

Management of dysphagia in advanced oropharyngeal cancer

Jamie L Penner, Susan E McClement, Jo-Ann V Sawatzky

Abstract

Individuals with advanced oropharyngeal cancer often experience dysphagia as a result of their illness and its treatment. Research consistently demonstrates that dysphagia and difficulty with oral intake have many implications, including a negative impact on quality of life. Nurses are in a key position to provide support and initiate appropriate interventions for individuals with dysphagia. Using the Human Response to Illness model (Mitchell et al, 1991) as an organising framework, this paper presents a critical review of the empirical literature regarding dysphagia in individuals with advanced oropharyngeal cancer that will: i) provide the reader with a comprehensive understanding of dysphagia; ii) identify current gaps in our knowledge; and iii) establish the foundation for appropriate evidence-based interventions to optimise functioning and quality of life in this patient population.

Each year, thousands of Canadians are affected by a diagnosis of cancer. It is estimated that in 2006 there will be approximately 153,000 new cases of cancer diagnosed in Canada (Canadian Cancer Society (CCS), 2006). Among these will be individuals diagnosed with cancer of the head and neck, including approximately 130 new cases of oropharyngeal cancer (CCS, 2006). Despite the relatively low incidence of oropharyngeal cancer, the specific needs of this patient population are substantial. Individuals with advanced oropharyngeal cancer experience a multitude of challenges as they respond to their illness, including difficulty with speech, breathing, and the ability to eat and drink. Dysphagia, defined as difficulty swallowing (Zorowitz and Robinson, 1999), is present in over 50% of head and neck cancer patients before treatment, particularly in those with advanced stage disease (Pauloski et al, 2000). Of particular concern is that many of these individuals suffer with dysphagia long after treatments are complete, which poses significant challenges in the areas of nutrition and hydration, and increases the risk of

aspiration. Of equal importance is that difficulty with oral intake also negatively affects the social interactions and emotional wellbeing, and consequently the quality of life (QoL) in this patient population.

The purpose of this article is to present a critical review of the empirical literature, and provide the reader with a comprehensive understanding of dysphagia in patients with advanced oropharyngeal cancer; identify current gaps in our knowledge; and establish the foundation for appropriate, evidence-based interventions to optimise the functioning and QoL. The Human Response to Illness model proposed by Mitchell et al (1991) will provide an organising framework. This model focuses on the physiologic, pathophysiologic, behavioural and experiential perspectives of the response to illness; all of which are central to the practice of nursing, and encompass a holistic approach to nursing care and research.

Background

Cancer of the head and neck is a phrase used to describe various neoplasms that arise from the mucosa of the upper aerodigestive tract. The more common of the head and neck cancers broadly include the mouth (oral cavity), pharynx (throat) and the larynx (voice box) (CCS, 2006). The majority of pharyngeal tumours are squamous cell carcinomas and occur in the oropharynx ('back of the mouth'). Oropharyngeal cancer includes neoplasms at the base of the tongue, tonsils, soft palate and pharyngeal walls. It is frequently diagnosed at an advanced stage (III or IV) and is characterised by invasion of surrounding tissues and involvement of cervical lymph nodes (CCS, 2006).

Oropharyngeal cancer is a disease of the aging adult. The majority of cases occur in individuals in the fifth and sixth

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decades; however, younger individuals may also be affected. Men are diagnosed with oropharyngeal cancer approximately three times as often as women (CCS, 2006). The five-year survival rate for advanced head and neck cancer is poor (<50%), due in part to late presentation (Jemal et al, 2006). Moreover, despite significant research into treatment regimens for head and neck cancer, patient survival rates have remained relatively unchanged over the past several decades (Jemal et al, 2006).

Various lifestyle factors dramatically increase the risk of oropharyngeal cancer, including tobacco use and alcohol consumption (CCS, 2006). Although the risk gradually declines with smoking cessation, the use of tobacco is a major risk factor for oropharyngeal cancer (Lewin et al, 1998). Heavy alcohol consumption (>20 g per day) also increases the risk of developing this disease, particularly if

it is combined with smoking (Lewin et al, 1998).

The Human Response to Illness model

According to Mitchell et al (1991), human response phenomena should be considered from physiologic, pathophysiologic, behavioural and experiential perspectives (Figure 1). While physiologic responses are based on the concept of normal biologic functioning, pathophysiologic responses indicate malfunction in the direction of decompensation. Behavioural responses are observable and measurable motor and verbal behaviours associated with the phenomenon of interest. Finally, experiential responses include concepts of personal experience and shared meaning about the phenomenon, as measured by self-report. An understanding of human responses from these four perspectives and the interrelationships between them are central to the practice of nursing. Furthermore, each of these perspectives can be understood in relation to their interaction with person and environmental factors to encompass a holistic view.

The Human Response to Illness model will provide a framework to gain insight into the multiple interacting perspectives of dysphagia in advanced oropharyngeal cancer. A comprehensive understanding of the physiology of swallowing and the pathophysiology of dysphagia, as well as the behavioural and experiential perspectives of this phenomenon will establish sound rationale for interventions. In addition, by considering these multiple perspectives, gaps in knowledge will be exposed, and key questions related to nursing science will be generated.

Swallowing physiology

The normal physiology of swallowing is well documented in the literature. Effective swallowing requires a complex and coordinated sequence of neuromuscular movements involving the oral cavity, pharynx and larynx. These movements are both voluntary and reflexive in nature, and serve in the manipulation and propulsion of the food bolus in the upper aerodigestive tract while protecting the airway (Hembree, 1997). Normal swallowing function is commonly divided into four stages: i) the oral preparatory stage ii) the oral stage iii)

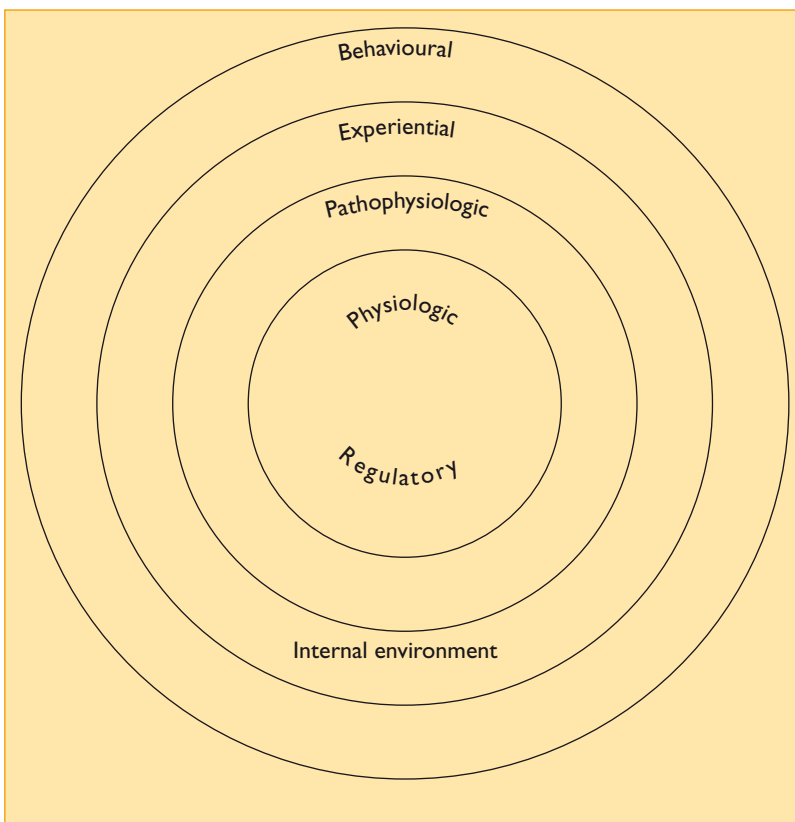


Figure 1. Human Response to Illness model. Relationships of the four perspectives of human responses. The responses within each perspective relate to each other and communicate with the internal and external environment
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the pharyngeal stage and iv) the esophageal stage (Khosh and Krespi, 1997).

The oral preparatory stage involves manipulation and mastication of food in the mouth, where it is broken down and collected into a bolus. The tongue elevates in an anterior-posterior direction during the oral phase of swallowing to propel the food bolus posteriorly into the pharynx, triggering the pharyngeal swallow. During the pharyngeal stage of swallowing the tongue moves the food bolus posteriorly and downward through the pharynx. At the same time, the airway is protected against aspiration by closing of the vocal and aryepiglottic folds, as well as elevation and forward movement of the larynx. Finally, peristalsis moves the food bolus from the pharynx through the esophagus during the esophageal stage of swallowing. The lower esophageal sphincter relaxes upon arrival of the food bolus, allowing the bolus to pass into the stomach (Khosh and Krespi, 1997).

Pathophysiology

Dysphagia occurs when there is a disruption in the normal anatomy or neuromuscular control of the structures involved in swallowing (Hembree, 1997). In advanced oropharyngeal cancer, primary tumours in the oropharynx may limit movements of the mandible or tongue, or cause an obstruction, resulting in difficulty with mastication or premature spilling of food bolus into the open airway (Zorowitz and Robinson, 1999).

Treatments for advanced oropharyngeal cancer often contribute to the pathophysiology of dysphagia. Standard treatment modalities for advanced oropharyngeal cancer involve surgery, followed by post-operative radiation therapy, or concomitant chemoradiation organ preservation therapy (CCS, 2006). Surgical resection of the base of the tongue causes loss of bolus control and premature spilling of the bolus into the pharynx. Resection of the tonsils or pharyngeal wall may interfere with transportation of the bolus due to decreased contraction of pharyngeal constrictor muscles or altered sensation. Resection of the submental muscles impedes hyolaryngeal elevation required to protect the airway from aspiration (Zorowitz and Robinson, 1999).

During radiation therapy, critical structures necessary for normal deglutition commonly fall within the irradiated field. The radiation therapy field usually covers a large

area of the head and neck to ensure that both the tumour and regional lymph nodes are treated with an adequate dose. Early changes to oral and oropharyngeal tissues following radiotherapy include mucositis and erythema, which cause pain and a burning sensation on swallowing (Arcuri and Schneider, 1992). Necrosis of the tongue has also been observed following high-dose radiotherapy to the tongue, tongue base and oropharynx (Arcuri and Schneider, 1992).

Other acute complications of radiotherapy, including taste disturbances, decreased saliva production, dental problems and hoarseness, can be distressing for patients (Czreninski and Kaplan, 2005). Physiological changes that persist six months or longer after radiotherapy involve hyposalivation and vascular changes that can reduce blood supply to the muscles and cause tissue fibrosis, abnormal motility and stenosis of the pharynx (Czreninski and Kaplan, 2005). Such tissue fibrosis can limit protective laryngeal movement, placing the patient at risk for aspiration.

Organ-preserving treatments, including the combinations of radiotherapy and chemotherapy, have been developed for individuals with advanced head and neck cancer in an attempt to improve prognosis and maintain anatomical structure. The assumption is that combined chemoradiation therapy will preserve the function of the treated organ and decrease morbidity associated with surgery and postoperative radiation. However, despite high rates of locoregional disease control and preservation of anatomical structure, concurrent chemoradiation treatment still has a long-term complication of dysphagia (Hanna et al, 2004). Specifically, chemotherapy has been found to have a radiosensitising effect, thus increasing the severity of adverse effects when given in combination with radiation therapy (Hanna et al, 2004).

Behavioural response

A variety of observable behaviours are indicative of dysphagia in patients with advanced oropharyngeal cancer. Commonly, individuals experiencing dysphagia will exhibit effortful swallows or a delay in initiating a swallow (Hembree, 1997). Drooling or the accumulation of food in the mouth may be noted in patients with poor lingual movement (Hembree, 1997). Furthermore, difficulty with swallowing often elicits a cough reflex, nasal or

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oral regurgitation, or the presence of a 'wet' voice quality (Hembree, 1997). These overt signs of dysphagia are important to recognise in the clinical examination and provide a strong basis for further objective clinical assessment of swallowing function.

The 'gold standard' for objective and direct assessment of swallowing function in patients with head and neck cancer is videofluoroscopy. This radiographic technique is designed to enable observation of the anatomy and physiology/pathophysiology of deglutition and identify strategies to improve swallowing safety or efficiency. For example, measured by videofluoroscopy, postsurgical oropharyngeal cancer patients have demonstrated decreased swallowing function postoperatively, with little improvement after 12 months (Pauloski et al, 1994). Furthermore, individuals treated with radiotherapy postoperatively commonly experience delayed radiation fibrosis resulting in decreased oropharyngeal swallow efficiency, a summary measure of swallowing function (Pauloski et al, 1994).

Despite the increased use of organ-preserving treatment modalities that presumably decrease the functional morbidity associated with surgery and radiation therapy, many individuals treated for advanced oropharyngeal cancer experience dysphagia regardless of the treatment modalities they receive. More specifically, when measured with videofluoroscopy, patients with locally advanced head and neck cancer demonstrate reduced tongue base retraction, reduced tongue strength and control, weakened pharyngeal muscles, and decreased laryngeal elevation resulting in reduced airway protection following treatment with chemoradiation (Logemann et al, 2006).

Swallowing function and dysphagia can also be assessed indirectly. Individuals diagnosed with oropharyngeal cancer often have difficulty with oral intake and are undernourished before the initiation of their treatment (Dixon, 2004). The toxic effects of treatments exacerbate swallowing problems in patients with advanced stage disease and thus place them at further risk for diminished nutritional status. Individuals with advanced oropharyngeal cancer receiving chemoradiotherapy for organ preservation often experience dehydration, electrolyte imbalance and undernutrition, requiring gastrostomy tube placement for nutritional support or enteral fluid replacement (Hanna et al, 2004).

Dysphagia elicits a high risk for aspiration in individuals with advanced oropharyngeal cancer. Aspiration is most commonly attributed to decreased laryngeal elevation and a delay in triggering the pharyngeal swallow (Lundy et al, 1999). This is particularly troubling in light of the fact that treatment modalities for patients with advanced oropharyngeal cancer are associated with these specific behavioural effects. Treatments consisting of combined chemoradiation therapy have an especially high risk of potentiating aspiration and aspiration pneumonia (Eisbruch et al, 2002). Careful assessment and appropriate interventions by a multidisciplinary team of nurses, speech language pathologists, dieticians, and physicians are imperative to address these potentially life-threatening sequelae of swallowing difficulty.

Because of the multidimensional impact of dysphagia on patients with advanced oropharyngeal cancer, QoL is often compromised. Accordingly, there has been a growing interest in research related to QoL in head and neck cancer patients. Reliable and valid measures of QoL facilitate a relatively objective evaluation of the indirect assessment of dysphagia. In a prospective study using the University of Washington Quality of Life (UW-QoL) questionnaire (Hassan and Weymuller, 1993), Deleyiannis et al (1997) compared pre- and post-treatment QoL scores of 13 individuals undergoing surgery and/or radiotherapy for advanced (stage III or IV) oropharyngeal cancer. They found that regardless of treatment modality, treatments were associated with a worsening of QoL in these particular patients, specifically with respect to chewing, swallowing and shoulder disability. Limitations of this study included its small sample size and the possible confounding of outcomes related to variations in the surgical resection, reconstruction and radiation techniques employed.

As organ-preserving surgical techniques and non-surgical treatment modalities for advanced oropharyngeal cancer have become more common, there has been an assumption that preserving an organ will uniformly result in a higher QoL (El-Diery et al, 2006). However, individuals with advanced oropharyngeal cancer who undergo surgery and radiation therapy or receive chemoradiation alone, experience similar effects of radiation therapy, overall swallowing difficulties, and levels of social

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disruption (El-Diery et al, 2006). In a retrospective study by Nguyen et al (2005), 73 patients who complained of dysphagia after radiotherapy, chemoradiotherapy, and postoperative radiotherapy were evaluated and compared to 31 patients who did not experience dysphagia post-treatment. The sample was heterogeneous, including various tumour sites and stages of disease.

Their findings revealed that dysphagia contributes to significant morbidity after treatment for head and neck cancer, and the severity of dysphagia correlates with a decreased QoL, regardless of treatment modality. Patients with moderate-to-severe dysphagia had significantly lower QoL scores compared to patients with no or mild dysphagia, measured by the UW-QoL and Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983) questionnaires. No distinction was made between the differences in QoL related to different tumour sites.

The MD Anderson Dysphagia Inventory (MDADI) is a tool designed to evaluate the impact of dysphagia on the QoL of patients with head and neck cancer (Chen et al, 2001). A strength of the MDADI is that it discriminates between groups of individuals with various tumours commonly found in the head and neck cancer population. Studies that have used the MDADI report that oral and oropharyngeal cancer and its associated treatments results in significantly greater swallowing difficulty as compared to other head and neck tumour sites, which, in turn, translates to an adverse impact on QoL after treatment (Chen et al, 2001; Gillespie et al, 2004).

Experiential response

Eating problems for people with advanced oropharyngeal cancer are severe, and often present before, as well as long after, treatments have finished. Despite this, few studies examining the subjective experience of dysphagia are found in the literature. A correlational descriptive study by Langius et al (1993) examined the perceived symptoms of oral and pharyngeal cancer patients before undergoing treatment. The most common problem identified by these patients was that of a subjective perception of eating difficulties. In particular, patients identified throat irritation, chewing problems, pain, and mouth dryness as contributing to their perceived eating problems (Langius et al, 1993). Difficulty with oral intake

also negatively affects the social interactions and emotional wellbeing of advanced oropharyngeal cancer patients. In a study by Larsson et al (2003), a phenomenological approach was used to gain an understanding of patients' lived experiences of dysphagia. Eight patients undergoing radiation therapy for cancer of the head and neck were interviewed to acquire an understanding of the meaning they attached to eating problems. Difficulties with eating and feelings of embarrassment caused individuals to avoid being around others, especially at mealtimes. Missing out on the stimulation of such shared activity resulted in feelings of social isolation. As such, the issue of QoL for these individuals is once again brought to light. Although most appropriate to consider as an indirect behavioural response, due to its objective measurability, it should be noted that decreased QoL related to dysphagia is also largely reflected through the subjective experiences of patients with advanced oropharyngeal cancer (Deleyiannis et al, 1997; Nguyen et al, 2005; El-Diery et al, 2006).

Interventions

The Human Response to Illness model has facilitated a comprehensive understanding of the multiple interacting perspectives of dysphagia in advanced oropharyngeal cancer. The knowledge gleaned related to the normal physiology of swallowing, the pathophysiology of dysphagia, specific to oropharyngeal cancer, and the objective and subjective measurement of this phenomenon, establishes sound rationale for interventions to optimise swallowing function and QoL in this patient population. Although there is minimal published research in this regard, there is emerging evidence that provides reason for cautious optimism. A discussion of the available research evidence related to interventions for dysphagia in advanced oropharyngeal cancer provides direction for knowledge translation in nursing practice and future research.

Lazarus (1993) examined the effects of the super-supraglottic swallow (designed to improve airway closure during the swallow), and the Mendelsohn manoeuvre (designed to increase laryngeal elevation and improve clearance of the bolus in the pharynx), in two groups of patients experiencing dysphagia six months and greater than ten years after radiotherapy. Using

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videofluorographic swallowing studies, they found that both manoeuvres were effective in improving the movement of pharyngeal structures during the swallow, resulting in improved bolus clearance, airway protection, and elimination of aspiration. As this study included a small sample size ($n=7$), with varying tumour sites, it lacks scientific rigour and generalisability.

In a subsequent pilot study, Lazarus et al (2002) examined the effects of four voluntary swallow manoeuvres on tongue base function during swallowing in three patients with head and neck cancer. Preliminary data, measured by manometry and videofluoroscopy, revealed that voluntary swallowing manoeuvres increased tongue base-pharyngeal wall pressures and contact duration during swallowing. These findings indicate that voluntary swallowing manoeuvres may enhance the posterior motion of the tongue, thereby improving the patient's ability to eat. Although these researchers assert that future studies will examine the effects of these four swallowing manoeuvres in a larger number of patients, the specific tumour sites or treatment modalities are not articulated.

Lazarus et al (2000) examined tongue function and its relation to swallowing in 13 subjects with oral or oropharyngeal cancer, treated with primary radiotherapy with or without chemotherapy, and 13 control subjects. Despite a small sample size, the study reported significant correlations of tongue strength and some temporal swallow measures, such as oral transit time and number of swallows per bolus ($r=0.66$ to 0.85), in head and neck cancer patients. As a result, these authors identified the need for future studies to examine the effects of tongue strengthening exercises on swallowing function, anticipating that improvement in tongue function will improve oral and pharyngeal stage swallowing.

The association between dysphagia and decreased QoL in head and neck cancer patients suggests the logical hypothesis that swallowing interventions may improve swallowing function, which, in turn, may have a positive impact on the QoL of these individuals. However, similar to that of objective swallowing function, minimal work has been done in relation to swallowing interventions and dysphagia-specific QoL. Recently, a cross-sectional analysis by Kulbersh et al (2006) evaluated the efficacy of pretreatment swallowing

exercises on swallowing-specific QoL. Thirty-seven patients in the study were undergoing organ preservation therapy for various head and neck cancers, and received swallowing exercises either before, or after, initiation of treatment. Their study suggested that pre-treatment swallowing exercises may improve swallowing-related QoL in patients receiving organ preservation therapy. It is noted that this finding needs to be evaluated in a larger study alongside objective measures of swallowing.

Research directions

Considering dysphagia in patients with advanced oropharyngeal cancer from the various perspectives outlined in the Human Response to Illness model has facilitated an understanding of this phenomenon and exposed gaps in our knowledge of this illness response. For example, the heterogeneity of tumour sites in head and neck cancer often makes it difficult to delineate site-specific findings in the research literature. Given that specific tumour sites exhibit different symptoms and involve varying treatment modalities, it is important for researchers to clearly define the population of interest.

Little research has been done in relation to the lived experience of dysphagia in patients with advanced oropharyngeal cancer and the meaning that these individuals attach to their experience. Individuals coping with dysphagia have many problems related to eating and simply managing their own oral secretions. Based on the literature that does exist, it is clear that dysphagia has a negative impact on patients' social interaction and emotional wellbeing. A deeper understanding of the personal experience of dysphagia could offer rich information to inform future work, and provide useful insights into the management of swallowing difficulties and supportive psychosocial interventions.

Finally, research examining swallowing interventions in relation to functional outcomes and dysphagia-specific QoL is scarce. Studies that have been done in this area have used small samples and have not identified specific tumour sites, making it difficult to generalise findings. There is clearly a need for further research to examine the effects of specific interventions on swallowing function and QoL in patients with advanced oropharyngeal cancer. Multi-site collaborations would facilitate larger samples sizes and

provide additional insight into strategies to cope with this adverse response to illness.

Conclusion

The Human Response to Illness model provides a framework for nurses to glean a comprehensive overview of dysphagia in this patient population. A review of the current evidence related to swallowing interventions revealed preliminary findings that appropriate swallowing exercises improve the movement of necessary swallowing structures. These findings have established reason for cautious optimism that swallowing function and QoL in these patients can be improved. Further research related to both the lived experience of dysphagia, and the efficacy of appropriate nursing interventions related to swallowing, are needed to expand nursing knowledge and improve patient outcomes in advanced head and neck oncology.

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Key words

- Dysphagia
- Advanced cancer
- Oropharyngeal
- Human response
- Nursing interventions