6

Optimizing Clinical Management of Head and Neck Cancer

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Introduction

The complex nature of head and neck cancer (HNC) and it's management presents clinical and service delivery challenges for professionals working with this population. The disease process, along with patient's age, comorbidities, acute and long-term effects of treatment, altered or loss of function, psychosocial factors, financial loss, and the impact on quality of life required optimization of patient care using a multidisciplinary, coordinated, and systematic approach. Historically, multidisciplinary coordinated care teams and services guided by clinical pathways (CP) have not been widely utilized. Patients may have been evaluated by one or some members of the oncology team, thereby potentially lessening the opportunity to receive treatment based on best practice models and without exposure to available research/clinical trials. Therefore, the collective clinical expertise of the MDT provides valuable input during the critical decision-making process to define potiential and resonable treatment options. The impact from HNC treatment and managing treatment side effects has become a significant public health issue because of the magnitude of the loss of function suffered by patients, the cost of service provision, and the high level of clinical expertise required by cancer providers (Gooi et al., 2016; Miller et al., 2016; National Comprehensive Cancer Network, 2017). Of equal importance is input provided by allied health professionals. Unfortunately, allied health professionals are not always included as integral members of the MDT. Referrals for the evaluation and management of anticipated functional problems from HNC treatment(s) may be inconsistent or nonexistent. Referrals to allied health professionals may not be initiated, or the timing of the referral may be significantly delayed contributing to suboptimal patient outcomes.

Current best practice models are increasingly moving away from historical service patterns

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towards integrated, systematic management. International clinical guidelines for cancer care advocate for a multidisciplinary team (MDT) approach to HNC management (Cancer Council Victoria, 2015; Clarke, Radford, Coffey, & Stewart, 2016; Cohen et al., 2016; National Comprehensive Cancer Network, 2017; Taylor-Goh, 2017). In fact, integrated and coordinated MDT input is suggested to initiate at the time of diagnosis and during the treatment planning process through to long-term survivorship. This approach is supported by studies which have established that HNC care delivered using a MDT approach results in improved patient outcomes and better survival rates (Friedland et al., 2011; Tsai, Kung, Wang, Huang, & Liu, 2015; Wang et al., 2012). Lassig et al. (2012) recently reported a 30% better survival rate in 388 patients undergoing radiation therapy and treated in an academic setting when compared to a community center facility. Although the authors proposed several factors to explain the improved survival rate for those treated at academic centers (such as technological advantages), they also highlighted the benefits of a MDT, including attendance at tumor board meetings and coordination of complex care during and following treatment (Lassig et al., 2012). Such evidence supports the need for HNC centers to develop and implement care using an integrated MDT best practice models based on clinical practice guidelines or CPs that are designed to direct HNC care before, during, and after treatment. Best practice models of HNC MDTs are provided in this chapter to provide a foundation of learning and to ultimately move practice patterns which will serve to benefit and enhance HNC patients survivorship outcomes.

Head and Neck Cancer Multidisciplinary Team

The goals of the modern MDT approach in HNC management are to “prevent, recognize, and treat” using evidence-based treatment protocols in a timely, appropriate, and patient-centered manner (Friedland et al., 2011; Jamal, Ebersole, Erman, & Chhetri, 2017). Treatment decisions seek curative intent (when possible) with improved patient care, long-term survival, and maximization of functional and QOL outcomes. However, the effects of these treatments typically cause significant acute and long-term functional side effects (e.g., nutrition, dysphagia, pain) and psychosocial issues (e.g., anxiety, depression) that negatively affect quality of life (see Kearney & Cavanagh, Chap. 20 and Bornbaum & Doyle, Chap. 5). Therefore, all medical and allied health professionals on the MDT must be informed, engaged, and integrated into the patient’s care to actively seek to manage the effects of treatment.

The MDT needed for HNC care requires a strong collaboration between highly specialized professionals. For example, the MTD generally consists of a head and neck surgeon, plastic and reconstructive surgeon/microvascular surgeon, radiation oncologist, medical oncologist, oral and maxillofacial surgeon, dentist/maxillofacial prosthodontist, pain specialist, pathologist, radiologist/imaging specialist, psychologist, speech pathologist, oncology dietitian, head and neck nurse specialist/nurse coordinator, clinical research coordinator, pharmacist, oncology social worker, physical therapist, occupational therapist, and, more recently, a lymphedema therapist (National Comprehensive Cancer Network, 2017; Taylor-Goh, 2017). The establishment of guidelines and CPs enable the MDT to communicate among themselves, as well as with the patient and his/her family members regarding many aspects of their care. Clinical guidelines and CPs also provide a framework to identify the level of involvement of each professional and to specify treatment planning, recommendations, assessments, tests, imaging, etc. as indicated throughout all stages of a patient’s care. The intensity of involvement by any given team member varies accordingly and will necessarily need to be adapted to the patient’s specific treatment response and reactions to treatment. It is recommended that patients will be followed by physician and rehabilitation team from pretreatment to 24 months posttreatment, as indicated. The managing physician(s), usually the head and neck surgeon, and the radiation and medical oncologist continue at least up to 5 years posttreatment for oncologic surveillance according to NCCN guidelines (National Comprehensive Cancer Network, 2017).

According to the Oncology Advisory Board: “excellent patient experience, including better coordination and clearer communication, drives clinical outcomes” (Advisory Board, 2015). Team communication and coordination of services is essential and may serve to reduce redundancy of care, improve efficiency, reduce costs, and improve patient outcomes. The collective experience and value of the MDT is needed to provide this level of integrated and timely care. Defining the roles of oncology physicians and other health professionals within the MDT and CP fosters teamwork and collaboration along the time continuum of care process. Patients should be educated about the MDT and CP throughout this process to increase their awareness, engagement, and knowledge of the high level of support available for optimal management of the sequela of treatment (Lawson & Ward, 2014). Each member of the MDT must understand the importance of respecting the clinical contributions and area of expertise of all team members to provide care in an interactive and collaborative manner. Patient input and education on the CP is essential. Best practice patterns encourage members of the MDT to educate patients before, during, and post-treatment on the purpose of the CP, how to follow the plan, and to actively seek input from patients to improve service delivery.

The MDT and Clinical Pathways

Not only does modern cancer care require multidisciplinary input, but it is also recognized as best practice for the MDT to be involved in the patient’s care within a CP – at pretreatment as well as during and post-treatment. Clinical pathways in HNC care strive to provide evidence-based algorithms with the goal of organizing patient care in a MDT model that is everevolving, structured, time-based, and efficient (Dautremont et al., 2016). The establishment of CPs provides the MDT and the patient a plan or “road map” to inform, educate, navigate care, and ensure coordinated and integrated service delivery before, during, and after HNC treatment (Friedland et al., 2011). Furthermore, a MDT utilizing clinical practice guidelines as the framework of a CP model serves to standardize and implement diagnostic and therapeutic evidence-based methods as a best practice, quality-driven approaches to care (Chen et al., 2000; Ellis, 2013; Weed, 1997).

The use of CPs has been shown to provide cost savings while enhancing patient outcomes (Chen et al., 2000). Delivery of MDT services through a coordinated head and neck CP is recognized to maximize results, increase efficiency in care delivery, reduce costs, shorten the length of hospital stay, and improve overall patient outcomes (Dautremont et al., 2016; Prades, Remue, van Hoof, & Borras, 2015). A comprehensive literature review by Prades et al. (2015) of studies from 2005 to 2012 “assessed the impact of MDT on patient outcomes in cancer care,” reported that oncology care provided by organized MDTs resulted in better clinical outcomes, and improved multidisciplinary decision-making processes and models of care, supporting the development and use of teams as a minimum standard for best practice care (Prades et al., 2015). Providing HNC care in a multidisciplinary model challenges teams to work cooperatively and stay engaged in the process. The framework and structure of a CP reinforces the need for teamwork to achieve positive clinical outcomes with team engagement.

The Clinical Care Pathway: MDT Management at Diagnosis

The first stage of the HNC CP is diagnosis and planning. As the patient’s diagnostic workup and treatment planning occur, the patient and their significant others benefit from the guidance, support, and education provided by all members of the MDT. Aggregate patient information, clinical assessment, imaging results, tumor histology, and staging should be presented to the MDT with all disciplines at the table, often during weekly tumor board discussions, to collectively establish the recommended treatment (Fig. 6.1). Case presentations and discussions at MDT tumor board conferences help the team as a whole to consider all aspects of the patient and their specific situation, and doing so will often influence

Fig. 6.1 Discussion of case information at a multidisciplinary tumor board

treatment decisions (Bergamini et al., 2016). The complexity of HNC management, where tumor sites are most often in anatomical regions with essential physiological functions (see Sahovaler, Yeh, & Fung, Chap. 1), requires input from the MDT and must be informed by evidence-based practice guidelines to reduce toxicity burden and improve patient survival (Beyzadeoglu, Ozyigit, & Selek, 2015; Gooi et al., 2016).

HNC treatment planning is highly complex and involves consideration of multimodality treatment options of surgery, radiation, and chemotherapy as defined by the National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines in Oncology (National Comprehensive Cancer Network, 2017) and the American Joint Commission on Cancer (AJCC) staging criteria (Amin et al., 2017). Tumor site, size and locoregional or distant metastasis guide treatment planning decisions using NCCN guidelines (based on AJCC staging classification) for selection of evidence-based HNC management options (Argiris, Karamouzis, Raben, & Ferris, 2008; Gooi et al., 2016; Miller et al., 2016). Physician knowledge of the guidelines, subspecialty clinical expertise, practice preferences, participation in a MDT approach, and practice location may influence treatment decisions (Lewis et al., 2010; Miller et al., 2016).

The Clinical Care Pathway: The MDT and Ongoing Supportive Care

Following diagnostic and treatment planning, clinical care pathways in HNC care involve ongoing input and coordination between the MDT during both the acute treatment phase and ongoing into the posttreatment period. During treatment, regular MDT meetings involving healthcare professionals caring for those patients undergoing primary or adjuvant (chemo) radiotherapy are part of the care pathway in many centers (Fleishman et al., 2007). Team members typically include medical, surgical and radiation oncology nurses, speech pathologists, oncology dieticians, oncology social workers, psychiatrists, psychologists, integrative oncology nursing and music therapists, as well as palliative care physicians with advanced clinical skills and training. During these meetings, one of the team members, often an advanced practice nurse in radiation oncology, reviews information on each patient currently on-treatment, as well as those patients soon to start. These regular meetings, often held weekly, involve discussion and tracking of patient progress during treatment and any evolving issues, such as mucositis, pain, xerostomia, dysphagia, nausea, weight loss, constipation, depression, etc. These sessions also provide a forum for ongoing communication among the professionals regarding patient status and intervention needs. Further, weekly meeting logs are maintained to identify and document follow-up on action plans by the appropriate professionals. Implementation of this type of weekly MDT meeting may result in less duplication of services between disciplines. Also, patients' satisfaction level may increase when informed that their oncology providers communicate with each other on a regular basis regarding the treatment and care they are receiving.

In addition to holding coordinated "on-treatment" meetings, it is essential to establish a "road map" for the patient, caregivers, and team members including planned posttreatment MDT appointments and key events (i.e., imaging, testing, labs, etc). The CP provides clarity for team members, patients, and family members. The structure of a CP should allow for pre-planned visits and interventions (i.e., interventions, imaging, labs, other outcome measures, and functional assessments) from baseline, during treatment, and into the extended long-term period. For example, the "Optimal Care Pathway for HNC" was established to provide a structure for a MDT approach that is accessible to patients and consistent in service delivery. The ultimate goal of the structural pathway is to provide high-quality care using this systematic approach to service provision. The Optimal Care Pathway contains seven critical steps in the patients' journey, including *Step 1*, prevention and early detection; *Step 2*, presentation, initial investigations, and referral; *Step 3*, diagnosis, staging, and treatment planning; *Step 4*, treatment; *Step 5*, care after initial treatment and recovery; *Step 6*, managing recurrent, residual, or metastatic disease; and *Step 7*, end-of-life care. Each step details involvement of all members of the MDT with the caveat that the pathway can be individualized depending on patients' treatment and care needs (Cancer Council Victoria, 2015).

An essential component of CP is to ensure that routine collection of outcome measures are utilized. Outcome measures vary depending on the speciality area of practice. Selection of outcome measures requires the MDT to identify significant and relevant information that is or will be needed to improve patient care. At a minimum, the process requires review of current literature and existing clinical pathways and guidelines, assessment of available tools, and developing consensus among MDT key stakeholders depending on the area of clinical expertise. Furthermore, CP models should be established based on review of validated, theory-based tools and measures. Clinical pathway models should utilize functional assessment protocols and validated clinical outcome measures and incorporate ongoing, long-term follow-up and coordination between the MDT members to maximize patient outcomes and quality of life (Jamal et al., 2017). For example, the United Kingdom National Multidisciplinary Guidelines recommend that all HNC patients should be seen by members of the MDT at "all stages of the patient's journey" and encouraged to follow established intervention pathways to improve patient care and outcomes (Clarke et al., 2016). Ideally, outcome data should be systematically collected at specified time points and integrated into an electronic medical record that will allow data retrieval and analysis across one or many patients over time. Systematic collection of both patient- and clinician-reported outcomes enables the MDT to measure functional changes over time and intervene when problems arise. Changes or problems in swallowing or dysphagia should be monitored by the speech pathologist and evaluated in a timely manner consistent with the CP structure. Dysphagia in HNC and monitoring changes through the CP will be discussed in the following section.

MDT and Clinical Care Pathways: Implementing a Dysphagia Management Pathway

Decline in swallow function significantly contributes to poor nutritional intake negatively impacting health-related QOL. Loss of swallow function and reduced nutritional status can be present from the time of initial diagnosis, become exacerbated during treatment due to related toxicities, and persist long-term for many patients (see Starmer, Chap. 18 and Arrese & Schieve, Chap. 19). Because of this, it is recognized in practice guidelines that swallowing and nutritional status should be assessed pretreatment and continue to be monitored during and post-treatment (Royal College of Speech & Language Therapists, & Taylor-Goh, 2005).

Internationally, countries such as the United States, the Netherlands, the United Kingdom, and Australia have established guidelines for head and neck cancer specifying the importance of including speech and swallow assessments with ongoing follow-up in the management of HNC patients (Gooi et al., 2016; Lawson et al., 2017). The Royal College of Speech and Language Therapists (RCSLT) resource manual for HNC specifies that speech pathologists should provide assessment, evidence-based swallowing interventions, patient education, and psychological support at pretreatment, during treatment, and posttreatment (Taylor-Goh, 2017). In the United States, the National Comprehensive Cancer Network (NCCN) (2017) has recommended the inclusion of speech pathology swallow assessments and follow-up as part of HNC care. However, the specifics of therapy, type, duration, and frequency, is not defined. Additionally, while the American Speech-Language-Hearing Association (ASHA) supports speech pathology interventions in the care of HNC patients through reviews of HNC evidence-based literature, clinical guidelines or recommendations are not provided (Gooi et al., 2016; Lawson et al., 2017). However, ASHA should develop guidelines and establish position statements on HNC management.

Hence, despite support in principle for systematic speech pathology involvement in dysphagia management post-HNC care, there is currently a lack of clarity and consistency in management pathways for the HNC patient (Krisciunas, Sokoloff, Stepas, & Langmore, 2012; Lawson et al., 2017). In particular, HNC standardized protocols using evidence-based swallowing interventions in clinical practice are limited (Krisciunas et al., 2012; Lawson et al., 2017; van den Berg et al., 2016). Existing descriptions of current management of dysphagia following HNC lack in scope and may be highly variable (Krisciunas et al., 2012; Lawson et al., 2017; van den Berg et al., 2016). Therefore, seeking a greater understanding of the critical timing, type, frequency, and intensity of treatment remains a critical need in future research studies given the lack of consistency in HNC dysphagia service delivery across clinicians and institutions (Krisciunas et al., 2012). At present the evidence base remains limited with few studies, small cohorts, heterogeneous groups, and high variability in intervention approaches utilized (inconsistent timing, duration, type of exercises, and the intensity of treatment) (Kraaijenga, van der Molen, van den Brekel, & Hilgers, 2014; Krisciunas et al., 2012; Roe & Ashforth, 2011).

Perhaps the paucity of established or widely accepted speech pathology HNC practice guidelines has led to speech pathologists to traditionally have a reactive, rather than proactive, approach to providing swallowing therapy to those treated for HNC (Lawson et al., 2017). A survey by Krisciunas et al. (Krisciunas et al., 2012) examined the usual practice patterns of speech pathologists working with HNC patients in the United States, and their data revealed that 76% of the respondents received referrals on a “case-by-case basis” without the support of any institutional or departmental policy (Krisciunas et al., 2012). More experienced clinicians (>5 years’ experience HNC) were 3.5 times more likely to intervene early and treat patients proactively (Krisciunas et al., 2012). However, over 80% of the clinicians surveyed reported providing treatment after radiation, rather than proactively during treatment (Krisciunas et al., 2012). Data collected should therefore be utilized to drive optimal clinical care and improve function.

Although greater clarity regarding the optimal clinical pathway for dysphagia management is still needed, there are aspects of the clinical pathway of care where there is greater consensus in clinical practice. One of these areas is that related to the issue of dysphagia assessment. Primary to the goal of improving functional outcomes is having the opportunity to provide early and ongoing assessment. This would occur from the point of first presentation to during and posttreatment, a process conducted in a structured, time point-based protocol model to ensure no patient is left behind (Cancer Council Victoria, 2015; Govender, Smith, Gardner, Barratt, & Taylor, 2017; Jamal et al., 2017; Lawson & Ward, 2014). Assessment of swallow function should include a clinical swallow evaluation and an instrumental assessment, either a videofluoroscopic swallow study (VFSS) and/or flexible endoscopic evaluation of swallow (FEES) to assess swallow physiology and severity of dysphagia (Cartmill, Cornwell, Ward, Davidson, & Porceddu, 2012; Leonard & Kendall, 2014). The clinical swallow examination is an important initial element to determine functional oral intake and gain insights into the patient's perspective of their capacity to manage oral intake.

Instrumental assessment, such as VFSS, is then an essential component of a thorough dysphagia assessment, a task that is necessary to identify physiological deficits, the severity of dysphagia, and the risk of aspiration and provide treatment and diet recommendations (Carnaby-Mann, Crary, Schmalfuss, & Amdur, 2012; Eisbruch et al., 2004; Leonard & Kendall, 2014; Manikantan et al., 2009; Perkins, Hancock, & Ward, 2014). This is of particular importance in this clinical population where silent aspiration (i.e., aspiration without overt signs such as coughing) is high. The impact of surgical and radiological interventions requires direct observation of functional swallow issues. Instrumental assessment should be performed at various time points to identify physiological swallowing problems and inform appropriate treatment (Hutcheson & Lewin, 2012). Furthermore, the rate of silent aspiration in HNC patients who are in long-term posttreatment has been understudied and, when reported, most often includes only patients who presented with a swallowing complaint, thereby, missing silent aspirators who remained undiagnosed (Hutcheson & Lewin, 2012; Nguyen et al., 2006). Thus, combined information from clinical and instrumental assessments is necessary for clinical decision-making specific to planning swallowing interventions, using compensatory swallow strategies, and recommending postural changes. Accurate, timely, and comprehensive assessment and treatment are required to reduce the risk of airway compromise and aspiration pneumonia, as well as to ensure the safest, least restrictive diet necessary to maintain adequate nutrition and hydration before, during, and posttreatment. The optimal course of action necessary to address patients functional needs is to establish and implement care using the structure of a CP with a MDT.

Best practice CPs for dysphagia rehabilitation continue to emerge and are slow to spread despite initial reports related to HNC over the years (Colangelo, Logemann, Pauloski, Pelzer, & Rademaker, 1996; Logemann & Bytell, 1979; McConnel et al., 1994; and others). There has, however, been a body of emerging evidence published in the past 10 years to support the use of early prophylactic management, as an adjunct to the traditional tailored posttreatment rehabilitation. Recent evidence supports that providing prophylactic exercises during and following treatment may improve patients' swallow function, which impacts nutritional status and overall QOL during treatment and long-term (Carnaby-Mann et al., 2012; Carroll et al., 2008; Hutcheson et al., 2013; Kotz et al., 2012; Kraaijenga et al., 2014; Kulbersh et al., 2006; Schindler et al., 2015; van der Molen et al., 2011; van der Molen, van Rossum, Rasch, Smeele, & Hilgers, 2014; Virani, Kunduk, Fink, & McWhorter, 2015). This work is based on the principle that early intervention can contribute to less functional decline, enabling patients to return to an oral diet sooner, leading to less weight loss and shorter and potentially less problematic enteric tube use duration (Carnaby-Mann et al., 2012; Duarte, Chhetri, Liu, Erman, & Wang, 2013; Hutcheson et al., 2013; Kotz et al., 2012; Kraaijenga et al., 2014).

There is positive evidence for early prophylactic swallowing intervention; however, patient adherence to swallowing exercise protocols historically has revealed a low compliance rate and the perception that HNC patients will have limited ability to participate in dysphagia treatment (Krisciunas et al., 2012). In a randomized controlled study of 60 HNC patients undergoing chemoradiation, adherence to prophylactic swallowing exercises showed fairly good adherence (Messing, Ward, Lazarus, et al., 2017). However, adherence rates dropped at 5 weeks during treatment, a finding that was consistent with other studies that reported partial or moderate exercise protocol adherence during treatment (Kotz et al., 2012; Messing, Ward, Lazarus, et al., 2017; Mortensen et al., 2015; van den Berg et al., 2016). Other studies also reported fairly good adherence during the early weeks of treatment with a decline observed later in treatment (Carnaby-Mann et al., 2012; Kraaijenga et al., 2014; Mortensen et al., 2015). Shinn et al. (2013) retrospectively studied adherence rates of 109 oropharyngeal cancer patients undergoing chemoradiation and found that only 13% of participants were fully adherent to swallow exercise protocols while 32% were partially adherent. Reasons for nonadherence included a lack of understanding of the exercise, treatment toxicities (pain, fatigue, nausea), and forgetting to do the exercises (Shinn et al., 2013).

Govender, Wood et al. (2017) studied dysphagia exercise adherence in 13 patients and identified the top reasons for noncompliance as those related to psychological distress (Starmer, Chap. 24), not understanding the exercises, forgetting to do the exercise, not having a system to track completion, feeling overwhelmed, and the common physical barriers of pain and fatigue. Some studies report that compliance was greater by 50% when patients complain of dysphagia (Krisciunas et al., 2012). Interestingly, patients who were prescribed a more intensive and aggressive swallow exercise protocol demonstrate increased compliance (Krisciunas et al., 2012). Acute toxicities experienced by patients during treatment also contribute to the decline in participation or adherence to swallowing exercises. Encouraging patients to continue to perform an evidence-based swallowing exercise protocol during and posttreatment is recommended for management of both early and late effects of treatment on swallow function (Hutcheson et al., 2012, 2013). To increase patients' adherence to performing exercise protocols, the MDT should seek to educate patients on the rationale for and benefits of performing swallowing exercises protocols to optimize and improve patient outcomes.

The complexities of HNC management including tumor factors (tumor size, location, type of treatment), patient factors (comorbidities, adherence, location to treatment center), and clinician factors (experience, support from institution, physician support) all contribute to challenges in establishing best practice and standard protocols (Lawson et al., 2017). The timing of diagnostic and therapeutic intervention, as well as dose/frequency and intensity of treatment, remains highly variable with a predominantly reactive rather than proactive treatment initiation approach (Kraaijenga et al., 2014; Krisciunas et al., 2012; Lawson et al., 2017; Logemann et al., 2008). However, standard of care protocols and best practice guidelines are not yet well established for the HNC patient. Furthermore, patient adherence to exercises remains an ongoing issue regarding what is the minimal required "dose" for positive benefit. For this reason, the importance and potential benefits of using a proactive rather than reactive approach focusing on maintaining adequate oral intake, swallow exercises, compensatory strategies, and maneuvers during and posttreatment are not insignificant and should be a component of HNC management (Hutcheson et al., 2013; Rosenthal, Lewin, & Eisbruch, 2006). When considered together, the issues noted above contribute in part to the difficulty in establishing practice guidelines and standardized treatment protocols for use in HNC management.

Implementation of a Clinical Pathway for Dysphagia Management: Experiences of One Service

Implementing an integrated and systematic MDT head and neck clinical pathway (HNCP) with comprehensive dysphagia management requires timely swallowing evaluations, early/prophylactic and long-term swallow therapy, management of nutritional status, and cancer and treatment-related toxicities requires a significant commitment and investment of resources from health-care professionals, administrative staff and the organization's administration. As recognized through recent research, few clinical services are currently delivering this complete model of care (Kulbersh et al., 2006; Roe & Ashforth, 2011), leading to a recognized "knowledge-to-practice" gap. The Milton J. Dance Jr. Head & Neck Center established a HNC clinical pathway in 2011, known as the Dance Head and Neck Clinical Pathway (D-HNCP). The D-HNCP was implemented following a randomized controlled trial for HNC patients, providing a framework for further development of the pathway (Messing, Ward, Ryniak, et al., 2017). The D-HNCP provides the framework for HNC patients to receive planned MDT appointments and interventions pretreatment, during treatment, to 24 months post-treatment with oncologic surviellance continuing to 5 years post-treatment according to NCCN guidelines.

Within the pathway, routine clinical-reported outcomes (CROs) and patient-reported outcomes (PROs) are collected to monitor patient performance. D-HNCP data are collected and managed using REDCap[1] electronic data capture tools (Harris et al., 2009). REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing (1) an intuitive interface for validated data entry, (2) audit trails for tracking data manipulation and export procedures, (3) automated export procedures for data downloads to common statistical packages, and (4) procedures for importing data from external sources. Patient demographics and CROs/PROs collected at D-HNCP time points are entered into REDCap. Findings from CROs/PROs as well as patient's subjective complaints serve to help monitor changes, during and posttreatment, in patients' nutritional status, weight, swallowing problems, diet level, and quality-of-life-related issues, which can in turn guide MDT interventions. Success of the D-HNCP, including sustainability, requires frequent team interaction, coordination of care, and the ability to recognize and devise solutions to problems. Comprehensive audits are performed to monitor *both* the MDT's and patients' compliance with scheduling, completion of D-HNCP time point appointments, and completion of PROs and CROs. Overall, the audits have revealed excellent adherence to the D-HNCP at pretreatment, during treatment, and 1–24-month posttreatment time points. Oncologic surviellence appointments continue past the 24-month time points (5+ years post-treatment) as per NCCN guidelines to monitor patients for potential recurrence, metastasis, or a new primary and to address any posttreatment-related issues (National Comprehensive Cancer Network, 2017). Physicians should be vigilant for any functional issues, such as worsening swallowing problems, weight loss, lymphedema, and mobility issues, which may require referral to the rehabilitation team. Dental recall appointments should continue post-radiation oral and dental care to ensure a healthy oral care regime is maintained (Hancock, Epstein, & Sadler, 2003). A systematic and integrative approach is required to design, implement, and sustain a CP model. Long-term follow of HNC patients proves to be challenging. It is, therefore, important to perform frequent audits to determine reasons for adherence rate changes posttreatment (Messing, Ward, Ryniak, et al., 2017).

Considerations for Implementing Clinical Pathways in HNC Care

Although the benefits of a coordinated MDT CP are not disputed, it is recognized that implementing a CP in today's complex healthcare environment can be fraught with roadblocks and pitfalls. Barriers to adequate treatment are not an isolated problem but multifactorial. Implementation of HNC MDT care within a structured, timely, and organized CP model requires ongoing integrated efforts from all members of the team to maximize functional outcomes and improve overall QOL and long-term survival.

Adherence to the use of established guidelines and clinical pathways in treatment decisions also has been linked to treatment setting, with high-volume centers having better survival outcomes compared to low-volume settings (Lassig et al., 2012; Lewis et al., 2010). Hence, factors specific to the MDT and its capacity to implement and sus-

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[1] http://www.sciencedirect.com/science/article/pii/S1532046408001226

tain a systematic clinical pathway needs to be addressed. Having a coordinated MDT housed in an established, patient-centered head and neck oncology center with a dedicated team of specialized oncology physicians, nursing, and allied health staff is essential to delivery of a coordinated pathway. However, each member of the MDT must also be a key stakeholder in the development and sustainability of the clinical pathway. Administrative staff are critical to the success of the pathway. Regular ongoing support from administrative staff is necessary to ensure coordination of appointments, tracking time points, scheduling, and conducting patient follow up calls to reschedule missed appointments. Information technology (IT) systems staff and support is also integral to its success. Clinical pathway management, including the implementation of alerts to schedule routine follow-up appointments and reminders for certain assessments and outcome measures to occur at particular time points, can be activated through an electronic medical record system or through other dedicated online electronic database/management systems such as REDCap (Harris et al., 2009). These systems help to provide a visual map of each patient's timeline, identify, and enter all data collected from PRO and CRO measures at designated time points.

Clinical research coordinators or other designated team members help to facilitate monitoring of both the MDT members and patient adherence to the clinical pathway requirements through periodic audits. These audits are essential to ensure that the clinical pathway is sustainable. Early work by Cabana et al. (Cabana et al., 1999) examined the issue of adherence to treatment guidelines and identified numerous physician limitations (lack of awareness, familiarity, agreement, self-efficacy, outcome expectancy, the inertia of previous practice experience, and other external barriers) as contributing to nonadherence to evidence-based guidelines in treatment decision-making (Cabana et al., 1999). Patient noncompliance with physician-recommended treatment based on NCCN guidelines has also been demonstrated to result in treatment deviations or failure to treat in approximately 15% of cancer cases (Lewis et al., 2010; Miller et al., 2016; National Comprehensive Cancer Network, 2017).

Developing a HN clinical pathway requires, in part, organizing a MDT with an experienced and effective leader who is committed to the project and able to identify and recruit champions to unify and move the program into action. Additionally, establishing a HN clinical pathway may require hiring new staff, reassigning or expanding existing job responsiblities, evaluating programmatic resources, and obtaining administrative and financial support from the facility/cancer service line. The inherent complex nature of a HN clinical pathway requires the engagement of key stakeholders, ongoing and open communication between team members, acceptance of changes as they arise, and an openmindedness to achieve program sustainability. Some of the potential barriers to the success of the clinical pathway are, as stated above, the complexity of a HN clinical pathway, physician and staff turnover, federal and state local policy changes, program constraints, workload and productivity demands, and patient needs.

Technology: Providing New Opportunities for Enhancing Clinical Pathways in HNC Care

Although there are multiple challenges to implementing clinical care pathways, advances in personal computing/devices and high end-user acceptance of technology-supported healthcare help to facilitate MDT interactions and provide new ways to support and deliver HNC clinical care pathways (Burns, Hill, & Ward, 2014; Cartmill, Wall, Ward, Hill, & Porceddu, 2016; Ward, Wall, Burns, Cartmill, & Hill, 2017). The new era of digital health records, electronic medical records, and integrated database systems now provide a greater opportunity to streamline patient management. Digital medical records help all members of the team have ready and immediate access to assessments conducted by others. Dedicated electronic data management systems within health services can also assist with patient scheduling, sending patient reminders about appointments and follow-ups which can assist and improve patient compliance with their clinical pathway (Wall, Ward, Cartmill, Hill, & Porceddu, 2017a). These systems can also provide prompts for the clinical staff regarding the assessments/outcome measurement required at each assessment time point in the clinical pathway. These built-in system reminders assist all members of the team to remain compliant with routine data collection expectations in accordance with the patient care pathway.

Greater availability of secure, stable videoconferencing platforms has also enhanced opportunities for interactions between MDT members. Videoconference consultations are being used by MDTs to link experts across facilities for case discussions and tumor board meetings (Hazin & Qaddoumi, 2010; Hughes et al., 2012; Olver & Selva-Nayagam, 2000; Savage, Nixon, & MacKenzie, 2007; Stalfors et al., 2001). Exchange of clinical data via digital file transfers enables fast and easy access to second opinions, and remote assistance and expert consultation for imaging and pathology are supporting cancer care in areas without services (Hazin & Qaddoumi, 2010). Medical support via videoconferencing is also being used to support remote and in-home delivery of chemotherapy (Sabesan et al., 2012), as well as regular medical and radiation oncology reviews (Ogawa et al., 2005). Telehealth has also provided opportunity to improve access to services for patients, reducing some of the costs and burden associated with cancer care. Recent evidence has demonstrated successful use of telehealth to provide posttreatment speech pathology services for patients managed for HNC (Burns, Kularatna, et al., 2017; Burns et al., 2012; Collins et al., 2017), with economic analysis revealing clear patient and service benefits (Burns, Kularatna, et al., 2017; Burns, Ward, et al., 2017; Collins et al., 2017).

Other systems, such as computer-based screening programs, have also been demonstrated to allow close monitoring of patient symptoms during HNC management (Wall, Ward, Cartmill, & Hill, 2013). These types of systems provide a fast and efficient way to determine current patient symptom presentation, assist referral into support services when needed, and minimize unnecessary appointments, helping to provide patients with "the right services at the right time" (Wall, Cartmill, Ward, Hill, Isenring, Byrnes, et al., 2016; Wall, Cartmill, Ward, Hill, Isenring, Porceddu, et al., 2016). Computer programs and apps have also been shown to be viable alternate means for delivery of therapy services. Such systems can help to enable patients to complete rehabilitation components of their care pathway, such as their intensive prophylactic swallowing rehabilitation (Wall et al., 2017a, 2017b), doing so at a time and place that is convenient to them. Finally, Internet-based patient information is used by many patients as a source of education and information sharing for patients with HNC. Though there are ongoing concerns regarding the quality of health information publically available on the Internet, directing patients to good Internet sites can compliment the ongoing education services provided by staff regarding symptoms, side effects, assessments, and other information relevant to the HNC care pathway and provide patients with resources to help their own self-management (Ni Riordain & McCreary, 2009).

Summary

Healthcare providers are continually challenged to obtain the best patient outcomes while reducing costs, hospital length of stay, and readmission rate. Although the complexities of HNC management create inherent barriers to providing care using a MDT approach and structured clinical pathway models, the benefits and necessity are evident and are considered the gold standard of care provision (Prades et al., 2015). Implementing care for HNC patients using a MDT approach and clinical pathway models has been shown to result in positive outcomes both for patients and those team members who provide care (Deneckere et al., 2012; Ellis, 2013; Miller et al., 2016; Prades et al., 2015). Clinical pathway models integrated with electronic medical records are integral to reduce redundancy of documentation and improve communication between care providers, in addition to improving service efficiency and safety. Embracing technology within clinical pathways can also assist in the creation of more efficient ways to monitor patient needs, facilitate access to and between team members, and reduce patient burden.

HNC care delivery using a clinical pathway structure can be challenging requiring vigilance through monitoring, modifications, ongoing staff, and patient education as well as consideration of patient and caregivers needs to ensure successful implementation. However, it is well worth the effort. In the words of a HNC patient, "the team provided an invaluable safety net that I could count during and after my cancer treatments and to this day".

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