The Organization and Delivery of Healthcare Services for Head and Neck Cancer Patients

Effective Date: November 2015

The recommendations contained in this guideline are a consensus of the Alberta Provincial Head and Neck Tumour Team and are a synthesis of currently accepted approaches to management, derived from a review of relevant scientific literature. Clinicians applying these guidelines should, in consultation with the patient, use independent medical judgment in the context of individual clinical circumstances to direct care.

BACKGROUND

The treatment of head and neck cancer is complex. Significant expertise is required from a range of healthcare professionals because of the involvement of anatomically diverse areas (soft tissue, bones, skin, and a variety of glands and organs), as well, because of the vital functions affected by both the cancer and the treatment (breathing, chewing, swallowing and speech).

A number of organizations have recognized the need for guidance regarding the organization and delivery of healthcare services for patients with head and neck cancer. In Canada, Cancer Care Ontario's Program in Evidence-Based Care published such recommendations in 2009.[1] These recommendations are largely an adaptation of the U.K.'s National Health Services, National Institute for Clinical Excellence Service's 2004 recommendations that are outlined in the document *Improving Outcomes in Head and Neck Cancers*. This document is the result of an extensive synthesis of the literature that has been translated into specific-practice oriented recommendations.[2]

The Alberta Provincial Head and Neck Tumour Team has included the following tumours types in its mandate: head and neck mucosal tumours, salivary gland cancers, tumours extending in to the skull base from the head and neck (craniofacial cancers, sinus cancers, etc.), major non-melanoma skin cancers (requiring free flap reconstruction, neck dissection and radiation), invasive/complex thyroid tumours (requiring laryngectomy, pharyngectomy, tracheal resection, etc), and other malignant tumours involving the head and neck region. The Alberta Provincial Endocrine Tumour Team, in collaboration and consultation with the Alberta Provincial Head and Neck Tumour Team, will lead the development of clinical practice guidelines related to thyroid cancer. However, guidelines regarding the organization and delivery of care for patients with invasive thyroid cancer requiring complex surgery and/or external beam radiation will be developed by the Alberta Provincial Head and Neck Tumour Team.

The goal of this clinical practice guideline is to outline the recommendations for the organization and delivery of healthcare services for head and neck cancer patients in Alberta. In an effort to reduce duplication of work, Cancer Care Ontario's recommendations have been adopted and adapted with some customizations to better fit the Alberta context.

The recommendations in this clinical practice guideline should be used as a guide rather than a fixed protocol. The implementation of this clinical practice guideline will depend on many factors besides the quality and credibility of the guidelines. Among those factors are sufficient funding to support full implementation and judgement used by healthcare professionals to form the multidisciplinary team and individualize care for head and neck cancer patients.

GUIDELINE QUESTIONS

- What does the health care team treating head and neck cancer patients look like?
- What are the minimum qualifications required by core team members?
- What are the minimum cancer centre and team member volumes that optimize clinical outcomes?
- What are the unique infrastructure requirements of team members?
- What are the acceptable wait times from referral to initiation of curative treatment for head and neck cancer patients?

DEVELOPMENT AND REVISION HISTORY

The Alberta Provincial Head and Neck Tumour Team used the following steps to develop this guideline:

1. The Executive of the Alberta Provincial Head and Neck Tumour Team individually reviewed the results of an environmental scan and literature review conducted by a Knowledge Management Specialist from the Guideline Utilization Resource Unit (described below).

2. Based on its review, the Executive gave support to the Tumour Team co-leads to adapt Cancer Care Ontario's recommendations about the organization and delivery of head and neck cancer care.

3. At a face-to-face meeting in April 2012 the Executive reviewed Cancer Care Ontario's recommendations once again and made edits to reflect the Alberta context. All recommendations had 100% consensus.

4. The Executive then distributed the draft recommendations via an anonymous e-mail survey to over 100 healthcare professionals from various disciplines within the province for review and comment. Response rate was 30%.

5. Based on these comments the guideline was revised and then sent to 3 expert reviewers outside the province for further review and comment.

6. The comments of the external reviewers were considered and incorporated as fitting into the guideline draft, and the Executive approved the guideline for publication to the website.

This guideline was reviewed and endorsed by the Alberta Provincial Head and Neck Tumour Team includes medical oncologists, radiation oncologists, surgical oncologists, nurses, pathologists, and pharmacists. Evidence was selected and reviewed by a working group comprised of members from the Alberta Provincial Head and Neck Tumour Team and a Knowledge Management Specialist from the Guideline Resource Unit. A detailed description of the methodology followed during the guideline development process can be found in the Guideline Resource Unit Handbook.

This guideline was originally developed in August, 2012. This guideline was revised in November 2012, January 2013, April 2013, May 2013, and November 2015. The latest version includes the addition of the second bullet under Cancer Centre and Team Member Volumes.

SEARCH STRATEGY

The biomedical literature was searched using the database PubMed. The search terms "head and neck neoplasm" and "organization and delivery" were combined using the Boolean operator term "and" to find publications pertaining to the chosen terms. Limits were not set for the search (e.g. language or publication type). As a result, 161 publications were identified. All abstracts were considered for possible inclusion. Publications that only described the effectiveness or feasibility of equipment, testing, or treatment, were not included in the evidence (e.g. endoscopic intubation with conventional plastic stents, intensity-modulated radiotherapy). After abstract review, 14 articles were reviewed in full and included in the evidence review.

The websites of prominent national and international clinical practice guideline developers were also searched for recommendations about the organization and delivery of health care services for head and

neck cancers. In total, seven websites were searched in addition to the SAGE Directory (Standards and Guidelines Evidence) on The Canadian Partnership Against Cancer's website.[3-10]

TARGET POPULATION

The recommendations outlined in this guideline are intended for adults over the age of 18 years with head and neck cancer. Different principles may apply to pediatric patients.

RECOMMENDATIONS

These recommendations were adapted from: *The Management of Head and Neck Cancer in Ontario: Organizational and Clinical Practice Guideline Recommendations,* 2009 (Program in Evidence-Based Care, Cancer Care Ontario).

1. Teams

- The teams will include a core team, primary care physician, and extended team.

  - *The core team:*
    - Is responsible for the assessment, planning, treatment, management, rehabilitation and survivorship of the patient.
    - Is comprised of:
      - Head and Neck Surgeon[1,2,10,11]
      - Head and Neck Reconstructive Surgeon[1,2,10,11]
      - Oral and Maxillofacial Surgeon[1,2]
      - Medical Oncologist[1,2,10,11]
      - Radiation Oncologist[1,10,11]
      - Maxillofacial Prosthodontist[2,10,11]
      - Dentist with expertise/interest in dental oncology[1,2,10,11]
      - Pathologist[1,2,10,11]
      - Clinical Nurse Specialist[1,2,10], Nurse Practitioner[1] or Advanced Practice Speech-Language Pathologist
      - Speech-Language Pathologist[1,2,10,11]
      - Specialized nursing care
      - Diagnostic Radiologist /Neuroradiologist[2,11]
      - Registered Dietitian[1,2,10,11]
      - Social Worker{[1,11]

  - *The primary care physician*[1] *(family physician or general practitioner):*
    - Is not involved in the daily treatment of a head and neck cancer patient, but plays an important role in post-treatment supportive care
    - Is responsible for the ongoing overall health of a head and neck cancer patient

  - *The extended team:*
    - Is responsible for supporting the core team to facilitate treatment, planning, management, survivorship and rehabilitation as needed.
    - Members have training or experience managing head and neck cancer patients
    - Is comprised of:
      - Neurosurgeon[1,2]
      - Thoracic Surgeon[2]

- Prosthetic Anaplastologist[1]
- Neurotologist
- Anesthsiologist[2] with a special interest in airway management[1] and perioperative care
- Health care providers with expertise in gastrostomy placement, feeding tube placement and support for patients requiring tube feeding[1,2]
- Interventional radiologist[1]
- Ophthalmologist[1,2,11]
- Pharmacist
- Pain Management Specialist[1,2]
- Palliative Care Specialist[1]
- Critical Care Physician
- Dental hygienists[2] and dental technician[1]
- Mental health providers, including Psychiatrist or Psychologist[1,2]
- Physiotherapist[1,2]
- Occupational Therapist[1,2]
- Radiation Physicist[1,2]
- Radiation Therapist[1,2]
- Respiratory Therapist[1]
- Hyperbaric medicine[1]
- Home care team[1]
- Dermatologist

2. Qualifications

- Specific minimum qualifications are required of individual practitioners on the core team responsible for managing patients with head and neck cancer (Table 1). These qualifications were adapted from Cancer Care Ontario[1] and in some instances have been modified and expanded to reflect knowledge from practice experiences in Alberta.

Table 1. Minimum qualification required to care for head and neck cancer patients

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
Head and Neck Surgeon	Degree in medicine or equivalent[1]	Royal College of Physicians and Surgeons of Canada (RCPSC) Specialist Certificate in Otolaryngology-Head and Neck Surgery, General Surgery or Plastic Surgery[1]	1-year minimum fellowship in Advanced Training in Head & Neck Oncologic Surgery through the American Head and Neck Society or equivalent Equivalent fellowship training will include a minimum of 1 year training at a major head and neck oncology centre with specific surgical training in each of the	The Head and Neck surgeon is the core team member who is responsible for the resection of head and neck cancers and will have training and experience in the surgical management of tumours in each disease site, as listed in the background section.

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
			areas include in the mandate of the Alberta Provincial Head and Neck Tumour team (head and neck mucosal tumours [all subsites], salivary gland tumours, tumours of the skull base, major skin cancers, invasive/complex thyroid and parathyroid tumours, and other tumours involving the head and neck region). The fellowship training program, and the fellow, must meet all the guidelines as defined in the, "Advanced Training Council Program Guidelines" from the AHNS	
Head and Neck Reconstructive Surgeon	Degree in medicine or equivalent[1]	RCPSC Specialist Certificate in Otolaryngology-Head and Neck Surgery, General Surgery or Plastic Surgery[1]	A minimum 1-yr fellowship in microvascular surgery with specific training in head and neck reconstruction as a major portion of the fellowship experience	The Head and Neck Reconstructive Surgeon is the core team member who is responsible for the surgical reconstruction of defects related to head and neck cancer treatment and will have training and experience in the reconstructive management of each disease site, as listed in the background section
Oral and Maxillofacial Surgeon	Degree in Dentistry, Medicine or equivalent	FRCD(C) Certificate in Oral and Maxillofacial Surgery, Fellowship Training Certificate or equivalent	Formal clinical fellowship or significant clinical training in head and neck cancer treatment at an expert center during Oral and Maxillofacial Surgery residency or fellowship	Oral and Maxillofacial Surgeons bring a unique skill set to the core team that is independent of the roles of the Head and Neck Surgeon and the Head and Neck Reconstructive Surgeon. Oral and Maxillofacial surgeons functioning as Head and Neck Surgeons or Reconstructive Surgeons, I.e. performing Head and Neck Cancer resections or reconstructions, on the core team

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
				must meet the criteria put forth in Tables 1 and 2 for those categories. Oral and Maxillofacial surgeons working in the core team will have expert level training and experience in head and neck cancer care treatment planning, treatment, and aftercare in conjunction with, and as a member of, the head and cancer core team and expert level training and experience in head and neck cancer resection and reconstruction in conjunction with, and as a member of, the head and cancer core team. This pertains primarily to head and neck cancer resection and reconstruction as it pertains to surgery involving the mandibular and maxillary complex and its contiguous structures.
Medical Oncologist	Degree in medicine or equivalent[1]	RCPSC Specialist Certificate in Internal Medicine or equivalent[1] RCPSC Certificate of Special Competence in Medical Oncology or equivalent[1]	Formal clinical fellowship or significant clinical training in head and neck cancer treatment at an expert centre during medical oncology residency or fellowship[1]	Enhanced knowledge and skill in the treatment of head and neck cancer patients[1]
Radiation Oncologist	Degree in medicine or equivalent[1]	RCPSC Specialist Certificate in Radiation Oncology or equivalent[1]	Formal clinical fellowship or significant clinical training in head and neck cancer treatment at an expert centre during radiation oncology residency or fellowship[1]	Enhanced knowledge and skill in the treatment of head and neck cancer patients[1]
Maxillofacial Prosthodontist	Degree in dentistry or	Registered as a Prosthodontist	Must have significant maxillofacial	Expert level experience in intra/extraoral maxillofacial

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
	equivalent Graduate degree in prosthodontics or equivalent fellowship with emphasis in maxillofacial prosthodontics	with the Alberta Dental Association and College Fellowship member of the American Academy of Maxillofacial Prosthetics	prosthodontic training during prosthodontic specialty program or added year to fellowship. Training must include head and neck cancer care. Individual must demonstrate and active involvement in head and neck cancer care within a major institutional head and neck cancer team. Individual must demonstrate being active in the American Academy of Maxillofacial Prosthetics Fellowship or equivalent	prosthodontic aspects of head and neck cancer care treatment planning, treatment and after care within a head and neck cancer care institutional environment. Expert level experience in management of head and neck cancer care sequealae related to maxillofacial prosthodontic care. Must be well experienced with surgical oncology, surgical reconstruction, radiation therapy and medical oncology patient care within an institutional head and neck cancer care institutional environment. Must have skills in digital surgical design and simulation to plan reconstructions for functional rehabilitation. In-depth experience in functional assessment and nasopharyngeal endoscopic assessment
Dentist	University-based degree in dentistry[1]	Member of the Alberta Dental Association and College	Should have significant training in the examination and treatment of head and neck cancer patients, (both pre- and post- cancer treatment). Often graduates of a General Practice Residency or Oral Medicine Residency	Enhanced knowledge and experience regarding the sequelae of head and neck cancer treatments (surgery/chemo/ radiation) on oral health. Experience in providing pre-radiation oral health consultation, treatment planning, management, and counselling. Experience in post-radiation oral health management and counselling, including prevention strategies and collaboration with other members of the head and neck cancer team
Pathologist	Degree in medicine or equivalent[1]	RCPSC Certificate of Special Competence in Anatomical or General Pathology[1]	Formal fellowship or significant experience in head and neck cancer pathology[1]	NA
Clinical Nurse Specialist	Master's degree in nursing[1]	NA	Should have prior oncology experience and expertise, but may require role	Knowledge and expertise in an area of cancer nursing[1] Greater breadth and depth of

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
			mentoring to develop specific oncology expertise[1]	knowledge compared to the Specialized Oncology Nurse[1] Qualified as a regulated independent practitioner according to the Health Professions Act
Nurse Practitioner	Master of Nursing, Nurse Practitioner	Holds Nurse Practitioner permit with College and Association of Registered Nurses of Alberta in Adult Stream of Practice	4,500 Registered Nurse practice hours in last five years in addition to completing required clinical hours within Nurse Practitioner education program. Successful completion of Nurse Practitioner National Registration Exam. Should have prior oncology experience and expertise, but may require role mentoring to develop specific oncology expertise	Nurse Practitioner is a Registered Nurse with advanced knowledge, skills and competencies. Integrate elements such as diagnosing, ordering and interpreting investigative tests, treating health problems and prescribing drugs into practice
Advanced Practice Speech-Language Pathologist	Master's degree in speech language pathology and advanced practice training	Member of the Alberta College of Speech-Language Pathologists and Audiologists Independent Authorizer with the Assistive Devices Program	Minimum of 5 years' experience required before advanced practice training can begin 2-year advanced practice training	Performs comprehensive health assessments in clinic setting, independently treats wounds, excellent patient and staff teaching skills
Speech-Language Pathologist	Master's degree or equivalent in speech pathology[1]	Member of the Alberta College of Speech-Language Pathologists and Audiologists Independent	Specialized training in speech, voice, and swallowing rehabilitation in head and neck cancer patients. Comprehensive education in the anatomy and	Knowledge and expertise in clinical swallowing assessment and therapy, video fluoroscopic swallowing assessment, fiberoptic endoscopic swallowing assessment, and the management of patients with tracheotomies and head and neck surgery with anatomical reconstruction

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
		Authorizer with the Assistive Devices Program[1]	physiology of the head and neck and surgical procedures	Approved for delegated controlled acts if required to do voice restoration work for laryngectomized patients.[1] This involves direct training for the placement of TEP valves at the Blom-Singer Course and subsequent supervision of the first 50 valve placements
Specialized nursing care	Bachelor's degree in nursing[1]	Registered with the College and Association of Registered Nurses of Alberta	Registered Nurses should have general oncology experience and/or be mentored to develop the skills to work with the patient population	Registered Nurses are working in an environment where the majority of individuals have a diagnosis of cancer or are at risk of developing cancer
Diagnostic Radiologist/ Neuroradiologist	Degree in medicine or equivalent[1]	RCPSC Certificate in Diagnostic Radiology Special certificate in neuroradiology or equivalent	Minimum of 1 year fellowship in neuroradiology/head and neck imaging	NA
Registered Dietitian	Bachelor's degree with major in food science and nutrition	Membership with the College of Dietitians of Alberta, eligible for membership with the Dietitians of Canada	Accredited dietetic internship professional license[1]	Should have hospital or patient care experience and/or oncology expertise[1] and experience with enteral nutrition
Social Worker	Bachelor's or Master's Degree in Social Work	Registered with the Alberta College of Social Workers Should have affiliation and membership with professional oncology social work organizations	Hospital or patient care experience, as well as oncology experience[2] Should have experience teaching, coaching and psycho-social support and counselling across the continuum with patients and families[1]	NA

Team member	Education	Professional license/ Certificate	Experience/Training	Knowledge, abilities and skills
		(e.g. Canadian Association of Social Workers) [1]		

3. Cancer Centre and Team Member Volumes

- The management of head and neck cancer patients is complex. The initial phases of care and ongoing care of all head and neck cancer patients should be centered at a single, high-volume centre with adequate support and expertise to provide the highest level of care.

- All patients with a new diagnosis of invasive head and neck cancer should be seen at a head and neck multidisciplinary clinic prior to initiation of treatment by the designated head and neck multidisciplinary team. These patients should subsequently be discussed at regularly scheduled Tumour Conference Rounds attended by the members of the core team to ensure consensus opinion on treatment and quality assurance.

- Although the development of centres of excellence is strongly encouraged, innovative collaborations between high-volume and low-volume centres and/or regions should be expanded and defined in order to maintain the high quality of care being provided to head and neck cancer patients[2] after the initial management phases.

- The development of small-volume, non-multidisciplinary treatment programs for patients with head and neck cancer is strongly discouraged.[1]

- There is data to support a volume quality relationship with higher volume centres having better outcomes.[12-15] However, no data exists in Alberta to directly inform minimum volume thresholds for surgeons, medical and radiation oncologists to ensure high-quality care. Thus, the Alberta Provincial Head and Neck Tumour Team, like Cancer Care Ontario,[1] endorse the volumes recommended by the National Institute for Health and Clinical Excellence.[2] In addition, there are no data or clinical practice guidelines in Alberta or elsewhere to directly inform the minimum volumes for Specialized Oncology Nurses, Advanced Practice Nurses, Advanced Speech-Language Pathologists, Registered Dietitians and Social Workers. Note that in some cases minimum recommended volumes and FTEs have been modified and expanded by the Alberta Provincial Head and Neck Tumour Team to reflect knowledge from practice experiences in Alberta (Table 2 and 3).

Table 2. Minimum recommended volumes required to care for head and neck cancer patients

Team member	Minimum volumes required
Head and Neck Surgeon	Assess 50 new head and neck cancer patients per year. Perform major surgery (requiring lateral compartment neck dissection or equivalent complexity) on 40 head and neck cancer patients per year[1]
Head and Neck Reconstructive Surgeon	20 head and neck cancer microsurgery cases per year[1]

Team member	Minimum volumes required
Oral and Maxillofacial Surgeon	A minimum of 50 assessments and 40 head and neck cancer patients treated per year
Medical Oncologist	A minimum of 25 head and neck cancer patients treated per year[1]
Radiation Oncologist	A minimum of 50 head and neck cancer patients treated per year[1]
Maxillofacial Prosthodontist	A minimum of 50 assessments and 40 head and neck cancer patients treated per year
Dentist	A minimum of 25 initial consultations and a minimum of 25 head and neck cancer patients managed during and post radiation per year
Pathologist	No minimum volumes currently established
Clinical Nurse Specialist	No minimum volumes currently established[1]
Nurse Practitioner	No minimum volumes currently established
Advanced Practice Speech-Language Pathologist	No minimum volumes currently established
Speech-Language Pathologist	No minimum volumes currently established
Specialized nursing care	No minimum volumes currently established
Diagnostic Radiologist /Neuroradiologist	No minimum volumes currently established
Registered Dietitian	No minimum volumes currently established[1]
Social Worker	No minimum volumes currently established[1]

Table 3. Minimum recommended FTE to care for head and neck cancer patients

Team member	Minimum FTE
Head and Neck Surgeon	No minimum FTE currently established[1]
Head and Neck Reconstructive Surgeon	No minimum FTE currently established[1]
Oral and Maxillofacial Surgeon	No minimum FTE currently established
Medical Oncologist	1.0 FTE per 150 head and neck cancer patients seen in consultation per year
Radiation Oncologist	1.0 FTE per 150 head and neck cancer patients seen in consultation per year[1]
Maxillofacial Prosthodontist	1.0 FTE per 150 head and neck cancer patients per year

Team member	Minimum FTE
Dentist	1.0 FTE per site based on 1,500-2,000 patient contacts per year
Pathologist	No minimum FTE currently established
Clinical Nurse Specialist	1.0 FTE per head and neck site group (especially with larger site groups seeing > 200 patients in consultation per year OR shared across another site group)[1]
Nurse Practitioner	1.0 FTE per head and neck site group (especially with larger site groups seeing > 200 patients in consultation per year OR shared across another site group)[1]
Advanced Practice Speech-Language Pathologist	1.0 FTE per 150 patients seen in consultation per year
Speech-Language Pathologist	No minimum FTE currently established
Specialized nursing care	No minimum FTE currently established
Diagnostic Radiologist /Neuroradiologist	No minimum FTE currently established
Registered Dietitian	1.0 FTE per 150 patients seen in consultation per year[1]
Social Worker	1.0 FTE per 150 patients seen in consultation per year[1]

Table 4. Unique infrastructure requirements*

Technology or team member	Recommendation for infrastructure requirements
PET Scanning	• Access to PET scanning within 2 weeks for pre- and post-treatment evaluation as clinically indicated
MRI and CT	• Access to MRI and CT for definitive staging and/or treatment planning, with expert head and neck radiology review, should be available, within 2 weeks of request
Pathologist	• Expert review of select head and neck cases prior to definitive management • Routine access to HPV/P16 testing
Surgical Oncologist	• Infrastructure for microvascular, laser and minimally invasive surgery[1] • Perioperative monitoring (≥ Level III)[1] • Specialized surgical nursing (head and neck)[1] • Clinical equipment[1] – endoscope with image capturing capability
Medical Oncologist	• Ambulatory chemotherapy unit and oncology pharmacy support[1] • Access to inpatient services including ability to administer chemotherapy[1] • Access to peripherally inserted central catheter (PICC) line placement, continuous infusion pumps
Radiation Oncologist	Radiation treatment facility, including: • Linear accelerator based external beam radiation treatment with multileaf collimation and IMRT capability[1] • Portal or CT based on board treatment verification[1]

Technology or team member	Recommendation for infrastructure requirements
	• CT simulation (with IV contrast available) and custom immobilization capabilities[1] • IMRT-capable treatment planning system[1] • Medical dosimetry and physics support for plan development and quality assurance[1] • Resources for staff and infrastructure[1]
Advanced Practice Speech-Language Pathologists	• Specialized equipment for speech rehabilitation (post-laryngectomy) • Availability and access to radiology and equipment to support the analysis of swallowing function

* These requirements are unique to the treatment of head and neck cancer and are beyond those requirements that would typically be found in these settings

Table 5. Wait times to care

Assessment or therapy	Time frame
Surgical Assessment	• Head and neck cancer patients should be seen by an experienced surgeon[10], as defined in Table 1 and 2, with access to the necessary diagnostic tools within 2 weeks of referral • Urgent assessment by an experienced surgeon should be immediately available for any patient with a suspected head and neck cancer and critical symptoms (e.g. severe dysphagia, airway obstructions, stridor, etc).
Primary Surgical Therapy	• Patients undergoing primary surgical therapy should have surgery performed within 4 weeks of the ready-to-treat date • The time from completion of surgery to the initiation of radiation therapy should be less than 6 weeks in the absence of post-operative medical or surgical complications

Maxillofacial Prosthodontics	• Maxillofacial Prosthodontic Care – Access to care within 3 months
	• Jaw Reconstruction Rehabilitation Care:
	  ○ Access to assessment within 3 months
	  ○ Access to treatment within 6 months

Radiation/Medical Oncology and Dental Assessment	• Within 2 weeks of referral
Primary Radiation Therapy	• The EBRT access target is a wait time interval of less than 4 weeks (i.e. ≤ 27 days) from the ready-to-treat date to the start-of-treatment date for all eligible patients. In certain cases there may be clinical indication for more rapid access to treatment

GLOSSARY OF ABBREVIATIONS

Acronym	Description
CT	Computed tomography
EBRT	External beam radiation therapy
FTE	Full-time equivalent
IMRT	Intensity-modulated radiation therapy
MRI	Magnetic resonance imaging
NA	Not assigned / not applicable
PEG	Percutaneous endoscopic gastroscopy
PET	Positron emission tomography
PICC	Peripherally inserted central catheter
RCPSC	Royal College of Physicians and Surgeons of Canada
TEP	Tracheoesophageal puncture

DISSEMINATION

- Present guideline at local and provincial tumour team meetings and weekly rounds
- Post the guideline on the Alberta Health Services website.
- Send an electronic notification of the new guideline to all members of CancerControl Alberta

MAINTENANCE

A formal review of the guideline will be conducted at the Annual Provincial Meeting in 2016. If critical new evidence is brought forward before that time, however, the guideline working group members will revise and update the document accordingly.

CONFLICT OF INTEREST

Participation of members of the Alberta Provincial Head and Neck Tumour Team in the development of this guideline has been voluntary and the authors have not been remunerated for their contributions. There was no direct industry involvement in the development or dissemination of this guideline. CancerControl Alberta recognizes that although industry support of research, education and other areas is necessary in order to advance patient care, such support may lead to potential conflicts of interest. Some members of the Alberta Provincial Head and Neck Tumour Team are involved in research funded by industry or have other such potential conflicts of interest. However the developers of this guideline are satisfied it was developed in an unbiased manner.

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APPENDIX 1: Evidence Tables

Table 1. Optimal composition of team for treating HN cancer patients

Guideline Developer	Core Team Members	Extended Team Members & Services
CCO 2009[1]	- Core team comprised of group of physicians & allied healthcare providers responsible for Ax, Tx, planning, management, survivorship & rehab of pts - Care of pts w HN cancer coordinated among members of the core team, including: - HN surgeon/Reconstructive surgeon - Medical oncologist - Radiation oncologist - Dentist w expertise/interest in dental oncology - Pathologist w expertise in histopathology & cytopathology - Clinical Nurse Specialist or Nurse Practitioner - Primary Registered Nurse (Inpatient & Ambulatory nurses) - Medical imaging physician - Speech-Language Pathologist - Registered Dietician - Social Worker	- Primary care physician not involved in day-to-day Tx of HN cancer pt, but plays important role in post-Tx supportive care; responsible for ongoing overall health of pt - Extended team will be called upon by core team to facilitate Tx, planning, management, survivorship, & rehab of pt - Members of extended team must have training or experience managing pts w HN cancers; extended team including: - Oral Surgeon: Doctor of Dental Surgery w fellowship training in maxillofacial surgery; proficiency w implantation techniques - Prosthodontist/Prosthetic anaplastologist - Anesthesiologist w special interest in airway management - Healthcare providers w expertise in gastrostomy creation, feeding tube placement, & support for pts requiring tube feeding - Interventional radiologist - Opthalmologist - Pain management specialist - Palliative care specialist - Dental technician & hygienist - Mental health providers, including psychiatrist or psychologist - Physiotherapist - Occupational therapist - Radiation physicist - Radiation therapist - Respiratory therapist - Hyperbaric medicine - Home care team
NCCN 2011 [11]	All HN cancer pts need access to full range of specialists & support services w expertise in management of pts w HN cancer for optimal Tx & follow-up - Surgery: HN, plastic & reconstructive - Oncology: radiation, medical - Pathology (including cytopathology) - Diagnostic radiology - Adjunctive services (including neurosurgery, ophthalmology,	F/U performed by physician & other healthcare professions w expertise in mgmt/prevention of Tx sequelae including comprehensive HN exam. Management of HN cancer pts may involve: - General medical care - Speech/swallowing Tx - Pain/symptom management

Guideline Developer	Core Team Members	Extended Team Members & Services
	psychiatry, addiction services, audiology, palliative care) - Specialized nursing care - Dentistry/prosthodontics - Physical medicine & rehabilitation - Speech & swallowing Tx - Clinical social work - Nutrition support	- Audiology - Nutritional support (enteral feeding, oral supplements) - Tracheotomy care
NICE 2004[2]	- Not necessary for every HN cancer MDT to incl. all types of specialists; however, important that all skills required to deal w range of pts treated by each MDT are available among members - Suggested members of upper aerodigestive tract cancer MDT: - Administrative head (lead physician) - Ear, nose & throat, maxillofacial or plastic surgeons ($n \geq 3$) - Clinical oncologists ($n \geq 2$) - Restorative dentist - Pathologists - Radiologist - Clinical Nurse Specialists - Speech-Language Pathologist - Senior nursing staff from HN ward - Palliative care specialist - Dietician - Team secretary - Data manager - MTD coordinator	- Extended team members required for some team members - Should have interest in HN cancer & experience of dealing w pt population - Extended team members: - Other specialist surgeons - Anesthetist w special interest in HN cancer - Gastroenterologists, radiologists, surgeons & other health professionals w expertise in gastrostomy creation, feeding tube placement & support for pts requiring tube feeding - Ophthalmologist - Pain management specialist - Nuclear medicine specialist - Therapeutic medicine specialist - Maxillofacial/dental tech - Dental hygienist - Social worker - Benefits advisor - Liaison psychiatrist - Clinical psychologist - Counselor - Physiotherapist - Occupational therapist
SIGN 2006 [10]	- 1st line Tx of HN cancers should be managed by specialists as part of MDT, members of team may vary from centre to centre, but likely to include: - Clinical nurse specialist - Specialist HN cancer surgeons (Ear, nose & throats; maxillofacial & plastic) - Clinical oncologist - Speech-language pathologist - Dietician - Restorative dentist - Radiologist	- Ward nurses - Chemo nurse - Specialist counselor - Clinical psychologist - Physiotherapist - Occupational therapist

Guideline Developer	Core Team Members	Extended Team Members & Services
	- Pathologist - Team secretary - Audit assistant - Refer pts w locoregional recurrence to palliative services for symptom control early on - Care of pts w incurable HN cancer should also be managed by palliative care services in conjunction w MDT - HN cancer pts should be offered emotional support, may be provided by clinical nurse specialist & non-clinically trained counselors	

Ax = assessment; HN = head and neck; MDT= multidisciplinary team; pt = patient; Tx = treatment; w = with;

Table 2. Recommended skill set and experience of CORE team members, as well as min practitioner specific volume thresholds and infrastructure requirements in treating patients with HN cancers

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
CCO 2009 [1]	HN surgeon / Reconstructive Surgeon	- Degree in medicine or equivalent, including RCPSC Specialist Certificate in surgical discipline - HN surgeon = surgeon trained in otolaryngology/ HN surgery, general surgery, or plastic surgery, w advanced training in HN oncology - Advanced training = having an Advanced Training in HN Oncologic Surgery Fellowship through the American HN Society or equivalent	NR	- Surgery/Oncology: Assess 50 new pts & major surgery on 40 pts per year -Surgery/ Reconstructive: 20 microsurgery cases annually Major surgery = 1) Neck dissection or equivalent complexity; 2) Composite dissection or equivalent complexity; 3) Laryngectomy or equivalent complexity	Surgical Oncology: - Infrastructure for microvascular, laser & minimally invasive surgery - Perioperative monitoring (≥Level III) - Specialized surgical nursing HN) - Clinic equipment (nasopharyngoscopy & image capture)
	Medical Oncologist	- Degree in medicine or equivalent, including RCPSC Specialist Certificate in Internal Medicine or equivalent,	NR	- 1.0 FTE per 200 HN cancer pts seen in consultation - Minimum 25 pts treated annually	- Ambulatory chemotherapy unit & oncology pharmacy support - Inpatient services assess, including ability to administer chemo

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
		as well as RCPSC Certificate of Special Competence in Medical Oncology or equivalent - Enhanced knowledge/skill in Tx of HN cancer pts, acquired from formal clinical fellowship or significant clinical training in HN cancer Tx at expert centre during medical oncology residency or fellowship			
	Radiation Oncologist	- Degree in medicine or equivalent, including RCPSC Specialist Certificate in Radiation Oncology or equivalent - Enhanced knowledge/skill in Tx of HN cancer pts, acquired from formal clinical fellowship or significant clinical training in HN cancer Tx at expert centre during radiation oncology residency or fellowship	NR	- 1.0 FTE per 100 pts seen in consultation per year - Minimum 50 pts treated annually	Radiation Tx Facility including: - Linear accelerator based external beam radiation Tx w multileaf collimation & intensity-modulated radiation Tx capability - Portal or computerized tomography based on board Tx verification - Computerized tomography simulation (w IV contrast available) & custom immobilization capabilities - Intensity-modulated radiation Tx-capable Tx planning system - Medical dosimetry & physics support for plan development & quality assurance - Resources for staff & infrastructure
	Dentist	University-based degree in dentistry & fulfilled requirements of the Royal College of Dental Surgeons of Ontario	NR	NR	NR
	Pathologist	- Degree in medicine or equivalent, including RCPSC Certificate of	NR	NR	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
		Special Competence on Anatomical Pathology - Enhanced knowledge/skill in pathology of HN cancer malignancies, acquired from formal fellowship or significant training in HN cancer at expert centre			
	Registered Nurses & Advanced Practice Nurses	- Bachelors degree in nursing & registered w the College of Nurses of Ontario - Ideally, all nurses Certified Oncology Nurses in Canada, as well as members of Canadian Association of Nurses in Oncology	NR	NR	- Access to interventional radiology for insertion of PEG tubes - Feeding pumps for inpatient & ambulatory settings
	Generalized & specialized oncology nurses	- Enhanced specialty knowledge/skill/practice in environment where majority of individuals have diagnosis of cancer or at risk of developing cancer - Registered nurse able to conduct comprehensive health assessment; engage in supportive & therapeutic relationships w pts/families, manage cancer symptoms & Tx side effects; provide teaching, coaching, psychosocial-spiritual support, counseling across continuum;	NR	Specialized Oncology Nurse: 1.0 FTE per 100 pts seen in consultation per year	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
		facilitate continuity of care & system navigation, self-determination, informed decision-making for pt/family; integrate best practice & evidence-based knowledge in care of pts/families - General oncology experience &/or be mentored to develop skills to work w pt population - Specialized oncology nurses aligned to inpatient & outpatient/ ambulatory care settings - In ambulatory care, primary registered nurse or Case Management model established in order for pts/families to receive consistent care across trajectory (diagnosis, Tx, survivorship/ palliation) & care settings (new pt clinics, reviews, & follow-up) for Ax, Tx planning, symptom mgmt, psychosocial support & long-term follow-up			
	Advanced Practice Oncology Nurse (Clinical Nurse Specialist &/or Nurse	- Masters degree in nursing w knowledge/expertise in area of cancer nursing; greater breadth/depth of knowledge compared to specialized oncology	NR	1.0 FTE per HN site group (especially w larger site groups seeing >200 pts in consultation per year OR shared across another site group	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
	Practitioner)	nurse - Advanced practice nurse functions in domains of direct clinical care, education, research, organizational leadership, & professional development - Advanced practice nurse w prior oncology experience/expertise but may require role mentoring to develop specific oncology expertise			
	Medical Imaging Physician	- Degree in medicine or equivalent & member of RCSP of ON, as well as completed RCPSC 5-year residency program & received Certificate of Special Competence in Diagnostic Radiology - Residency followed by 1+ years fellowship training in subspecialty discipline	NR	NR	NR
	Speech-Language Pathologist	- Masters degree or equivalent in speech pathology & registered member of College of Audiologists & Speech-Language Pathologists of Ontario, as well as, Independent Authorizer w Assistive Devices Program - Knowledge/expertise in	NR	1.0 FTE per 150 pts seen in consultation per year	- Specialize equip for speech rehabilitation (post-laryngectomy) - Availability & access to radiology for completion of modified barium swallows & equipment to support analysis of swallowing function

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
		clinical swallowing Ax & Tx, video fluoroscopic swallowing Ax, & management of pts w tracheotomies - If required to do voice restoration work for laryngectomized pts, speech-language pathologist approved for delegated controlled acts & have specialized training in tracheoesophageal puncture			
	Registered Dietician	- Bachelor's degree accredited by Dieticians of Canada & completion of dietetic internship program accredited by Dieticians of Canada - Registration w College of Dieticians of Ontario & a Dieticians of Canada member - Hospital or pt care experience &/or oncology expertise recommended - Experience/training in enteral/parenteral nutrition support valuable	NR	1.0 FTE per 150 pts seen in consultation per year	- Access to interventional radiology for insertion of PEG tubes - Feeding pumps for inpatient & ambulatory settings - Access to endoscopy suite or interventional radiology for G-tube placement
	Social Worker Primary Care	- Masters degree in Social Work (MSW) & registration (RSW) w Ontario College of Social Workers & Social Service Workers - Hospital or pt care	NR	1.0 FTE per 150 pts seen in consultation per year	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
		experience as well as oncology expertise - Ideally, social workers have experience providing teaching, coaching, psychosocial-spiritual support & counselling across continuum w pts/families			
SIGN 2006 [10]	MDT in general	- ≥ 1 member should be familiar w technique of endoscopic resection - Healthcare professionals skilled in gastrostomy placement - Skilled individual aware of complex social support needs of HN cancer pts	- Discuss & agree on pathway of care w pts, relative, carers & general practitioner; document - Offer pts information about support groups	NR	NR
	Clinical Nurse Specialist	Expertise in HN cancer	- Primary point-of-contact for pts/families regarding information & queries - Main link between pt & other team members - Monitor pt Tx	NR	NR
NICE 2004[2]	MDT in general	All members should specialize in HN cancer	- Overall responsibility for Ax, Tx planning & management of all pts throughout course of disease & rehabilitation, & for supporting, advising & educating professional who provide services for HN cancer pts outside Centre - Offer an outreach service, liaising w those who have less	- Member of MDT that should deal w minimum 100 new cases of upper aerodigestive tract cancers per year (excluding glandular tumors); implies population base > 1 million	- Information & facilities (adequate room, table space, microscope & data projector/monitor for MDT to study radiographic & pathology images together) necessary for effective team functioning & clinical decision-making available at each meeting - Dedicated time for MDT team members to attend meetings - Recognize some time may be required for staff training - Videoconferencing facilities may be necessary - System for recording decision & action items; info/decisions re pts should be recorded on

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
			specialized expertise to ensure high level of care provided for pts in periphery - Discuss audit, clinical trials, & other issues of relevance		appropriate pro-forma avail on laptop during meetings - Audit support staff who work w data manager
	Administrative Head	NR	- Work closely w coordinator - Ensure Tx plans & other info relevant to specific pts sent to their general practitioners & referring hospitals	See minimum volumes required for MDT in general	NR
	Surgeons	- Likely to be ear, nose & throat, maxillofacial, or plastic surgeons - Proficient in reconstruction, including microvascular techniques - Should normally dedicate ½ his/her time to HN cancer	NR	See minimum volumes required for MDT in general	- Specialized HN ward where pts can be nursed post operation - Tx may be provided by for pts w small localized upper aerodigestive tract tumours by surgeons w appropriate skills in peripheral hospitals, if surgeons full members of MDT & MDT consider it appropriate
	Clinical Oncologists	NR	- Clinical nurse specialist should be present at every MDT meeting	See minimum volumes required for MDT in general	NR
	Pathologists	- Expertise in histopathology & cytopathology - Experience participating in external quality assurance schemes	NR	See minimum volumes required for MDT in general	NR
	Clinical Nurse Specialists	Requires highly developed communication &	- Role: psychosocial support & co-ordination of care for pts & families;	See minimum volumes required for MDT in general	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
		psychosocial skills to recognize pts non-clinical needs & problems directly associated w their cancer or Tx	level of involvement w individual pts will vary according to their requirements - May delegate specific tasks to other names nurses - Provision of advice, education & support for other members of nursing team & other professionals important facet of role - Identify pts who might benefit from referral to other professional & be able to arrange access to services - Not expected to take on administrative burden of coordinating MDT meetings		
	Speech-Language Pathologists	Expertise required for helping pts w communication or swallowing	- Take responsibility for Ax of communication & swallowing before Tx; share responsibility w MDT members for discussing impact of proposed Tx & helping pts who have problems w eating, drinking or communication during & after Tx - Provide psychosocial support & information for pts & carers - Contribute to MDT discussions on Tx planning	See minimum volumes required for MDT in general	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
	Palliative Care Specialist	- Doctor or nurse - Experience working w palliative care services in community	NR	See minimum volumes required for MDT in general	NR
	Dietician	Specific expertise in dealing w HN cancer pts	- Involved in pre-Tx Ax - Take action to correct pts' pre-existing nutritional deficiencies before Tx begins & to maintain nutritional status during Tx - Provide support & advice for pts who require tube feeding - Help pts to cope w after-effects of Tx - Provide education regarding nutritional issues for other professionals	See minimum volumes required for MDT in general	NR

Guideline Developer	Type of Team Member	Skill Set or Experience	Roles and Responsibilities	Minimum Volumes Required	Infrastructure Requirements
	Team Secretary	NR	- Provide clerical support for MDT - Record all team decisions - Communicate appropriate info promptly to all those requiring it (e.g. general practitioners)	See minimum volumes required for MDT in general	NR
	Data Manager	NR	- Ensure MDT has all relevant details for each meeting - Record care plan details - Ensure data avail for other purposes (e.g. clinical audit)	See minimum volumes required for MDT in general	NR
	MDT Coordinator	NR	- Organize MDT meetings - May take role of team secretary &/or data manager - Works w pathologists & radiologist to ensure all new diagnosis of cancer in any HN site w which MDT deals are identified - Not a clinical nurse specialist; inappropriate utilization of healthcare provider	See minimum volumes required for MDT in general	NR

Ax = assessment; FTE = full time equivalent; HN = head and neck; MDT = multidisciplinary team; NR = not reported; pt = patient; RCPSC = Royal College of Physicians and Surgeons of Canada; Tx = treatment; w = with

Table 3. Recommended skill set and experience of EXTENDED team members/services, as well as min practitioner specific volume thresholds and infrastructure requirements in treating patients with HN cancers

Guideline Developer	Type of Team Member/ Service	Skill Set of Experience	Roles and responsibilities	Minimum Volumes Required	Infrastructure Requirements
CCO 2009[1]	Primary Care Physician	Completed degree in medicine or equivalent, ideally including College of Family Physicians of Canada Certificate in Family Medicine	NR	NR	NR
NICE 2004[2]	Gastroentero-logists, Radiologists, Surgeons	Expertise in gastronomy creation, feeding tube placement & support for pts who require tube feeding	NR	Member of MDT that should deal w min 100 new cases of upper aerodigestive tract cancers per year (excluding glandular tumors); implies population base > 1 million	NR
	Dental Services	Consultant w experience in maxillofacial prosthetics & implantology	Coordinate pt dental care post Tx by liaison w primary care dental practitioners	See above	NR
	Psychological Services	Expertise in social anxiety, depression & addiction (e.g. alcohol, nicotine)	Assess pts psychological needs & provide or arrange appropriate Tx when required	See above	NR

HN = head and neck; MDT = multidisciplinary team; NR = not reported; pt = patient; Tx = treatment; w = with

Table 4. Recommended team and cancer center processes and structures

Guideline Developer	Recommendations
CCO 2009[1]	- Innovative collaborations between high-volume & low-volume centers &/or regions should be expanded & defined to maintain high quality of care being provided to HN cancer pts (might include multidisciplinary case conferencing options, joint care planning w regional care delivery models - Development of small-volume, non-multidisciplinary Tx programs for pts w HN cancer discouraged
SIGN 2006[10]	- Tx plans should be formulated by MDT in consultation w pt; individual pt characteristics, local expertise & pt preference should guide management of HN cancer - Rapid access or “one stop” clinics should be available for pts who fulfill appropriate referral criteria (i.e. pts suspected of having HN cancers); pts should be seen within 2 weeks of urgent referral
NICE 2004[2]	- Ax & Tx of HN cancers should become increasingly concentrated in cancer centers serving populations > 1 million pts

Guideline Developer	Recommendations

	- All HN cancers (including thyroid cancer) should be managed by appropriate MDTs
	- Each MDT should have administrative head (lead clinician)
	- Specify range of cancers MDT deals w (e.g. pts w thyroid cancer) to inform which specific member will be needed
	- Arrangements for referral at each stage of pts cancer journey should be streamlined
	- Diagnostics clinics should be established for pts w neck lumps
	- Co-ordinated local support teams should be established to provide long-term support & rehabilitation for pts in community; these teams will work closely w every level of service, from primary care teams to specialist MDT
	- Identify specific HN cancer MDTs which will provide Tx for pts w cancer in rare sites & pts whose cancers present especially challenging problems (e.g. salivary gland tumors, tumors at base of skull); locate these teams in large centers w access to winder range of resources
	- Manage sarcomas presenting as HN cancers jointly w a sarcoma MDT; discuss all cases together w members of respective MDTs prior to decisions regarding management & again when definitive histology available; have specialist sarcoma pathologist on sarcoma MDT review all suspected sarcomas
	- About MTD meetings:
	  - Require more than establishment of joint or multidisciplinary clinics; requires formal team membership & regular meetings
	  - All members expected to attend; each MDT member should be present at majority meetings; cover should be available if unavailable
	  - Teleconferencing may be used to ensure access to particular specialists
	  - Core team members should meet weekly
	  - Extended team member need not attend all MDT meetings, but available when expertise required
	  - Following pts identified for discussion & case notes (including diagnosis, staging & pathology information) available for meeting:
	  - Pts w new diagnosis of cancer in any HN site w which MDT deals
	  - Pts who have undergone initial surgery
	  - Pts w newly identified recurrent or metastatic disease
	  - Other pts whose management thought by any member of MDT to require discussion
	- Research regarding effectiveness of management (including Ax, Tx, delivery of services & rehabilitation) urgently requires development & expansion; multi-centre clinical trials should be encouraged & supported

Ax = assessment; HN = head and neck; MDT = multidisciplinary team; NR = not reported; pt = patient; Tx = treatment; w = with

Table 5. Evidence from the peer-reviewed literature related to the organization and delivery of healthcare services for HN cancer (2002-2012)

Author	Publication Description	Results/Conclusions
Chen 2010[16]	- Retrospective study - Survival data for 19,326 pts w advanced laryngeal cancer (stage III & IV) & who received Tx (CRT, TL, RT) - Tx received at 1 of 6 types of facilities: a) Teaching/research (high-& low-volume) b) Community cancer center	Methods: - Multivariate proportional hazards regression used to determine 90-day, 365-day & 4-year HR Results: - Tx included: TL (37.6%), CRT (29.4%), RT alone (33%) - 36.2% pts treated at high-volume teaching/research centres (average, 17.1 cases/year) - Among all pts, 20% died w/n 1st year - In multivariate models controlled for covariates, 90-day, 365-day, & 4 year HR estimates for death were lowest for high-volume teaching/research centres

Author	Publication Description	Results/Conclusions
	(high-& low-volume) c) Community (high-& low-volume)	Author conclusions: - Receiving Tx at high-volume teaching/research facility associated w improved survival - Undergoing TL associated w improved survival - Regionalization of care for pts w advanced-stage laryngeal cancer has occurred, because most pts treated at high-volume teaching/research facilities or at high-volume community cancer centers
Chen 2009[17]	- Retrospective study - Data for 11,446 early-stage laryngeal cancer pts analyzed	Methods: Assessed relationship between survival & Tx volume using proportional hazards regression Results: - Tx at low-volume facilities associated w significantly increased likelihood of death (HR 1.20, 95%CI 1.04-1.38) - Surgical resection, compared w radiation Tx, associated w lower mortality (HR 0.74, 95% CI 0.69-0.80) Author conclusions: - Tx at high-volume facility associated w better survival - Surgical Tx versus radiation associated w better survival (could not control for confounders; may bias Tx selection)
Manikantan 2009[18]	- Literature review (1980-2009) of surveillance strategies in post-Tx HN cancer pts - 59 publications analyzed	Recommendations regarding organization & delivery of healthcare for HN cancers - 1st clinical evaluation should take place 4-8 weeks post-Tx completion - Psychological support, advice on hygiene & risk factors integral part of follow-up - Surveillance should be more intense in 3-year post-Tx completion; pts should be educated about symptomatology - Non-oncological components such as swallowing function, voice rehabilitation, morphological changes, neuromuscular alterations, cosmetics sequelae & psychological support have to be catered for during routine surveillance
Ouwens 2009[19]	- Prospective before-after study, single institute - Evaluation of an integrated care program	Methods: - Prospective before-after study in 1 clinic for HN oncology on 311 adults w HN cancer to evaluate integrated care program - Quality dimensions & components of integrated care program included: - Pt-oriented quality: Pt info record w information about relevant issues; specialty nurses who gave extra support for stopping smoking & reducing alcohol consumption - Organization quality: Optimization of diagnostic process (intake day, arrangements about numbers of procedures needed) recorded in clinical pathway & checklist) - Medical-technical quality: Monitoring of weight change & nutrition by dietitian ; meetings for physicians, nurses & allied health professionals about specific topics in the care for pts w HN cancer; extra radiologists specializing in HN cancer - Integrated care requirements: Multidisciplinary pt care team; specialist nurses; integrated care pathways; clinical leader Results: - Scores on integrated care indicators showed implementation of integrated care program led to relevant improvements - Wait time for diagnostic procedures < 10 days (improvement of 37%) - Support for smoking cessation (+37%)

Author	Publication Description	Results/Conclusions
		- Nutrition support (+44%) - Ax of computed tomography & magnetic resonance imaging scans by expert radiologist (+23%) - No. pts in contact w specialist nurses (+37%) - Program had no relevant effect on outcome indicators (i.e. quality of life & pt satisfaction) Author Conclusions: - Integrated care program can improve several aspects of management of pts w HN cancers
Akman 2008[20]	- Retrospective - Analyze sig of place of surgery on outcome of pts w laryngeal cancer who underwent surgical operations in other centers & subsequently referred to Dokuz Eylul University HN Tumour Group for postoperative radiation	Methods: - Pts (*n*=253) divided into 3 groups according to place of surgery: - Group1 – pts who had surgical operation at Dokuz Eylul University Hospital, Turkey - Group 2 – referred from centers w oncological surgical experience - Group 3 – pts referred from hospitals w no surgical teams experienced in HN cancer Tx - Clinical & pathological features of pts analyzed to assess impact of surgery on clinical outcomes & prognostic factors for survival Results: - Median follow-up 48 months - 5-y OS, LRDFS & DMFS was 66, 88 & 91% respectively - When pts clinical & histopathological features analyzed for impact of place of surgery, surgical margin positivity rates higher in Group 3 (p=0.032), although Group 1 & 2 had more advanced clinical & pathological N stage disease (p=0.012, p=0.001) - Multivariate analysis, older age (p<0.0001), presence of perinodal invasion (p=0.012), time interval between surgery & RT > 6 weeks (p=0.003) & tumour grade (p=0.049) most significant factors - For LRFFS, advanced clinical stage (p=0.002), place of surgery (p=0.031) & presence of clinical subglottic invasion (p=0.029) shown to be important prognostic factors - For DMFS only pathological (+) lymph node status (p=0.046) significant factor in multivariate analysis Author Conclusions: - Significance of place of surgery as well as other well-known prognostic factors underlines importance of experience MDT if best results to be obtained for pt
Jeannon 2008[21]	- Correspondence regarding implementation of NICE guidelines	Key points: - Implementation of NICE improving outcomes guidelines manual for HN cancer may have huge potential cost implication - HN cancer is rare disease which utilizes large quantities of resources which can only be provided in tertiary centre - HN cancer services should be centralized into single site for each cancer network - New higher tariff rate for complex HN cancer cases needed which recognizes true cost of work - Each network should set own tariff to make HN cancer care financially viable
Westin 2008[22]	- Review of literature on management of HN cancer using MDT meetings	Findings: - MDT has developed because of complexity of clinical workup & Tx of HN cancer for which no single physician can claim to master all training & skills necessary to treat pts

Author	Publication Description	Results/Conclusions
		- MDT ensures professional efforts coordinated & timely; ensuring best results for pts - MDT usually involves centralization of care w specialization; benefits Tx outcome; enables development of clinical pathways to minimize complications; improves on cost & effectiveness
Ouwens 2007[23]	- Systematic development of valid set of indicators for assessing care of HN cancer pts	Methods: - Defined set of indicators based on integrated care literature, national evidence-based guidelines for pts w HN cancer, & opinions of professionals & pts - Tested set of indicators regarding Ax of current practice & clinimetric characteristics at RUNMC (university hospital in the Netherlands – one of the main reference centres for HN oncology approx. 425 new pts/year) Results: - Final set consisted of 8 integrated care indicators & 23 specific indicators (not listed here) for pts w HN cancer: 1) Availability of an MDT 2) Functioning of MDT according to team climate inventory 3) Availability of integrated care pathways for HN cancer pts 4) Use of clinical pathway for each pt w HN cancer 5) Availability of case manager 6) No. pts that had interaction w case manager(s) 7) No. pts that feel involved in decisions regarding Tx 8) No. pts that are well informed on all info items - Current practice Ax produced high scores for integrated care indicators, but specific indicators showed room for improvement - Practice test showed 9 indicators had both low percentages of missing values & high percentages for improvement: 1) No. pts who know who to talk to for information & questions 2) No. pts who were well informed on all information items applicable to their situation 3) No. pts who said they were offered emotional support 4) No. pts who were informed about possibilities to contact companions in distress 5) No. pts who could see a specialist 1 day after referral 6) No. pts who had all necessary diagnostic procedures on day of 1st visit to specialist 7) No. pts who started 1st Tx within 30 days after their 1st visit to specialist 8) No. pts who said that transition went seamlessly a) to HN centre b) within hospital between departments c) from HN centre returning home 9) No. pts who were monitored regarding their nutrition health status before, during & after Tx Author Conclusions: - The indicators, while based on evidence-based guidelines & principles of integrated care, should incorporate pts' opinions & include practice test - Quality of integrated care for HN pts could be improved
Stalfors 2007[24]	- Audit of HN oncology MDT meetings	Methods: - Quality of MDT meetings in western region of Sweden assessed based on following factors: - How often can diagnosis, TNM-classification & Tx plans be successfully established from workup presented at pts 1st MDT meeting?

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		- What are reasons for failure? - How often is TNM-classification altered at Tx start? - Any impact on quality on decisions w regard to telemedicine also studied Results: - 329 pts presented at MDT meetings during 1 year included prospectively & data collected in protocol - Diagnosis & Tx plan established for 73% of pts at 1st MDT meeting - TNM classification reviewed in 1.4% pts before Tx Author Conclusions: - Validity of decisions made at MDT meetings satisfactory, but improvements regarding quality of workups possible - Mode of presentation of pts at MDT meeting not decisive for quality of decision regarding diagnosis & Tx plans
Fleissig 2006[25]	- Review of literature (1985-2006) -Describes barriers to successful implementation of MDT working Note: not HN specific; all cancer	- Some issues in cancer care in UK that MDT working aimed to resolve - Non-uniform access to specialist care - Frequent reporting of inadequacies in cancer services - Disjointed referral system - Large variations in frequency of individual Tx used, caseload for particular doctors treating cancer & pt survival - Putative benefits of MDT working - Improved consistency, continuity, coordination & cost-effectiveness of care - Improved communication between health professionals - Improved clinical outcomes - Increased recruitment into clinical trials - Opportunities to improve audit - Increased satisfaction & psychological well-being of pts - Educational opportunities for health professionals - Support from collegial environment - Increased job satisfaction & psychological well-being of team members - Requirements for effective MDT working - Leadership & team dynamics - Administrative support - Staff time - Funding - Evidence from published empirical studies & reports in UK regarding benefits of MDT working is sparse - Barriers to good practice & functioning - Attendance - Administrative support - Review of pts Author conclusions: - MDT working widely introduced around UK for provision of cancer care, but little evidence for its direct effect on quality of pt care

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		-Systems that assess effectiveness of teams not fully developed; need better methods needed to monitor performance, team working, outcomes
Killeen 2005[26]	- Review of literature regarding provider volume & outcomes for oncological procedures	Methods: - Studies included if involved pts cohort from 1984 onwards, community- or population-based, assessed health outcome as dependent variable & volume as independent variable - Studies scored to assess generalizability w respect to any observed volume-outcome relationship Results: - 68 relevant studies; 41 included (13 of which based on clinical data) - All showed inverse relationship, of variable magnitude, between provider, volume & mortality or no volume-outcome effect - All but 2 clinical reports revealed statistically significant post relationship between volume & outcome; none demonstrated the opposite Author Conclusions: - High-volume providers have significantly better outcome for complex cancer surgery, specifically for pancreatic, oesphagectomy, gastrectomy & rectal resection
Patel 2004[27]	- Retrospective cohort study - Assess impact on pts of proposal to centralize HN oncology services in UK	Methods: - Retrospective audit of 2001-2002 HN cancer database - Total number of hospital visits for diagnostic, therapeutic & other management services recorded; using this data, extra distance required to travel to potential regional cancer center Results: - Each pt would have to travel average extra 5333 miles during 1st 6 months of management Author Conclusions: - Agencies involved w restructuring oncology services must recognize non-clinical impact of centralization & make provisions to overcome burden facing pts & carers
Gendron 2002[28]	- Cohort study; tertiary care academic med center - Evaluate durability over time of reduction of resource utilization post-implementation of clinical care pathway (delineates daily interventions & goals) for HN surgery	Methods: - 3 groups of pts who underwent major resection & tracheostomy for upper aerodigestive tract cancers - Control group (pre-clinical care pathway, n=87) - Cohort from 1996-1997 (1st y post-clinical care pathway, n=43) - Cohort from 1999 (n=82) - Main outcome = length of stay, readmission & complication rates, hospital charges Results: - Median length of stay & length of stay exclusive of intensive care unit decreased in 1st year & stable at 3 year (from 13.0 to 8.0 days & from 10.5 to 6.4 days, respectively) - ICU decreased across 3 year from 2.2 to 1.1 days (p=0.001) - Median total charges declined from $105410 pre-CCP to $65919 at 3 y - Incidence of post-op pneumonia decreased from 12% to 1% (p=0.02) across 3 year

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		- Readmission rate decreased from 18% to 11% (p=0.37%) across 3 year Author conclusions: - Clinical care pathway for HN cancer maintained improvement in length of stay & charges seen in 1st year of implementation & continues to decrease resource utilization while enhancing quality of care
Chen 2000[29]	- Cross-sectional study; cancer Tx center - Assess impact of clinical care pathway on practice of HN oncologic surgery in an academic center	Methods: - 3 groups of pts who underwent unilateral neck dissection: - Historical control group (treated prior to clinical care pathway implementation, *n*=96) - Contemporaneous non-pathway group (not managed on clinical care pathway, *n*=64) - Pathway group (managed on clinical pathway, *n*=30) - Main outcome = median length of stay (hospital), median total cost of care Results: - Median length of stay of historical control, contemporaneous non-pathway, pathway decreased from 4.0 to 2.0 d (p<0.001) - Total median cost of care less in pathway group ($6227) versus historical control group ($8459) (p<0.001) - Largest decrease in categories of costs: - Tx costs (-38%) including room/board, nursing - Surgery-related & diagnostic test costs (-16%) - No significant difference between contemporaneous pathway & pathway groups for costs or length of stay - Mean (p=0.11) & median (p=0.07) length of stay lower in pathway group, but not significant - Contemporaneous non-pathway & pathway groups did not differ in complications or readmissions Author conclusions: - Development & implementation of clinical care pathway played significant role in decreasing length of stay & total care costs associated w neck dissection between non-pathway & pathway pts

Ax = assessment; CRT = chemoradiotherapy; DMFS = Distant metastasis-free survival; HN = head and neck; HR = hazard ratio; LRDFS = Locoregional disease-free survival; MDT = multidisciplinary team; NR = not reported; pt = patient; RT = radiotherapy; OS = overall survival; TL = total laryngectomy; Tx = treatment; w = with