing staff or allied health professionals can identify dysphagic individuals in cases where swallowing teams and/or swallowing therapists are not employed. This is necessary so that early diagnosis and management can be initiated which will aid in the prevention of potential problems such as malnutrition, aspiration pneumonia and dehydration.
- Methods to ensure an adequate nutrition and hydration status for dysphagic and non-dysphagic individuals should be investigated. Musson et al. (1990) and Lipner et al. (1990) provide excellent recommendations to facilitate feeding programs which utilize volunteer assistants. It is crucial that volunteers involved with feeding dysphagic clients receive comprehensive training on the management of dysphagia.

The ideal situation would be to have interdisciplinary management of dysphagic patients in all of the long-term care facilities across Newfoundland. Although the prospect of employing Dietitians, Swallowing Therapists, and other team members, in every long-term care facility may be unrealistic due to budget restraints, measures still must be taken to ensure this residential population is not overlooked in its medical care. Solutions to this problem include investing the resources, time and money to have the professionals

currently on staff to receive expert and professional training, both theoretical and practical, in the diagnosis and management of dysphagia. The most suitable professional to be trained in dysphagia diagnosis and management is a registered Clinical Dietitian. This is because most long-term care facilities already employ a clinical dietitian and these professionals have a strong background in physiology, food and nutrition, and feeding difficulties that accompany aging. Clinical dietitians also have the expertise to identify and treat problems associated with malnutrition, which often poses a threat to persons with dysphagia. In any case, guidelines for the identification and management of dysphagia should be administered by available resource persons, such as those currently employed within a facility, at all times.

Management of dysphagia is possible, but not if the seriousness of this problem is overlooked. Early intervention and treatment of dysphagia is essential to optimize client care and comfort and reduce the health risks associated with unmanaged dysphagia.

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Appendix 1:
Fleming Index of Dysphagia

Table 1. Fleming Index of Dysphagia

1. Pseudonumber	CC 1-9 [ ]
2. Pseudoname	CC 10-26 [ ]
3. Age	CC 27-29 [ ]
4. Date of this report	CC 30-37 [ ]
5. Institution code patient's service	CC 38-42 [ ]

Severity rating

I. Possible chronic problem
II. Important problem
III. Most critical, needs immediate attention

Problem coding

1-Problem present, new and documented
2-Problem present, new but not documented
3-Problem present, recurrent and documented
4-Problem present, recurrent but not documented
5-Problem not present
6-Other
7-Unknown

6. Aspiration pneumonia demonstrated radiographically	CC-43 { }
7. Laryngeal penetration of bolus demonstrated radiographically	CC-44 { }
8. With tracheostoma tube in, aspiration is demonstrated when food-colored bolus emerges from tube	CC-45 { }
9. Patient appears to demonstrate psychological components that may be associated with dysphagia	CC-46 { }
10. Dehydration (osmolality < 300 or > 1,200 MOsm/kg or specific gravity < 1.002 or > 1.030 or positive skin wrinkle test)	CC-47 { }
11. Presence of a nasogastric feeding tube, gastrostoma, jejunostoma, or feeding pharyngostoma with nutrition problem and/or aspiration as precursor	CC-48 { }
12. Weight loss at admission. Greater than 10% loss of normal body weight	CC-49 { }
13. Weight loss as inpatient. Greater than 1 lb (0.45 kg) loss per week	CC-50 { }
14. Stricture, stasis, regurgitation, or reflux with radiographic demonstration	CC-51 { }
15. Stricture, stasis, or reflux with endoscopic demonstration	CC-52 { }
16. Stasis or reflux with manometric demonstration	CC-53 { }
17. Stricture, stasis, regurgitation or reflux requiring dilatation	CC-54 { }
18. Stricture, stasis, retching, or regurgitation requiring food texture change	CC-55 { }
19. Patient complains of difficulty swallowing	CC-56 { }
20. Patient requires positioning support for eating	CC-57 { }
21. Patient is edentulous, lacks opposing occlusion, or doesn't wear dentures when eating	CC-58 { }
22. Patient has ill-fitting dentures (won't stay in place), patient won't wear because dentures are considered uncomfortable, there is ulceration of alveolar ridge	CC-59 { }
23. Patient is on a nonregular food texture	CC-60 { }

Table 2. Input for part of the FID

1. Pseudonumber	CC 1-9 [3][6][3][4][8][9][6][5][7]
2. Pseudoname	CC 10-26 [J][O][H][N][S][O][N][ ][J][A][M][E][S]
3. Age	CC 27-29 [ ][7][ ]
4. Date of this report	CC 30-37 [ ][0][0][7][ ][9][8][6]
5. Institution code/patient's service	CC 38-42 [H][N][5][5][3]

Severity rating

I. Possible chronic problem
II. Important problem
III. Most critical, needs immediate attention

Problem coding

1-Problem present, new and documented
2-Problem present, new but not documented
3-Problem present, recurrent and documented
4-Problem present, recurrent but not documented
5-Problem not present
6-Other
7-Unknown

6. Aspiration pneumonia demonstrated radiographically	CC-43 {1}
7 Laryngeal penetration of bolus demonstrated radiographically	CC-44 {7}
8. With tracheostoma tube in, aspiration is demonstrated when food-colored bolus emerges from tube	CC-45 {6}

Source: Fleming and Weaver, 1987

Appendix 2:
Anatomy of the Oropharyngeal Area Pertinent to Swallowing

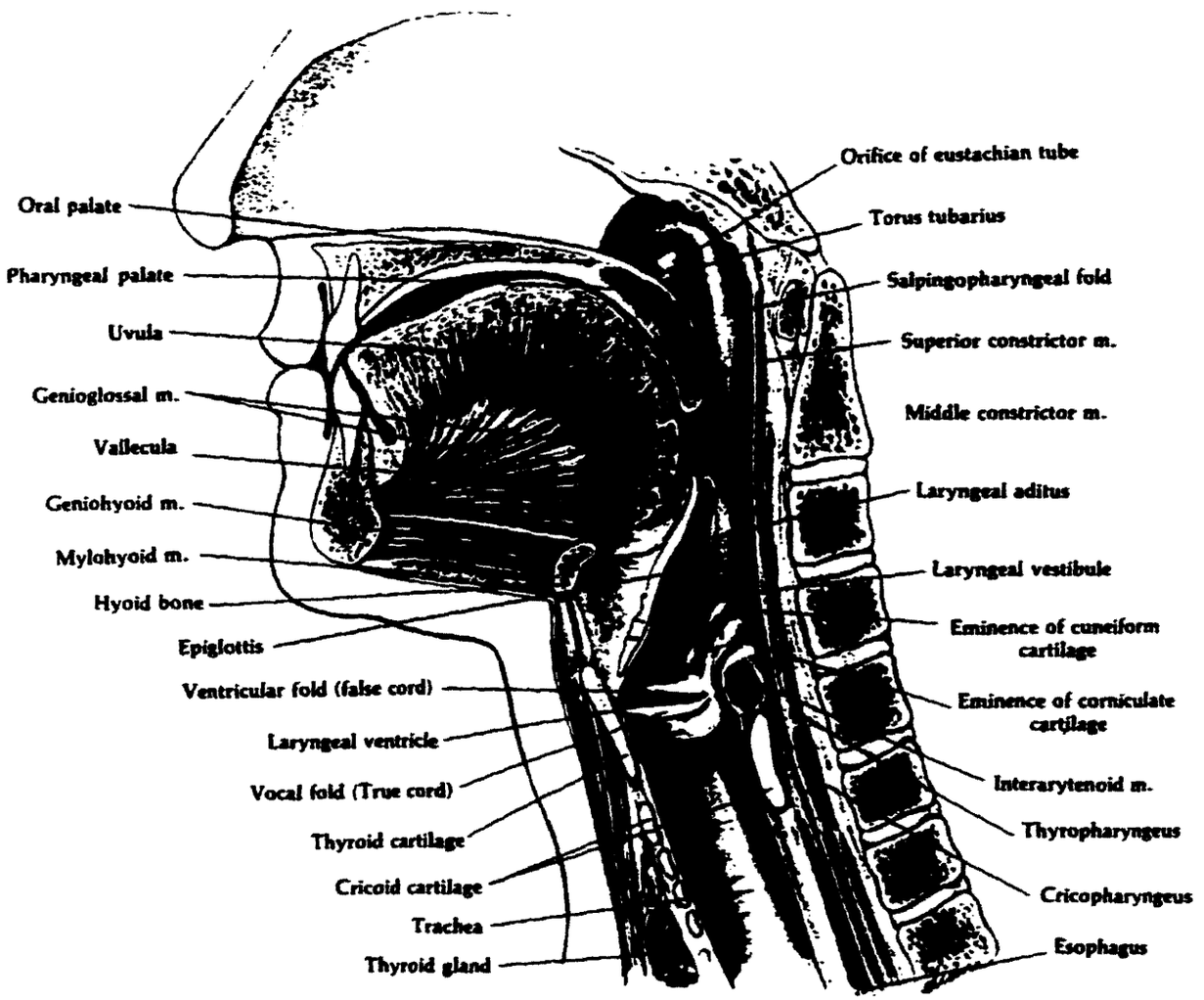

Figure 1

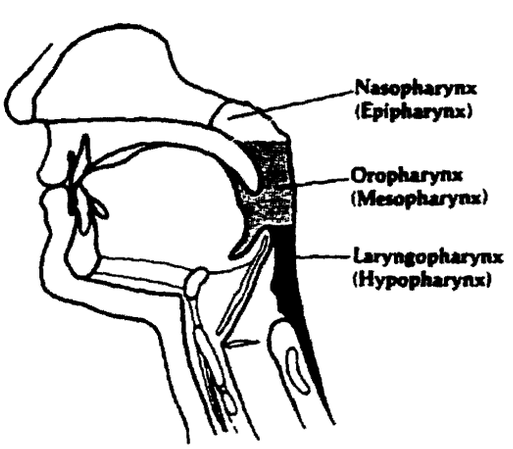

Figure 2

Source: Bosma et al., 1986

Appendix 3:
Common Problems in the Oral Preparatory and Oral Phases of Swallowing

Common Problems in the Oral Preparatory or Oral Phase of Swallowing

Clinical Symptom	Disorder	Consequence
Lingual (Tongue) Function	Tongue Function	
Bolus is not formed There is difficulty positioning the bolus or tongue struggling action Tongue pushes food forward. Residual food on palate.	Impaired tongue function in terms of range of movements, strength, and coordination of movements as well as decreased oral sensation. Examples include: Unstable lingual position Alterations in the tongue's ability to move side-to-side, anteriorly-posteriorly, or with rotational movements. Lingual rocking and pumping Abnormal chewing and rotary jaw motion Reduced tongue elevation Reduced range of motion	May cause disruption in bolus preparation, initiation of the swallow and lingual transport of the bolus. All may contribute to aspiration.
	Decrease lingual propulsion and/or decreased pressure to propel bolus	If lingual propulsion is reduced, the bolus is not transported to oropharynx and/or, bolus not posteriorly propelled into oropharynx and therefore, swallowing response is delayed or not initiated. Also, while remaining in the oral cavity, the bolus can drip down the base of the tongue and pool in the pharyngeal areas.
Tongue rocking and pumping	Flaccid (hypotonic) or rigid (hypertonic) (tongue is rigid when held in a bunched or retracted position and often associated with Parkinsons disease)	Delay in the swallow initiation, impaired hyolaryngeal elevation, and pooling in the pharyngeal areas.
Random discoordinated tongue movements	Apraxia	Failure to trigger the pharyngeal phase of swallowing

"Pocketing" or squirreling of food into flaccid or insensitive cheeks or buccal area	Reduced buccal tension	Pocketed food becomes dislodged after the meal and may fall over base of tongue into unprotected airway causing aspiration, penetration or obstruction.
Inability to manage own secretions, drooling during meals, impairment in the retrieval of food/fluid from utensils, food and/or liquid spilling out of mouth.	Labial (lip) weakness or inadequate lip closure secondary to decreased tone or poor sensation	Proper lip seal is necessary to alter the pressure in the oral cavity in order to move the bolus horizontally across the tongue and into the pharynx whereby gravity assists with vertical flow in the pharynx. (Buchholz,1994, Robbins, 1994)
Coughing before the swallow	Incompetent palatoglossal sphincter (tongue base does not contact velum)	Premature loss of the bolus and aspiration
Reduced oral sensation	neurological condition	This impedes bolus preparation, initiation of the swallow, and bolus transport.

Source:Sonies, 1992, Mendelsohn, 1993, Groher, 1994b, Logemann, 1995

Appendix 4:
Common Problems in the Pharyngeal Phase of Swallowing

Common Problems in the Pharyngeal Phase of Swallowing

Symptom – may be viewed via a Modified Barium Swallow	Disorder	Consequence
Nasal reflux	Decreased velopharyngeal closure and pharyngeal weakness	Discomfort and voluntary reduction in oral food intake
Bolus residue in the pharynx on the pharyngeal walls and/or pyriform sinuses	Reduced pharyngeal wall contraction due to incomplete contact between mucosal surfaces in the pharynx. May be secondary to muscular weakness, scarring or tumor growth	Residue could be aspirated after the pharyngeal phase of swallow is completed
Pooling or accumulation of food in the pharyngeal areas: a. Valleculae b. One side of Pyriform sinus and Valleculae	a. Reduced movement of the posterior base of the tongue; b. Unilateral pharyngeal wall dysfunction or weakness	Some pooling in the valleculae is normal before the swallow, however, the duration and degree of pooling may cause residue build-up which can be dripped into the laryngeal area after the swallow and this can lead to aspiration if not cleared with coughing reflexes and/or throat clearing
Impaired or absent cough reflex	Neurological Dysfunction or Respiratory Dysfunction May be due to a desensitized cough reflex secondary to chronic laryngeal stimulation (i.e. chronic aspiration) (Buchholz, 1994)	May lead to aspiration (silent or overt) or penetration, and may increase risk for developing pneumonia. Person may be unable to effectively clear aspirated or penetrated materials.
Penetration of food/fluid at level of larynx; food residue at entrance to airway	reduced laryngeal elevation/closure	May lead to penetration or aspiration if not cleared

Aspiration (silent or overt) during the swallow	reduced anterior laryngeal movement, cricopharyngeal dysfunction, or reduced vocal fold closure	May lead to aspiration pneumonia
Wet or gurgly voice after the swallow	Indicates pooling of the bolus residue on the vocal cords, foods/fluids have penetrated the larynx	Predicts the possibility of silent aspiration (Horner, 1988, 1990) and risk of aspiration (Linden, 1983). Indicates pharyngeal stage dysfunction (Linden, 1983) and reduced airway closure.
Reduced pharyngeal sensation or paralysis		Impedes elevation of the larynx, opening of the upper esophageal sphincter

Source: Sonies (1992), Horner (1988,1990), Mendelsohn (1993), Groher (1994b), Linden (1983), Buchholz (1994)

Appendix 5:
Classification of Prandial Aspiration

Classification of Prandial Aspiration

Aspiration before the pharyngeal phase

- most common type in central neurological disease[1,15,17]
- due to loss of bolus control during oral phase or to delayed pharyngeal swallow
- conservative management: thicken the diet, neck flexion during deglutition, supraglottic swallow, effortful swallow, thermal stimulation[15]
- surgical management: horizontal epiglottoplasty, tongue base flaps, laryngeal suspension[10,50]

Aspiration during the pharyngeal phase

- least common type of aspiration[1,17]
- due to vocal palsy, paresis or inco-ordination
- conservative management: vocal adduction exercises
- surgical management: augment the paralyzed vocal cord[12]

Aspiration after the pharyngeal phase

- due to inhalation of uncleared residue at the laryngeal inlet
- conservative management: thinning the diet, alternating liquids, Mendelsohn manoeuvre[51,52], head rotation[53]
- surgical management: translaryngeal resection of the cricoid lamina, cricopharyngeal myotomy, laryngeal elevation[18]

Source: Mendelsohn, 1993

Appendix 6:
Possible Roles of Dysphagia Team Members

Possible Roles of Members of the Interdisciplinary Swallowing Team

•**Swallowing Therapist (ST)**- This role may be assumed by a number of allied health professionals such as a Speech-Language Pathologist (S-LP), Occupational Therapist (OT), Nurse or Clinical Dietitian. Role statements depend on the facility and level of training for each discipline involved. The swallowing therapist is usually a S-LP (Logemann, 1994).

The ST is responsible for conducting a medical chart review, medication review, dysphagia history of signs and symptoms, bedside evaluation, and dysphagia screening. If the patient is an appropriate candidate for a videofluoroscopic exam, the ST notifies the physician who writes the medical order for a Modified Barium Swallow Study. The Radiologist and ST conjointly conduct the Modified Barium Swallow protocol and concur as to the presence or absence of penetration/aspiration as well as any structural defect. The ST communicates recommendations to the primary care nurse and if appropriate implements an individualized therapy program to provide facilitative and/or compensatory strategies. Couselling is essential and is provided to the patient and family regarding swallowing disorders and any recommendations implemented.

•**Clinical Dietitian** - Traditionally, the role of the Dietitian in the diagnoses and management of dysphagia has been reported in the literature as being the assessment of nutritional status, calorie counts, and initiation and monitoring of alternate feeding routes. Today however, many Canadian dietitians are also taking an active role as the swallowing therapist, including the completion of bedside swallowing assessments, videofluoroscopies, and determining the etiology of dysphagia.

In many situations, the dietitian is the first professional to recognize that a swallowing problem exists, although this is rarely mentioned in the literature. This may occur in the completion of nutritional assessments for weight loss, poor appetite, anemia, dehydration, etc., in which the etiology may be secondary to dysphagia. As such, it is important for the dietitian to incorporate a dysphagia screen into all nutritional assessments and conduct a bedside evaluation of the swallow where appropriate. Logemann (1994) mentions that the respiratory therapist and nurses are often the first to identify dysphagic patients.

In a traditional role, the dietitian conducts assessments on all patients referred to the dysphagia team. This is accomplished via medical chart review, medication review, nutritional and diet histories, and evaluation of nutritional status. In a team where the ST is not a dietitian, the bedside swallowing evaluation and modified barium swallow is usually attended with the ST. The dietitian concurs with the ST regarding appropriate texture and fluid modifications following the bedside evaluation and/or videofluroscopy. Oral, enteral or parenteral nutrition is prescribed and issues regarding the initiation, continuation and/or discontinuation of alternate feeding routes are addressed. Following assessment, a care plan is developed and implemented based on nutritional and dysphagic requirements. This care plan is communicated to physicians, nursing staff and the dysphagia team. The dietitian routinely follows patients to monitor adequacy of oral intake, acceptance of diet,

hydration and nutritional status and swallowing progress. Appropriate education is provided to the patient and family both during hospitalization and for home.

Regular communication between the ST and dietitian is essential, especially when the patient progresses from a non-oral feeding route to an oral feeding route. During this transition, it is extremely important to gradually decrease the enteral feeds pending adequacy of oral intake and nutritional status (Logemann, 1994). This transition must also be communicated to the primary care physician to prevent early discontinuation of the enteral feeds.

•**Occupational Therapist (OT)** - The OT may function as the ST in some hospitals (Logemann, 1994). In a traditional role the OT positions and seats patients for safe swallowing and reduction of muscle spasticity. Responsibilities may include facilitating self feeding through therapy to improve upper extremity strength and coordination, modifying the eating environment and provision of adaptive feeding aids. The OT also educates family/caregivers regarding feeding and positioning interventions.

•**Physiotherapist (PT)** - The PT may provide expertise in positioning the patient to prevent gastroesphageal reflux or to facilitate optimal positioning during meals. The PT may also conduct and supervise a program of general conditioning or muscle strengthening, specifically of the musculature which supports the head and neck.

•**Nurse** - Nursing personnel monitor the patient's medical status and are responsible for addressing any swallowing concerns with the nurse in charge, the physician, or ST. Very often, nursing staff are the first to notice signs and symptoms of dysphagia (Logemann, 1994) and therefore may screen patient at risk for swallowing problems. The nurse is responsible for demonstrating any feeding modifications, administering non-oral feedings, documenting oral and non-oral intake, and cleaning of the patient's oral cavity in order to maintain good oral hygiene. In some hospitals, nurses may provide swallowing therapy (Logemann, 1994) or function as the ST.

•**Attending Physician** - The physician is responsible for making referrals to the Dysphagia Team in cases where dysphagia is suspected and usually writes orders for a Modified Barium Swallow Study. The physician is responsible for making decisions regarding the implementation of recommendations made by members of the dysphagia team. The physician acts as the main coordinator of all care the patient receives.

•**Neurologist** - The neurologist is usually consulted by the attending physician when neurological problems are suspected. The neurologist completes a neurological evaluation focusing on cranial nerves innervating swallow-related musculature. He/she also diagnoses neurological diseases which may present with dysphagic symptoms such as stroke or Parkinson's Disease.

•**Gastroenterologist** - The gastroenterologist may complete evaluation of the swallowing process to rule out esophageal involvement such as strictures, cancer, esphagitis, etc. Esophageal dysphagia is managed with various treatment modalities including dilation, anti-reflux therapy and surgery (Elliott, 1988).

•**Psychologist** - The psychologist may assess the patient to determine if psychological factors, such as anxiety, is contributing to the swallowing problem. Treatment is provided where appropriate and written documentation of the assessment and patient's progress is provided to the physicians and dysphagia team members.

•**Respiratory Therapist** (RT) - The RT provides information related to respiratory disorders, tracheostomy tubes and their use/function, choice of tracheostomy tube, and use of tubes during feedings. He/she may consult with the physician regarding removal of the tube and may develop strategies for feeding patients who require ventilator support. The RT may provide insight into the consequences of aspiration.

•**Social Worker** - The Social Worker may provide counselling to the patient and/or family to assist them in coping with the swallowing disorder and appropriate management. She may help them make informed choices as to management decisions. He/she may also be involved with helping the patient secure financial resources if long-term enteral nutrition is required.

•**Gerontologist** - If the patient is old and/or prognosis is poor, the gerontologist may help the patient, family members and team decide on the most appropriate management (eg. if safe oral feeding is not possible, does the patient continue with oral feeds and risk aspiration or do they begin enteral nutrition?)

•**Pharmacist** - The Pharmacist reviews the patient's medication profile and provides expertise on potential drug interactions and their effect on swallowing ability or xerostomia. If the patient is unable to swallow medications, alternative formulations of drugs (e.g. tablet, capsule, liquid) and methods of administration (e.g. IV, NG tube, etc.) may be suggested. The Pharmacist may also provide recommendations for alternative drug therapy where a patient's current medication (e.g. diuretics, antidepressants) has a negative impact on swallowing ability.

•**Otolaryngologist** - The otolaryngologist evaluates the anatomical structure of the head and neck as well conducts a neurophysiologic assessment of the larynx and pharynx. The otolaryngologist may also complete swallowing assessments using various techniques and surgically intervene where appropriate (Koch,1993).

•**Radiologist** - The radiologist conducts the Modified Barium Swallow with the ST and is usually responsible for patient's well-being during the procedure. If aspiration occurs during the study, the radiologist suctions and medically manages the problem where appropriate. The radiologist and ST concur as to the presence or absence of penetration/aspiration as well as any structural defect observed. The radiologist may provide written documentation of the results of the MBS.

•**Physical Medicine Physician** - This professional may organize the patients dysphagia rehabilitation program to coincide with the overall rehabilitation schedule (Logemann, 1994)

Appendix 7:
Diet Texture Modifications

Various Diet Textures and Fluid Modifications for Dysphagia

Examples of Foods on the Dysphagia Menu	Common Names Used to Describe the Texture/Fluid Level	Rationale for Texture/Fluid Modification
Pureed All food is pureed to a smooth, lump-free consistency with foods that easily form a bolus. Foods textures are homogeneous. Purees may be thick or thin depending on the patient's specific problem Examples: Pureed strained meats, pureed casseroles, vegetables, fruits, smooth cooked cereals, puddings, smooth yogurt	Thresher/Kehoe (1993): Dysphagia Pureed Robertson et al. (1993): Pureed (Viscosity Levels vary) Thick Puree= 2000+ cps Thin Puree= 800-2000 cps Thick Fluid= 250-800 cps Pardoe (1993) Stage One diet	cricopharyngeal dysfunction, poor bolus conrol, reduced oral transit, delayed swallow reflex, impaired mastication, reduced pharyngeal peristalsis, impared lip and tongue control, edentulous oral cavity Usually with this diet, the patient also requires liquid or crushed medications (Martin, 1991)
Pureed/Mechanical Soft All food is either pureed, minced or ground. Examples: Pureed, ground or chopped meats with gravy, pureed fruits and vegetables or soft, moist fruits; may or may not include bread	Thresher/Kehoe (1993): Broken into two categories: Dysphagia Advanced Pureed and Dysphagia Mechanical Soft Robertson et al. (1993): Minced/Chopped Pardoe (1993) Stage Two (included soft breads and moist cakes)	vertical chewing, mild-moderate impairments in oral-pharyngeal function; edentulous oral cavity
Mechanical Soft Food must be cohesive, bolus forming, moist, and not fall apart in the mouth. Examples: ground, chopped or well-cooked meats with gravy, canned fruits and vegetables, includes soft breads, cottage cheese, dry cereal softened in milk	Thresher/Kehoe (1993): Mechanical Soft Robertson et al. (1993): Dysphagia/Dental Soft Pardoe (1993) Stage Three Stage Four (included all foods in Stage Three plus foods with solids and liquids together [eg.veg. soup] and excluded dry breads, tough meat, corn, rice, and apples)	mild deficits in oral transit, decreased rotary chewing, poor dental status, minimal to mild deficits in oral-pharyngeal function
Regular	Pardoe (1993) Stage Five	swallow ability returned to normal

Nectar-thickened Fluids includes ice cream, which when melted has a viscosity similar to nectar	O-Gara (1990) Medium thick liquids: nectar consistency, tomato juice, thick cream soup, buttermilk, ice cream	reduced lingual control; reduced airway protection;reduced oral awareness
Honey-thickened fluids	Pardoe (1993) Thick Fluids: all liquids not classified as a thin liquid. Includes milk, any juice not classified as a thin liquid, sherbet, ice cream O-Gara (1990) Thick Fluids: honey consistency fluids, gelatin, hot cereal, pudding with milk added	reduced lingual control; reduced airway protection;reduced oral awareness
Thin Fluids includes jello which when melted is a thin liquid	Pardoe (1993) Thin Fluids: water; juices thinner than pineapple; other thin liquids except gelatin desserts O-Gara (1990) Thin Fluids:apple juice, water, pineapple, orange, milk, coffee, broth	

Appendix 8:
Letter of Approval from Human Investigation Committee,
Memorial University of Newfoundland

Memorial
University of Newfoundland

Office of Research and Graduate Studies (Medicine)
Faculty of Medicine, The Health Sciences Centre

25 November 1994

FILE COPY

TO: Ms. Kim Butt-Chedore

FROM: Dr. Verna M. Skanes, Assistant Dean,
Research and Graduate Studies (Medicine)

SUBJECT: Application to the Human Investigation Committee ~~#94.93~~ 94.117

The Human Investigation Committee of the Faculty of Medicine has reviewed your proposal for the study entitled **"The Prevalence of Dysphagia in a Nursing Home Population".**

Full approval has been granted from point of view of ethics as defined in the terms of reference of this Faculty Committee.

It will be **your responsibility to seek necessary approval from the hospital(s) wherein the investigation will be conducted.**

Notwithstanding the approval of the HIC, the primary responsibility for the ethical conduct of the investigation remains with you.

Verna M. Skanes, Ph.D.
Assistant Dean

cc Dr. K.M.W. Keough, Vice-President (Research)
Dr. Robin Moore-Orr, Supervisor

Appendix 9:
Consent Form from Research Institution

The Prevalence of Dysphagia in a Long-Term Care Facility
Primary Investigator: Kim Butt-Chedore

Liability Disclaimer Statement

Your signature on this form indicates that you have understood to your satisfaction the information regarding the participation of Hoyles-Escasoni Complex in this research project and agree to have questionnaires filled out by Nursing Staff on all residents who meet the inclusion criteria for the study. You also agree to the completion of chart audits on all residents who meet the inclusion criteria for the study. In no way does this waive your legal rights nor release the investigator from her legal and professional responsibilities.

I, _____, the undersigned, agree to the participation of Hoyles-Escasoni Complex residents in the research study described.

Any questions have been answered and I understand what is involved in the study. I realize that participation is voluntary and that there is no guarantee that I will benefit from my involvement. I acknowledge that a copy of this form has been given to me.

_____ _____
(Signature of Chair of Ethic Board) (Date)

_____ _____
(Witness Signature) (Date)

To be signed by investigator

To the best of my ability I have fully explained to Mrs. Pamela Elliott, as a representative for the Ethics Board at Hoyles-Escasoni Complex, the nature of this research study. I have invited questions and provided answers. I believe that Mrs. Elliott understands the implications and voluntary nature of the study.

_____ _____
(Signature of Investigator) (Date)

Phone Number: 747-4460 (home, after 5 pm)
737-7094 (work, between 9am and 4pm)

Appendix 10:
Chart Review Form

CHART REVIEW FORM (for period from August 01,1994 to February 28,1995) **STUDY NUMBER:** _____
NR= documentation in chart sketchy, variable not addressed
Patient's Name:_____ MCP #: _____
DOB: _____ Sex: M □ F □
Age: _____ <25□ 25-34□ 35-44□ 45-54□ 55-64 □ 65-74□ 75-84 □ 85-94 □ 95-104 □ ≥ 104 □
Died, Death due to: _____
Date of Admission: _____ (number of years/months): _____

Primary Diagnosis (if CVA specify site of lesion): _____

Associated Problem List (conditions related to either malnutrition/inadequate nutrition, dehydration or dysphagia)

_____
_____
_____
_____
_____
_____

Past Medical History

_____
_____
_____
_____
_____
_____

Medication List Max. # of meds taken at one time during the study period: _____

Supplementation:
Iron : YES □ NO□ Type:_____
B_{12} : YES □ NO□
Multivits: YES □ NO□ Type:_____
Calcium: YES □ NO□ Type:_____
Folic Acid: YES □ NO□
Other Vitamins: Type:_____

Antipsychotics:YES □ NO□ Type:
TCAs: YES □ NO□ Type:
Anticholinergics:YES □ NO□ Type:
Other: refer to list

Dysphagia Documented: YES □ NO□ By whom? DR □ R.Dt.□ Nurse□ OT□ PT□ Other: _____
Degree of Dysphagia: Mild □ Moderate □ Severe □

I. **FEEDING STATUS**
A. **Functional Problems Noted:**

choking□
drooling□
gurgly voice after drinking/eating□
coughing□
absent swallow□
reduced gag reflex□
pocketing of food□
food spilling out of mouth □
subjective patient complaint□
trouble drinking fluids□
food residue in mouth□
spitting□
excessive and/or thick saliva □
nasal/oral regurgitation □
refusal to eat/won't open mouth□
lump in throat feeling□
chest pain when swallowing □
meal time > 25 min. or meals longer than nomal□
dysarthria (slurred speech)□

Difficulty Swallowing Meds: YES □ NO□ NR □

B. **Clinical Data:**
Height:_____cm _____in Not recorded □
Wt (within last year): _____kg _____ lbs NR □ (Date: _____) BMI within last year:_____
Present Wt :_____kg _____ lbs NR □ Present BMI: _____
Weight: Loss□ Gain□ Fluctuating□ Stable□ Amt.: _____ NR □ Period of weight loss: _____wks/mo

Skin Integrity:
Presence of Decubitus Ulcers: YES □ NO □ NR □
Skin Intact?: Yes (Firm/Good)□ No (skin breakdown)□ At Risk for breakdown□

Factors Affecting Food Intake:
CHEWING Difficulty?: YES □ NO □ NR □ N/A (i.e on tube feeds) □
NAUSEA: Y□ N□ NR □ VOMITING: Y□ N□ NR □ (record *yes* only if nausea/vomiting ≥3days at a time)
Resident complaints of Not Hungry Y□ N□ NR □
Vision: Adequate/Normal □ Poor □ Blind□ Hearing: Adequate/Normal □ Poor □ Deaf□

C. **Dietary - Restrictions and/or Prescriptions**

Regular☐ Liquids only ☐ (Full fluids ☐ Clear fluids ☐)
NPO ☐ Thick or Thin Liquids?: Thick ☐ Thin ☐ Nectar Consistency ☐ Not Specified☐
Mechanical Soft ☐ Thick Fluids recommended? YES ☐ NO/NR ☐ Date _____ Reason: _____By?
Minced☐ Thicken Fluids ordered? YES ☐ NO ☐ NR ☐ Date _____ Reason: _____
Pureed☐
Therapeutic (specify): _____

D. **Alternative Nutritional Support within past six months:**

None ☐ Nutritional Supplements? YES ☐ NO ☐
TPN ☐ PPN ☐ ENTERAL ☐ (specify: NG ☐, G tube ☐ , J tube ☐, Other: _____)

E. **Assistance with feeding**

ABILITY TO EAT: Level 1 (No assistance) ☐ Level 2 (Partial Assistance) ☐ Level 3 (Total Assistance/Feed)☐
Has to be **suctioned during feeding**: on occasion ☐ frequently ☐ not mentioned in chart ☐
Special utensils required Yes ☐ NO ☐ NR ☐

Feeding

Independent ☐
Independent with physical aids in place ☐
Requires Supervision (1 person to position, place, or prepare) but feeds self ☐
Needs 1 person assistance with some aspects ☐
Needs total assistance of 1 person (liquids and solids) ☐
Fed with assistance (not specified) ☐

 # days/month with no B, D, or S OR
≥ 2 meals missed /day OR
2-3 partial meals /day

Aug: Sept:
Oct: Nov:
Dec: Jan:
Feb:

HYDRATION Status: Adequate ☐ Inadequate ☐ WELL NOURISHED? (as per Nursing reports) YES ☐ NO ☐

Has to be encouraged to eat/drink ☐
Reports Of Eating/Appetite: Poor ☐ Fair☐ Good/Normal ☐ Very Good☐ Excellent☐ NR ☐ (well=good)
Reports of Drinking/Fluid Intake: Poor ☐ Fair☐ Good/Normal ☐ Very Good☐ Excellent☐ NR ☐

F. **Mental status contributing to dysphagia:**

Confused☐ Reduced cognition ☐ Agitated ☐
Impaired perception ☐ Agressive ☐ Drowsy during meals☐
Demented ☐ Psychotic ☐
Aphasia ☐ (Receptive ☐ Expressive ☐)

G. **Medical complications affected by swallowing status**

Suspected aspiration (1)☐ Suspected pneumonia (2)☐
Aspiration Pneumonia (3)☐ Respiratory distress(4)☐
Upper Respiratory Tract Infection (5)☐ GE Reflux (6)☐
Dehydration (7)☐ Malnutrition(8)☐
Inadeq. Oral Intake of food or fluids(9)☐ Increased Temperature >3 days (10)☐
Congestion (11)☐ Other (12)_____
Oral Feeding discontinued Yes ☐ No ☐ NR☐
If yes, specify reason number (eg. 6 = reflux): _____

II. **INTERVENTION**

Indicate whom was consulted for swallowing problems: R.Dt. ☐ OT☐ Dr ☐ Other☐ _____
Who recommended this consult?: Nurse ☐ R.Dt. ☐ OT☐ Dr ☐ Other☐ _____ Other details:
Bedside swallowing assessment completed?: YES ☐ NO ☐ Results: Mild☐ Moderate☐ Severe ☐ NoDysphagia☐
Modified Barium swallow completed?: YES ☐ NO ☐ Results: Mild☐ Moderate☐ Severe ☐ No Dysphagia ☐
Family teaching: YES ☐ NO☐ By whom:_____
Feeding instructions posted or placed in chart: YES ☐ NO☐ By whom:_____

III. OTHER INFO:

AS ANALYSED BY RESEARCHER:
DYSPHAGIA PRESENT ☐ DYSPHAGIA ABSENT ☐ Mild☐ Moderate☐ Severe ☐

Appendix 11:
Nursing Questionnaire

QUESTIONNAIRE

Dysphagia, or swallowing problems, in the elderly population can have detrimental effects on the overall health status. Dysphagia can cause decreased nutritional status, possibly lead to aspiration pneumonia, can negatively effect psychological health and lead to increased morbidity and mortality. There is also increased cost to the health care system due to increased hospitalizations, excessive food wastage, and nursing time necessary for either assistance with meals or performing total feeds.

It is of great importance that patients with eating problems be identified. This is necessary so that, in the future, comprehensive programs may be developed to aid in the maintenance of optimal health status by promoting adequate nutrition and by promoting greater independence for residents during meal times.

Please take a few minutes to fill out the following questionnaire on the assigned resident(s). All questionnaires remain in the strictest of confidentiality.

Note: This questionnaire should be completed by Nursing staff who have worked with the resident for no less than one month.

Resident's name: _____

Resident's MCP number:____/___/___/____

Study number: _____ (to be filled in by investigator)

The bottom portion of this page will be removed by the investigator and stored in a secure place.

Eating Problems: Questionnaire

Study number: _____ (to be filled in by investigator)

How long have you cared for this patient? (please indicate in number of months) ___

1. Does this resident self-feed (i.e. feed him or herself)?
   yes ☐ no ☐ occasionally ☐ unsure ☐

2. Does this resident eat in the dining room?
   yes ☐ no ☐ occasionally ☐ unsure ☐

3. Does this resident require **assistance** at meal time?
   yes ☐ no ☐ occasionally ☐ unsure ☐
   If NO, go to Question # 6.

4. If this resident does require assistance, please check ( ) the form of assistance **most frequently** required:
   a. Positioning ☐
   b. Tray set up ☐
   c. Special utensils needed ☐
   d. Needs constant supervision but does not need to be fed ☐
   e. Needs occasional supervision but does not need to fed ☐
   f. Must be fed ☐
   g. Other _____ (please be specific)

5. If this resident must be fed, approximately how much time is spent feeding this resident per meal (exclude time for positioning, tray set up, etc.)? Please check ( ) the one that best applies.
   a. 0-15 minutes ☐
   b. 16-25 minutes ☐
   c. 26-35 minutes ☐
   d. 36-45 minutes ☐
   e. more than 45 minutes ☐

Please Turn Over

6. Does this resident demonstrate any of the following? Please check ( ) only those that are applicable.

a. not alert enough to eat ☐
b. refuses food during meal times (e.g. will not open mouth, turns head, etc.) ☐
c. does not attempt to self feed but accepts food ☐

7. Does this patient demonstrate any of the following when eating? Please check ( ) **all** of those that are applicable.

a. choking	☐	i. food residue in the mouth	☐
b. drooling	☐	j. spitting	☐
c. gurgly voice	☐	k. excessive or thick saliva	☐
d. coughing	☐	l. nasal or oral regurgitation	☐
e. absent swallow	☐	m. refusal to eat	☐
f. reduced gag reflex	☐	n. feeling of a lump in throat	☐
g. pocketing of food in cheeks	☐	o. chest pain when swallowing	☐
h. food spills out of mouth	☐	p. don't know (can't observe)	☐

8. Does the resident have any present diet modifications? Please check ( ) only one.

a. no diet modifications ☐
b. NPO (nothing by mouth) ☐
c. mechanical soft ☐
d. minced ☐
e. pureed ☐
f. full fluids only ☐
f. clear fluids only ☐

9. Does this resident require **thickened** fluids?

yes ☐ no ☐ occasionally ☐ unsure ☐

If **yes**, please indicate the reason why this resident requires thickened fluids (Be specific) : _____
If you do not know why this resident requires thickened fluids, check here: ☐

10. Does this resident receive nutritional supplements such as Ensure, Boost, Nutren, etc.?

yes☐ no ☐

Please Turn Over

11. Has this resident required alternate nutritional support **in the past six months?** **NOTE: this alternate nutritional support must be related to the resident's inability to eat foods orally and NOT related to surgery.** Please check ( ) the applicable feeding support.

a. IV feeds ☐
b. NG (nasogastric) feeds ☐
c. G-tube (gastrostomy) feeds ☐
d. J-tube (jejunostomy) feeds ☐
e. duodenostomy feeds ☐
f. other: _____

12. In your opinion, has this patient lost weight in the past six months?
yes ☐ no ☐ unsure ☐ If YES, Indicate how much weight was lost: ≤ 5 lbs ☐ 6-10 lbs ☐ 11-15 lbs ☐ 16-20 lbs ☐ > 20 lbs ☐

13. Did this resident have a history of dehydration, within the past 6 months?
yes ☐ no ☐

14. Do any of the following exist? Please check ( ) only those that are applicable.

a. chronic upper respiratory tract infections ☐
b. slurred or laboured speech ☐
c. past history of aspiration pneumonia ☐

15. In your opinion, does this resident have a swallowing problem?
yes ☐ no ☐

16. If YES, would you classify this swallowing problem as:
a. mild ☐
b. moderate ☐
or c. severe ☐

17. Have you received any training specifically on Dysphagia?
yes ☐ no ☐

If yes, please specify how this training was obtained:
a. inservices at Hoyles-Escasoni ☐
b. course work (university, nursing school, etc.) ☐
c. work experience ☐
d. other :_____

Additional Comments or observations:

Thank you very much for your time and effort. The results of this study will be made available to nursing staff as soon as possible.

Appendix 12:
Results of Pilot Study

Pilot Study Methodology and Results

Methodology

Institution Selection/Subject Selection

A pilot study was conducted in February, 1994 in an instituition similar to the institution in the main study. Consent to conduct the study and have access to the resident's charts was obtained from the Director of Nursing. There were 146 residents (15 males, 131 females) in the institution, however only 28 patients (19%) met the inclusion criteria for the study (refer to inclusion criteria for main study). Twenty of these were randomly selected as subjects, via names being drawn from a hat. Questionnaires were filled out by nursing staff who fed the patients. These were either registered nurses (RNs) or registered nursing assistants (RNAs). The main goals of the pilot study was to pretest: the questionnaire for readability and content; the operational definition of dysphagia for accuracy; and the chart audit form for content and usefulness. Nursing staff were invited to provide comments on the layout and readability of the questionnaire.

Questionnaire and Chart Audit Design: Refer to Main Study

Operational Definitions

The *operational definition of dysphagia* for the pilot study is outlined below:

Dysphagia was considered to exist if the resident met one of three criteria:

i. The resident had at any one problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally (e.g. reported signs of choking, drooling, inability to complete an attempted swallow)

ii. There was a history of aspiration pneumonia with a diagnosis of a neuromuscular disease

or iii. Dysphagia was documented in the chart by the physician, dietitian, nurse, or occupational therapist.

Dysphagia was classified as being mild, moderate or severe based on the following associated complications or conditions.

Mild Dysphagia:
The subject

- had at least one problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally
- presented with or without weight loss
- was on pureed, mechanical soft, or some other texture/fluid modification

Moderate Dysphagia:
The subject

- had at least one problem in the oral or pharyngeal stage of swallowing that

affected the ability to feed or be fed orally
- presented with or without weight loss
- was on pureed, mechanical soft, or some other texture/fluid modification
- had a neuromuscular disease and/or dehydration

Severe Dysphagia:
The subject
- had at least one problem in the oral or pharyngeal stage of swallowing that affected the ability to feed or be fed orally
- presented with or without weight loss
- was on pureed, mechanical soft, or some other texture/fluid modification
- had a neuromuscular disease and/or dehydration
- required total enteral nutrition (TEN) or total parenteral nutrition (TPN) and/or suctioning of food or fluids secondary to dysphagia

In ambiguous cases, a speech-language pathologist was consulted to review each individual subject file.

Results of Pilot Study

There were a total of 20 subjects (19 Females/1 Male) with a mean age of 92 years. The age distribution, as outlined in Table 7.1, indicates that 60% of subjects were between the ages of 75 and 94 with approximately one-third of the subjects 95 years of age or older. Sixty percent of subjects had possible dysphagia and there were 40% of subjects without any identifiable signs of dysphagia. Table 7.1 outlines the distribution of those with dysphagia in each age group. Nursing staff indicated that only 10% (n=2) of subjects had a swallowing problem, and that 65% (n=13) of subjects did not have a swallowing problem (this was not recorded for five patients).

Table 7.1: Age Group Distribution and Frequency of Dysphagia (Pilot Study)

Age Group (in years)	Frequency of Subjects in Age Group (N=20)	Percentage of Subjects in Age Group	Frequency of Subjects with Dysphagia (n=12)	Percentage of Subjects with Dysphagia
65-74	1	5%	1	8.3%
75-84	4	20%	2	16.7%
85-94	8	40%	4	33.3%
95-104	4	20%	3	25.0%
≥ 104	3	15%	2	16.7%

Using the operational definitions as indicated, three-quarters of the subjects (n=9) with dysphagia were classified as having mild dysphagia with the remaining subjects having

moderate (n=2) or severe dysphagia (n=1). Three-quarters of these subjects were also on oral nutritional supplementation, with 42% of those with dysphagia having lost weight. Of those without dysphagia, only 25% lost weight (refer to table 7.2). Length of time required for feeding subjects with dysphagia was not recorded for two-thirds of the subjects. For three subjects it took between 0 and 15 minutes and for one subject it took between 16 and 25 minutes. Table 7.3 outlines the necessary assistance at meal time for those subjects with dysphagia. Only one subject required total assistance with feeding. With respect to diet, only 5 subjects were on a texture modified diet as indicated in table 7.4.

Table 7.2: Weight Status: Dysphagic vs. Non-Dysphagic Subjects

	Dysphagic Subjects (n=12) (percentage)	Non-Dysphagic Subjects (n=8) (percentage)
Those with reported weight loss	5 (42%)	2 (25%)
Those with no weight loss	3 (25%)	6 (75%)
Those in which the Nurse was unsure if weight was lost or gained	2 (16.7%)	0
Weight status Not Recorded	2 (16.7%)	0

Table 7.3: Form of Feeding Assistance Required for Subjects with Dysphagia

Form of Feeding Assistance Required	Frequency (n=12)
Requires tray set up	3
Requires occasional supervision but does not need to be feed	1
Requires positioning and feeding	1
Requires positioning and tray set up	2
Requires positioning, tray set up and special utensils	1
Requires enteral feeds	1
Not Recorded	3

Table 7.4: Diet Texture Modifications for Subjects with Mild, Moderate or Severe Dysphagia

Food Texture	Mild (n=9)	Moderate (n=2)	Severe (n=1)	Fluid Consistency	Mild (n=9)	Moderate (n=2)	Severe (n=1)
No texture modification	2	1		Regular fluids	2	1	
Mechanical Soft	1			Occasional thickened fluids	1	1	
Minced	1			Thickened fluids all the time	3		
Pureed	3	1		Nurse unsure if subject on thickened fluids	1		
Not Recorded	2		1 (subject tube feed)	Not Recorded	2		1 (subject tube feed)

After completion of the pilot study the following changes were made for the main study: a question regarding amount of weight loss and a place to indicate the date of completion of the questionnaire was added to the nursing questionnaire; it was decided to review the chart for the six month period preceding completion of the questionnaire; and questions were added to the chart audit form which included use of vitamin/mineral supplementation, use of anticholinergic, antipsychotic, and tricyclic antidepressant medications, reports of visual problems, and reports of medical problems secondary to possible dysphagia.

It was decided that despite the fact that many data were not recorded in the charts, the main study was still feasible since the pilot study does indicate there are significant problems with swallowing in long term care residents.

Appendix 13:
Nursing Care Flow Sheets

Hoyles • Escasoni Complex

NURSING CARE FLOWSHEET

Resident's name: _____ Month/Year: _____

File Number: _____

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ACTIVITIES OF DAILY LIVING	HYGIENE	AM care as per care plan															
		HS care as per care plan															
		Bath (B) shower (S) bedbath (BB)															
		Shampoo (S) Hairdresser (H)															
		Nail care															
		Shave															
	ELIMINATION	Bladder function N															
		voided (V), not voided (O) D															
		incontinent (I)															
		Bowel Function															
		normal (N), diarrhea (D) D															
		No bm (O), constipated (C)															
	NUT	Meals B															
		full (F), partial (P) D															
		fluids (FL), refused (R) S															
	AMB	Ambulation as per care D															
		plan N															
	SLP	Sleep (if not normal)															
		noisy (N)															
		restless (R), wandering (W)															
	SEN	Hearing Aid															
		Eyeglasses															
		Dentures															
SPECIAL NEEDS		Dialysis															
		Catheter Care															
		Tracheostomy care _____															
		_____															
		Ostomy care															
		tube feeding _____															
		_____															
		_____															
		_____															
		_____															
		_____															
		Dressing															
		Skin Care															
		Skin Intact N															
		Y - yes N - no D															
		AR - At Risk															
SAFETY																	
		Bedrails															
		Restraints N															
		Mitts (M), pelvic (P) D															
		Body holder(B)															

			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
ACTIVITIES OF DAILY LIVING	HYGIENE	AM care as per care plan																
		HS care as per care plan																
		Bath (B) shower (S) bedbath (BB)																
		Shampoo (S) Hairdresser (H)																
		Nail care																
		Shave																
	ELIMINATION	Bladder function N																
		voided (V), not voided (O) D																
		incontinent (I)																
		Bowel Function																
		normal (N), diarrhea (D) D																
		No bm (O), constipated (C)																
	NUT	Meals B																
		full (F), partial (P) D																
		fluids (FL), refused (R) S																
	AMB	Ambulation as per care D																
		plan N																
	SLP	Sleep (if not normal)																
		noisy (N)																
		restless (R), wandering (W)																
	SEN	Hearing Aid																
		Eyeglasses																
		Dentures																
	SPECIAL NEEDS	Dialysis																
		Catheter Care																
		Tracheostomy care																
		Ostomy care																
		tube feeding																
		Dressing																
		Skin Care																
		Skin Intact N																
		Y - yes N - no D																
		AR - At Risk																
	SAFETY																	
		Bedrails																
		Restraints N																
		Mitts (M), pelvic (P) D																
		Body holder(B)																

INIT	SIGNATURE

INIT	SIGNATURE

INIT	SIGNATURE

INIT	SIGNATURE

Appendix 14:
Additional Results

Additional Results

Table A: Frequencies of Signs and Symptoms of Swallowing Impairment in Subjects with and without Dysphagia (N=193)

Sign and/or Symptom of Swallowing Impairment	Overall Frequency (N=193)	Dysphagia Absent (n=105)	Dysphagia Present (n=88)	p-Value
Drooling	18	0	18	<0.0001
Pocketing Food in Cheeks	14	0	14	<0.0001
Food Spilling from Mouth	22	1	21	<0.0001
Trouble Drinking Fluids	7	0	7	0.0035
Food Residue in Mouth after Swallowing	20	0	20	<0.0001
Spitting	10	0	10	0.0003
Excess Saliva	9	0	9	0.0007
Choking	42	1	41	<0.0001
Gurgly Voice	11	0	11	0.0006
Coughing	36	1	35	<0.0001
Absent Swallow	7	0	7	0.003
Reduced Gag Reflex	15	0	15	<0.0001
Nasal/Oral Reguritation	5	0	5	0.0185
Suctioning of Saliva/Food Required during/after Meals	4	1	3	0.2472
Subjective Patient Complaint of difficulty swallowing	7	0	7	0.0035
Difficulty Swallowing Meds	6	2	4	0.262
Refusal to Eat	24	3	21	<0.0001
Lump in Throat Feeling	2	0	2	0.2066
Chest Pain when Swallowing	1	0	1	0.4560
Meal Time >25 min. or meals take longer than normal	9	0	9	0.0007
Dysarthria (Slurred Speech)	15	1	14	0.0003
Subject not Hungry	4	3	1	0.3797
Eating has to be Encouraged	37	18	19	0.4343

Table B : Frequencies of Dysphagia According to Various Past Medical History or Diagnosis

Diagnosis or Past Medical History	Dysphagia Absent	Dysphagia Present	Percentage of Subjects with Dysphagia
Psychiatric Diseases			
Alzheimers Disease	30	33	52%
Organic Brain Syndrome*	1	4	80%
Dementia/Senility	14	14	50%
Depression	17	9	35%
Other Psychiatric Illness	5	8	62%
Neurologic Disorders			
Cerebrovascular Accidents	18	16	47%
Parkinson's Disease*	2	2	50%
Myastenia Gravis	0	9	100%
Cerebral Palsey	6	4	40%
Head Injury	6	4	40%
Epilepsy	6	2	25%
Multiple Sclerosis*	2	1	33%
Other			
Fractured Hip	15	8	35%
Pneumonia	5	4	44%
Aspiration Pneumonia*	2	0	0%
Seizures	11	7	39%
Diabetes	20	12	38%
Hiatal Hernia,GERD, Gastritis	7	5	42%

Table C: Associated Problem List (conditions affecting malnutrition, dehydration, or dysphagia)

Problem	No Dysphagia	Mild Dysphagia	Moderate Dysphagia	Severe Dysphagia
Other	3	2	2	0
Anemia	6	2	1	0
Fractured Hip	1	0	0	0
Malnutrition	2	1	1	0
Decubutis Ulcers	2	0	0	0
Alcohol Abuse	2	0	0	0
Cataracts/Glaucoma	1	1	1	0
Dystonia	0	1	0	0
Systemic/Medical				
Osteoarthritis	0	0	1	0
Pneumonia	1	1	0	0
Potential for Pneumonia	0	0	1	0
Cholesystectomy	1	0	0	0
Glucose Intolerance/Diabetes	1	0	0	0
Hypertension	1	0	0	0
Hypo/Hyperthyroidism	0	0	1	0
Urinary Tract Infection	15	11	3	0
Neurological				
CVA	2	1	2	0
Seizures, Epilepsy	6	7	2	0
TIA's	0	1	1	0
Globally Impaired	4	4	0	0
Head Injury	1	0	0	0
Physical				
Paraplegia	1	1	0	0
Psychiatric				
Mental Retardation	0	0	0	1
Dementia	0	0	1	0
Schizophrenia	3	0	0	0
Depression	7	1	2	0
Gastrointestinal				
Hiatal Hernia	5	2	1	0
Diverticular Disease	1	1	0	0
Chronic Diarrhea	9	2	2	0
Emesis	4	2	3	2
Constipation/Chronic Laxative Use	19	30	18	4
Dry, Sore, or Ulcerated Mouth	8	1	3	0
Peptic Ulcer	0	1	0	0
Sore Throat	5	2	0	0
Barrett's Esophagus	0	0	1	0
Dysphagia	0	1	0	0

Table D: Past Medical History and Presence of Dysphagia

Past Medical History	No Dysphagia	Mild Dysphagia	Moderate Dysphagia	Severe Dysphagia
Other	57	0	0	0
Anemia	18	8	4	2
Fractured Hip	14	4	4	0
Fractures	9	3	3	0
Malnutrition	1	1	0	0
Dehydration	1	0	1	0
Decubitis Ulcers	5	3	2	0
Alcohol Abuse	8	2	1	0
Cataracts/Glaucoma	12	6	5	0
Dysarthria	0	1	0	0
Anorexia	0	1	0	0
Obesity	2	3	0	0
Facial Paralysis	0	0	1	0
Polypharynx	0	1	0	0
Systemic/Medical				
Osteoarthritis	20	5	6	0
Osteoporosis	6	4	3	0
Pneumonia	5	1	3	0
Aspiration Pneumonia	2	0	1	0
Cholecystitis	11	0	3	0
Glucose Intolerance/Diabetes	16	8	2	0
Hypertension	18	11	8	1
Hypo/Hyperthyroidism	0	6	5	2
Urinary Tract Infection	13	1	6	0
Cancer	6	5	4	0
Atherosclerosis, Angina,AF,BBB,CHF,IHD,MI	38	8	11	1
Chronic Respiratory Infections/Distress	1	1	2	1
Periperal Vascular Disease	3	0	0	0
Gout	2	1	0	1
Chronic Obstructive Lung Disease	6	4	4	1
Neurological				
CVA	6	4	2	1
Seizures, Epilepsy	17	4	4	1
TIA's	5	2	4	0
Globally Impaired	1	0	0	0
Head Injury	1	1	0	0
Frontal Lobe or Organic Brain Syndrome	0	0	2	0
Degenerative Cerebral Problem	0	1	0	0
Neuralgia	1	0	0	0
Parkinsons Disease	0	0	1	0
Myasthenia Gravis	0	9	0	0
Huntington's Disease	1	0	0	0
Physical				
Paraplegia	4	0	1	0

Psychiatric				
Mental Retardation	4	0	1	1
Dementia,Senility	5	3	2	0
Schizophrenia	5	4	2	0
Depression	14	7	1	0
Alzheimers Disease	1	0	0	0
Autonomic or Diabetic Neuropathy	2	0	0	0
Jacob Creutzfeld Disease	0	1	0	0
Gastrointestinal				
Hiatal Hernia,GERD,Gastritis	7	1	4	0
Diverticular Disease	6	1	1	0
Ishemic Bowel Disease	0	1	0	0
Emesis	1	0	1	0
Constipation/Hemorrides	5	2	2	0
Dry, Sore, or Ulcerated Mouth	2	0	0	0
Peptic,Esophgeal,Gastric,Duodenal Ulcer	6	1	4	3
Sore Throat	1	0	0	0
Gastrectomy,Gastric Surgery	2	0	1	1
Bowel Obstruction, Ostomy, Resection	2	2	1	0
Dysphagia	0	4	2	2

Table E: Distribution by Diet Texture Modifications and Level of Severity

Dysphagia Severity	Regular	Mech. Soft	Minced	Pureed	Full Fluids	NPO or Enteral feeds	Not Recorded	Total
Mild	5	3	21	18	1	0	1	49
Moderate	8	5	10	8	2	0	1	34
Severe	0	1	0	1	0	3	0	5
Dysphagia Absent	60	2	23	1	0	1	18	105
Total	73	11	54	28	3	4	20	193

chi square= 201.73; df=21; p-value=0.000000000

Table F : Frequency of Subjects in each Percentile of Inadequate Oral Intake

Percentage of days thoughout study period with inadequate oral intake(the resident missed ≥ 2 meals per day or ate only 2-3 partial meals per day)	Frequency (Percentage) of subjects in each category
5-9.9%	9 (4.7%)
10-14.9%	30 (15.5%)
15-19.9%	49 (25.4%)
20-24.9%	33 (17.1%)
25-29.9%	16 (8.3%)
30-34.9%	17 (8.8%)
35-39.9%	8 (4.1%)
40-44.9%	6 (3.1%)
45-49.9%	0
50-54.9%	4 (2.1%)
55-59.9%	3 (1.6%)
60-64.9%	3 (1.6%)
65-69.9%	3 (1.6%)
70-74.9%	2 (1.0%)
75-79.9%	0
80-84.9%	1 (0.5%)
85-89.9%	0
90-94.9%	1 (0.5%)
95-99.9%	1 (0.5%)
not applicable	2 (1.0%)
Not recorded	5 (2.6%)
TOTAL	193

Table G: Relationship with Adequate Oral Intake and Presence of Dysphagia

Percentage of days with inadequate oral intake	Dysphagia		TOTALS*
	Absent	Present	
5-14.9%	19	20	39
15-19.9%	32	17	49
20-24.9%	21	12	33
25-29.9%	8	8	16
30-34.9%	10	7	17
35-44.9%	5	9	14
≥45%	6	12	18
TOTALS	101	85	186

*Information was not recorded for 5 subjects and oral intake was not applicable for 2 subjects

chi square = 9.44; df = 6; p value = 0.1504

Table H: Vitamin/Mineral Presciptions

Vitamin and Mineral Use in Residential Population		
Vitamin or Mineral Prescibed	Frequencies and Percentage of Subjects taking Vitamins/Minerals	Specific Type of Vitamins/Minerals
Iron Supplement	10/193 = 5.2%	3/10 ferrous gluconate 1/10 multivitamin 3/10 ferrous sulphate 3/10 not specified
B_{12}	20/193 = 10.4%	
Multi Vitamins	12/193 = 6.2%	1/12 multivitamin with Iron 1/12 Centrum 1/12 multivitamin with Zinc 3/12 not recorded 6/12 Maltevol 12
Calcium	4/193 = 2.1%	2/4 calcium carbonate 2/4 Os-Cal-D
Folic Acid	4/193 = 2.1%	
Other Vitamins	1/193 = 0.5%	Alertonic

Table I: Antipsychotic Medication use

Antipsychotic Medications	Frequency (# subjects taking)
Loxapine	11
Haldol	9
Chlorpromazine	6
Perphenazine	6
Pimozide (orap)	1
Thioridazine	2
Loxapine & Haldol	1
Trifluoperazine	1
Methrotrimeprazine	1
Flupenthixol	1
Methotrineprazine & Perphenazine	1
Pericyazine & Chlorpromazine	1
Loxapine & Chlorpromazine	2
No Antipsycotic Medication Used	146
not recorded	4
TOTAL	193

Table J: Tricyclic Antidepressant (TCA) Use

Tricyclic Antidepressant	Frequency	Percentage
Nortriptyline	1	0.5%
Trimipramine	5	2.6%
Amitriptylene	8	4.1%
Desipramine	2	1.0%
Clomipramine	1	0.5%
no TCA used	172	89.1%
not recorded	4	2.1%
Total	193	

Table K: Use of Other Medications

Other Medication Types	Frequency	Percentage
Ativan/Lorazepam	36	18.7
Ipatropium Bromide	3	1.6
Gravol	4	2.1
Captopril	1	0.5
Ativan & Gravol (prn)	2	1
Ativan & Atrovent	1	0.5
No other meds	143	74.1
Not recorded	4	2.1
TOTAL	193	100%

Table L: Relationship between Other** Drug Use and Presence of Dysphagia

	No use of Other meds**	Use of Other meds	TOTAL*
Dysphagia Absent	83	20	103
Dysphagia Present	59	27	86
TOTAL	142	47	189

** includes ativan, ipatropium bromide, gravol, captopril, or combinations of these.
*not recorded for 4 subjects.
OR = 1.90; uncorrected chi square = 3.60;p value = 0.0578176

Table M: Nutritional Supplement Use as per Nursing Questionnaire and Chart Review

	Questionnaire NO nutritional supplements	**Questionnaire** HAS nutritional supplements	Supplement use not recorded* in Questionnaire	Total
Chart Review NO nutritional supplements	110	9	2	121
Chart Review HAS nutritional supplements	33	20	0	53
Supplement use not documented* in Chart	16	3	0	19
Total	159	32	2	193

* not used in statistical analysis

cohen's kappa=0.345; var(k)=0.0077; z=3.93; CI=0.1719