



## Review

## Evaluation of the benefit and use of multidisciplinary teams in the treatment of head and neck cancer



Lisa Licitra<sup>a</sup>, Ulrich Keilholz<sup>b</sup>, Makoto Tahara<sup>c</sup>, Jin-Ching Lin<sup>d</sup>, Pauline Chomette<sup>e</sup>, Philippe Ceruse<sup>f</sup>, Kevin Harrington<sup>g</sup>, Ricard Mesia<sup>h,\*</sup>

<sup>a</sup>Head and Neck Cancer Medical Oncology Department, Fondazione IRCCS Istituto Nazionale Tumori, Milan, Italy

<sup>b</sup>Charité Comprehensive Cancer Center, Berlin, Germany

<sup>c</sup>Department of Head and Neck Medical Oncology, National Cancer Center Hospital East, Tokyo, Japan

<sup>d</sup>Department of Radiation Oncology, Taichung Veterans General Hospital, Taichung, Taiwan

<sup>e</sup>Merck KGaA, Darmstadt, Germany

<sup>f</sup>Otolaryngology, Head and Neck Surgery Department, University Hospital Lyon, University Claude Bernard Lyon 1, Lyon, France

<sup>g</sup>Division of Radiotherapy and Imaging, The Institute of Cancer Research, London, UK

<sup>h</sup>Hospitalet de Llobregat, Barcelona, Spain

## ARTICLE INFO

## Article history:

Received 23 May 2016

Accepted 3 June 2016

## Keywords:

Multidisciplinary team

Healthcare delivery

Head and neck cancer

## SUMMARY

Given the complexities of multimodality treatment for patients with head and neck cancer, the rationale for the use of multidisciplinary teams (MDTs) to define individual optimal treatment strategies on a per-patient basis is apparent. Increased use of guideline-directed approaches, reduced time to treatment and improved outcomes, which result from use of an MDT approach in head and neck cancer, have been documented. A discussion of these recent advances, as well as presentation of available country-specific guidance on the roles and responsibilities of team members, supports the creation of similar local-language recommendations for the treatment of patients with head and neck cancer. Finally, expert practical advice on the implementation of MDTs may enable the establishment of the MDT approach more universally around the world.

© 2016 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Given the complexities of multimodality treatment for patients with cancer, no one medical professional can possess the necessary background to make optimal treatment decisions independently or avoid inevitable unconscious bias toward their own area of expertise. In most major cancer types, multidisciplinary teams (MDTs) were implemented previously, and, in recent years, the MDT approach has been extended to head and neck cancer. Head and neck cancers involve several anatomically diverse sites, including larynx, pharynx, nasal cavity, paranasal sinuses, and oral cavity. Both the cancer and its treatment can affect vital functions, such as breathing and swallowing, be associated with poor functional outcome (e.g. chewing and speech), and have profound effects on cosmetic appearance, all of which may affect the patient's quality of life. The complexity of disease, the need for multimodality

treatment, which can include surgery, radiation, chemotherapy, and/or targeted therapy, and the patient population, which is more likely to be elderly and have comorbidities and less social support, argue for an individually tailored treatment plan. Furthermore, treatment goals—which include cure, organ preservation, palliation, and a desire to minimize toxicity, reduce symptoms, and maintain quality of life—must also be considered. Thus, optimal management of patients with head and neck cancer should involve a range of healthcare professionals with relevant expertise [1]. This review discusses the data supporting the use of MDTs for the treatment of patients with head and neck cancer and presents the available country-specific guidance to enable more widespread implementation of MDTs to improve the care of patients globally.

## Methods

A literature search of PubMed and Google Scholar, with the combined search terms of “head and neck cancer” and “multi-disciplinary” for the period January 1, 2000, to November 1, 2015, was performed. In addition, the websites of prominent national and international organizations that develop English-language

\* Corresponding author at: Medical Oncology Department, Catalan Institut of Oncology - L'Hospitalet, Universitat de Barcelona, IDIBELL, Spain. Tel.: +34 932607744.

E-mail address: [rmesia@iconcologia.net](mailto:rmesia@iconcologia.net) (R. Mesia).

cancer guidelines—Cancer Care Ontario, the European Society for Medical Oncology (ESMO), the National Comprehensive Cancer Network (NCCN), the New Zealand Guidelines Group, the Sociedad Española de Oncología Médica (SEOM), and the UK National Institute for Health and Clinical Excellence—were searched.

Guidelines and legal requirements are difficult to identify and access, and we recognized that such guidelines would be written in the local language. Therefore, we contacted Merck colleagues with specific knowledge of head and neck cancer treatment in their respective countries to request additional information regarding the legal requirements for MDTs, the availability of guidelines, and key supporting references for each country. Responses were received from 29 countries.

## Rationale for the MDT approach

In the absence of an MDT discussion, there is a real risk that factors relevant to treatment planning might be missed, and, in some cases, patients may not be considered for the appropriate treatment. Thus, the ability to individualize the optimal treatment approach for each patient may be lost. In addition, the opportunity to recruit to important clinical trials may be missed. As treatment in head and neck cancer began to include a multimodality approach, the benefits of MDTs in decision-making became apparent [2]. Several governing bodies—including ESMO [3], the NCCN [4], and SEOM [5]—recommend that treatment plans be established by an MDT [6,7]. Similarly, a working group of Asian experts

**Table 1**  
Recommended team composition.

Team <sup>a</sup>	Specialty	Supported by guidelines and published references in countries
Core team	Head and neck surgeon(s)/oral and maxillofacial surgeon(s)	AU, CA, DE, DK, IT, NL, NZ, UK
	Radiation oncologist	AU, CA, DE, IT, NL, NZ, UK
	Medical oncologist	AU, CA, DE, DK, IT, NL, NZ, UK
	Pathologist	AU, CA, DE, DK, NL (as extended team), NZ, UK
	Radiologist ± PET-trained imaging specialist/diagnostic radiologist/nuclear medicine specialist with PET expertise	AU, CA, DE, DK, NZ, UK
	Otolaryngologist	IT, NZ
	Dentist/oral health consultant	AU, CA, IT, NZ, UK
	Maxillofacial prosthodontist	CA, NZ
	Plastic and reconstructive surgeon	AU, CA, DK (as extended team), NL, NZ, UK
	Referring physician	NZ, UK
	Hematologist	DE
	Respiratory physician	AU
	Palliative medicine physician	AU, UK
	Specialist nurse	AU, CA, DK, IT, NZ, UK
	Speech language pathologist	CA, IT, NL (as extended team), NZ, UK
	Dietitian	CA, IT, NL (as extended team), NZ, UK
	Social worker	AU, CA, IT, UK (as extended team)
	Clinical trial coordinator	AU
	Data manager	AU, UK
	MDT meeting coordinator/pathway project officer/administrative officer/care coordinator	AU, DK, NZ, UK
Extended team	Neurosurgeon	AU, CA, DK
	Upper GI surgeon	AU
	Thoracic surgeon	CA
	Prosthetic anaplastologist	CA, NL
	Vascular surgeon	AU
	Anesthesiologist	CA, UK
	Gastroenterologist	UK
	Endocrinologist	DK
	Interventional radiologist	CA
	Neurotologist	CA
	Neurosurgeon	NZ
	Ophthalmologist	AU, CA, DK, UK
	Psychiatrist/mental health professional	AU, CA, IT, NZ, UK
	Critical care physician	CA
	Radiation physicist	CA, NL
	Radiation therapist/therapeutic radiographer	CA, NL, UK
	Hyperbaric medicine	CA
	Dermatologist	CA
	Pain management specialist	AU, CA, IT, NZ, UK
	Pharmacist	CA
	Addiction services	AU
	Audiology	AU
	HCP with expertise in gastrostomy placement	CA, NZ, UK
	Palliative care	CA, NZ
	Dental hygienists/technician	CA, NL, UK
	Geriatric cancer assessment team	AU
	Adolescent and young adult cancer assessment team	AU, NZ
	Home care team	CA
	Physiotherapist	CA, NL, UK
	Occupational therapist	AU, CA, UK
Rural/remote liaison nurse	AU	
Benefits advisor	UK	

AU, Australia; CA, Canada; DE, Germany; DK, Denmark; IT, Italy; MDT, multidisciplinary team; NL, the Netherlands; NZ, New Zealand; PET, positron emission tomography; UK, United Kingdom.

<sup>a</sup> IT and NZ guidelines do not distinguish between a core team and extended team. France is not included in the table because the French guidelines do not delineate the specific specialists that must be included in the MDT.

**Table 2**  
Summary of available guidelines on the establishment of MDTs.

Country or region	Reference
Australia	South Australian Head and Neck Cancer Pathway 2013 South Australian Health website: <a href="http://www.sahealth.sa.gov.au">http://www.sahealth.sa.gov.au</a>
Austria	Leitlinie des DONKO zur Erstellung einer Geschäftsordnung für Tumorboards DONKO website: <a href="http://donko.or.at">http://donko.or.at</a>
Alberta, Canada	Harris JR, et al. <i>Curr Oncol</i> 2014;21:e704–4
Denmark	Progress for Head and Neck Cancer, National Board of Health, 2012 Sundhedsstyrelsen website: <a href="https://sundhedsstyrelsen.dk">https://sundhedsstyrelsen.dk</a>
France	Deneuve S et al. <i>Eur Ann Otorhinolaryngol Head Neck Dis</i> 2015;132: 213–5 and HAS, ÉVALUATION ET AMÉLIORATION DES PRATIQUES, Une démarche d'amélioration de la qualité, Réunion de concertation pluridisciplinaire en cancérologie Oncopaca website: <a href="http://www.oncopaca.org">http://www.oncopaca.org</a>
Germany	Erhebungsbogen Kopf-Hals-Tumorzentren in Onkologischen Zentren <a href="http://www.onkozert.de">http://www.onkozert.de</a>
Italy	Associazione Italiana di Oncologia Medica (AIOM) website: <a href="http://www.aiom.it/">http://www.aiom.it/</a> Linee guida Tumori Della Testa E Del Collo 2015 and State of the Art Oncology in Europe website: <a href="http://www.startoncology.net">http://www.startoncology.net</a> and The Italian Head and Neck Oncologic Society website: <a href="http://www.AIOCC.it">www.AIOCC.it</a>
Netherlands	Centralization of Head and Neck Cancer Care Netherlands Head and Neck Cancer Working Group website: <a href="http://www.nwhht.nl/">http://www.nwhht.nl/</a>
New Zealand	Standards of Service Provision for Head and Neck Cancer Patients in New Zealand–Provisional 2013 available at the New Zealand Ministry of Health website: <a href="https://www.health.govt.nz">https://www.health.govt.nz</a>
United Kingdom	Improving Outcomes in Head and Neck Cancers. The Manual 2004 Regular updates are available at the National Institute for Clinical Excellence website: <a href="https://www.nice.org.uk">https://www.nice.org.uk</a>

recommend that treatment decisions be made within the context of MDT discussion, keeping patient preference and clinician expertise in mind [8].

In the complex treatment path for patients with head and neck cancer, multiple specialists will provide input into the treatment plan [9]. A team approach is designed to provide all patients with a carefully determined treatment plan focused on providing the most comprehensive, effective care possible. This should occur whenever a new management plan is required. Every relapse and every decision to start a new systemic treatment should be discussed [7]. Published guidelines recommend that the MDT include members with the skills required to deal with the full range of patients treated by the MDT (Table 1), that all patients be discussed by a core team, and that referrals to an expanded team of specialists occur depending on the needs of the patient (Table 1). However, the suggested composition of the core team varies across guidelines. Country-specific guidelines support both smaller and larger core-team approaches (Table 1). Most guidelines provide specific recommendations regarding the specialists that should be included in the core MDT (Table 1).

### Goals and responsibilities

Most published guidelines (Table 2) recommend that the MDT have stated goals, which may include an increased ability to recruit patients to clinical trials, optimized treatment planning, including better adherence to country-specific guidelines, improved coordination between care providers and support teams, and more

efficient delivery of care. In addition, the MDT should follow documented procedures and hold regular formal meetings, which all members are expected to attend on a regular basis.

The role of the MDT begins at the time of the initial diagnosis and treatment planning, when the team formulates an individualized treatment approach based on the disease characteristics of the individual patient as well as their history, health and performance status, and treatment goals. The MDT should continue to be involved in the management of the patient over the course of their disease and recovery. A plan should be in place regarding when and how to provide the initial assessment, the suitability of the patient for relevant clinical trials, supportive care to manage treatment toxicities, and the process for consideration of later treatment modalities [2]. The decision to provide only best supportive care should also be ratified by an MDT. Recommendations should be periodically reviewed against treatment decisions to improve decision-making for future patients, and, when there is deviation from the MDT's recommendation, the rationale for treatment decisions should be documented [10]. The Australian guidelines recommend that patients and their primary care providers be informed about the role of the MDT in the decision-making process. Following a decision at the MDT meeting, the referring physician should discuss the team's treatment recommendations with the patient. These discussions may also include the patient's family, and or caregiver and should include the goals of treatment, likely outcomes and potential side effects of treatment [11]. In some countries (e.g. France) the patient may attend the MDT meeting. Knowing that they are receiving comprehensive care may reduce anxiety among patients and caregivers.

MDT-based care may raise questions about medicolegal risk for members that could result in potential barriers to implementation. Consensus recommendations regarding the legal implications of MDTs state that healthcare professionals who contribute to a treatment recommendation within an MDT share corporate responsibility for the decisions within their area of expertise [12]. Similarly, the associated hospitals or clinics are accountable [13]. Awareness of their legal responsibilities should encourage an effort to fully explore all of the member's opinions during the meetings. Importantly, physicians who feel that their opinions are not adequately expressed by the group decision are advised to formally record their alternate viewpoints in the patient's record. Finally, the recommendations suggest that every opinion that differs substantially from the majority opinion should be presented to the patient [13]. Sidhom and Poulsen suggest that all healthcare professionals practicing within an MDT be made aware of the legal implications of their participation [13]. However, it was determined from a survey of a total of 136 physicians working in 18 oncology MDTs in 4 hospitals in Australia that awareness of these legal implications was low; only 48% of physicians were aware that they are legally liable for decisions made by the MDT in Australia [14]. The vast majority (71%) of these clinicians did not formally document their dissent when they had important disagreements with the decision presented to the patient. A greater awareness of individual responsibility while working in the team environment has the potential to both improve outcomes for patients and limit legal liabilities.

### Benefits of the MDT approach

MDTs with the full range of necessary expertise and access to state-of-the-art facilities are best positioned to provide comprehensive and effective care for their patients. In addition to improved survival, theoretical benefits of the MDT approach include improved staging accuracy, increased adherence to clinical practice guidelines, more cost-effective care, and better communication, culminating in improved value and clinician and patient

satisfaction. Connecting changes in management to improvements in patient care and outcomes is challenging partly because MDTs are considered the standard of care in head and neck cancer; identification of a valid control group or designing a prospective trial with a “no MDT” arm is almost impossible [15]. However, evidence is mounting as several organizations have begun to measure these potential benefits in robust and clinically relevant ways using either a retrospective approach or a “before and after” study design.

#### *MDTs positively affect treatment decisions*

The value of expert data review was recognized as early as 2002 when Loevner et al. from the University of Pennsylvania Medical Center (Philadelphia, Pennsylvania) demonstrated the clinical value of reinterpreting cross-sectional images of patients with head and neck cancer, in the setting of an MDT [16]. Change in image interpretation occurred in 41% of patients, with staging revised in 34% of patients and discovery of previously missed systemic metastases in 2 patients (1.5%) [16]. To evaluate the impact of an MDT on treatment planning, a prospective study of 120 consecutive patients with newly diagnosed head and neck cancer seen between 2009 and 2010 was performed at a single institution. When the “preconference” diagnosis, stage, and treatment plans were compared with the “postconference” opinion of the MDT, more than 25% of patients had some change in tumor diagnosis, stage, or treatment plan. Within this group, 31% had a change in diagnosis or stage that did not result in a change in treatment, 59% had a change in their treatment plan without a change in diagnosis, and 9% had changes in both diagnosis and treatment. Most frequently, treatment changes involved the addition of multimodality care ( $P = 0.0084$ ) [17]. Similarly, clinical and follow-up data were collected prospectively from 172 patients treated at the Sydney Head and Neck Cancer Institute (Sydney, Australia) between December 2011 and October 2012; pre- and post-MDT treatment plans were compared [15]. Changes in management were documented in 30% of patients. Among the changes, 67% were major and involved modification of cancer treatment modality, whereas minor changes included alterations to the extent of a treatment modality (e.g. radiation field or dose) or the addition of a diagnostic test. Referrals by a medical or radiation oncologist were more likely to be altered by the MDT than were those made by surgical oncologists ( $P = 0.05$ ) [15]. More recently, The Istituto Nazionale Tumori of Milan, Italy, conducted a retrospective analysis of 781 patients who were seen between May 2007 and January 2012, 70% of whom had been referred to the cancer center for a second opinion. Following MDT evaluation, further diagnostic investigations were requested in about 50% of cases, diagnosis was changed in 3% of cases, and the recommended treatment was changed in about 10% of patients. Since most referred patients were subsequently treated at their original centers, the evaluation of the impact of the MDT management on patient outcomes was not possible [18].

Kelly et al., using a different method, compared files from patients treated between 2001 and 2008, either before or after the introduction of an MDT at Ipswich Hospital (Ipswich, Australia) in 2006. Retrospectively collected data for patients treated in the pre-MDT period ( $n = 48$ ) were compared with prospectively collected data in the post-MDT period ( $n = 65$ ). Patients treated after the implementation of the MDT system had improved rates of adherence to local guidelines. The time between surgery and radiotherapy was reduced from 61 to 48 days after the implementation of the MDT ( $P = 0.009$ ). Finally, the mean hospital stay declined by more than a week ( $P = 0.002$ ), which the authors propose may reflect reductions in the time patients wait in the hospital for the process of diagnosis, staging, and pretreatment evaluations [19].

Although improved decision-making and better adherence to guidance regarding standard of care is an important goal of MDTs, improving the quality of life, including limiting the decline in speech and swallowing functions, is also of great importance. Ideally, any dysfunction in swallowing and communication ability should be assessed during a pretreatment consultation with a speech-language pathologist (SLP), and strategies to minimize dysfunction throughout treatment should be implemented. To study the effects of MDTs on referral patterns and compliance with treatment of voice and swallowing difficulties, case documents from a series of patients with oropharyngeal cancers treated at Johns Hopkins (Baltimore, MD, United States) between 2006 and 2010 were retrospectively assessed. The 25 patients treated within the MDT had more SLP visits than did the 93 patients treated outside the MDT (mean = 1.8 vs 0.2,  $P < 0.0001$ ). Interestingly, of the multiple factors considered, participation in an MDT clinic was the only significant variable associated with SLP treatment compliance [20].

#### *MDTs reduce time to treatment*

Waiting times, defined as the number of days between histopathological diagnosis and start of treatment, affect prognosis [21–23]. Given that a goal of MDTs is to improve patient care, it would be important to demonstrate that providing care within the MDT structure does not negatively affect waiting times. Patil et al. performed a retrospective chart review comparing waiting times for patients with newly diagnosed disease who were treated in a 24-month period either before ( $n = 51$ ) or after ( $n = 66$ ) implementation of an MDT approach in 2007 at the University of Cincinnati Veteran’s Administration Hospital (Cincinnati, Ohio, United States) [24]. The time from initial consultation to being seen in the otolaryngology clinic decreased significantly from 27.5 to 16.5 days ( $P < 0.0001$ ), and the time from a positive biopsy result being reported to the date of initiating definitive treatment decreased significantly from 35 to 27 days ( $P = 0.04$ ) [24]. Authors from Charing Cross Hospital (London, United Kingdom) performed a retrospective case-control study of the most recent 50 patients treated without delay and compared them with the most recent 50 patients whose treatment was significantly delayed. A significant association between initial review by a physician outside the head and neck MDT and treatment delay was seen ( $P < 0.001$ ) [25].

#### *MDTs can improve outcomes*

Although effects on outcome are more difficult to measure than changes to treatment patterns, evidence is accumulating that MDTs can improve overall survival in patients with head and neck cancer. This should not be surprising given the documented improvements in practice that occur when MDTs are used. The first demonstration of an impact of MDTs on survival in patients with head and neck cancer was seen by analyzing patients in England treated between December 1996 and November 1997 (South and West Audit of Head and Neck Cancer; SWAHN I) and between September 1999 and August 2000 (SWAHN II). SWAHN I demonstrated a trend toward increased survival for patients treated by an MDT, which was confirmed by a statistically significant improvement in survival in the later SWAHN II cohort (hazard ratio [HR] = 0.7,  $P = 0.02$ ) [26]. Implementation of the MDT approach at the Cincinnati Veteran’s Administration Hospital (Cincinnati, Ohio, United States) resulted in a numerically improved 5-year mortality rate in patients with head and neck cancer, as shown by a retrospective chart review [24]. Friedland et al. (University of Western Australia, Perth, Western Australia, Australia) compared the outcomes of 726 patients with head and neck cancer managed at a single institution between 1996 and 2008 who were either treated

within ( $n = 395$ ) or outside ( $n = 331$ ) the MDT setting. In this retrospective analysis, patients with stage IV disease treated by an MDT had significantly improved 5-year survival rates compared with non-MDT-treated patients (HR = 0.69,  $P = 0.004$ ) [27]. One of the largest studies conducted in head and neck cancer involved 9297 patients with newly diagnosed oral cavity cancer treated in Taiwan, China. Patients who had been treated within the framework of an MDT were matched to patients treated without MDT care. MDT care reduced the relative risk of death (HR = 0.84, 95% CI 0.78–0.90), with stronger effects seen in older patients [28].

#### *MDTs can be run efficiently*

The potential impact on cost and time may cause some clinicians to argue that MDTs are not practical for all patients and should be reserved for patients with advanced disease or complex presentations. To address such questions, an analysis of time taken to discuss new patients with head and neck cancer in MDT meetings was undertaken at Aintree University Hospital (Liverpool, United Kingdom) [29]. In a series of 10 weekly meetings wherein 105 patients were discussed, total time per patient ranged from 0.25 to 8 min, with a mean of 2 min. An increase in the number of MDT participants was associated with longer discussion time (Spearman rank-order coefficient = 0.63,  $P < 0.001$ ). The longest discussions concerned patients with advanced T ( $P = 0.006$ ) and N ( $P = 0.009$ ) stage disease, the elderly ( $P = 0.02$ ), and male patients ( $P = 0.05$ ). The authors commented that many patients are discussed only briefly and that concentrating resources on patients with complex needs who require multimodal treatment might be a good approach. For example, early-stage patients could be registered but only briefly discussed by the MDT. Finally, telemedicine has been explored as an alternative to face-to-face meetings of the MDT. In one study, patients who had attended the meetings with their local otolaryngologist via teleconference did not experience telemedicine as a barrier and were confident to take part in these meetings in a familiar environment [30].

#### **Costs associated with MDT implementation**

An important question for clinicians and clinic administrators is the cost associated with running an MDT. The authors of the Australian pre- and post-MDT prospective comparison study described above proposed that any administrative costs associated with setting up the MDT at their institution could be offset by reductions in hospital stays and other cost savings associated with improved patient evaluation, but they did not provide a cost analysis in their article [19]. We researched this topic in the literature and found very few studies that address the topic of costs. It appears that this is a gap in our knowledge, because very little research has been done to directly assess the costs of MDT implementation and administration in comparison with the potential costs savings that might arise from more efficient and effective care delivery. The concept of value does not appear to have been addressed in the literature as of yet. In fact, a systematic literature analysis of economic studies of MDTs used in cancer care determined that the current evidence is insufficient to determine whether MDTs are cost-effective [31].

#### *Authors' perspective on implementing an MDT*

Each of the authors (with the exception of PC) currently works within an MDT and has extensive experience with MDT design, organization, and implementation. Their collective experience regarding the perceived benefits to patients and clinicians, as well

as the hurdles that had to be overcome to implement the MDT approach, is presented in Table 3.

#### *Country-specific approaches to guidance on MDTs*

Responders to the Merck survey supplied feedback on the situation in a total of 29 countries in Europe, Latin America, and Asia. The results suggest that, in many countries, MDTs are in use in large urban academic hospital settings but are less available in rural areas. In some countries, MDTs are required for reimbursement of some specific treatment regimens (Korea and Lithuania). Most reported that guidelines for MDT implementation are not yet available in their country. Countries that provided guidance include Australia, Canada, Denmark, Germany, Italy, the Netherlands, New Zealand, and the United Kingdom (Table 2). Countries with legal requirements are few. Although our survey indicated that MDTs are legally binding in Austria, Denmark, France, Korea, and Lithuania, France was the only country for which we could identify publically available information regarding the law.

Many guidelines specify the composition of both a core team and an extended team (Table 2). A wide range of specialties is represented: as many as 15 core-team specialists are recommended in the UK guidelines, and as few as 3 clinicians are recommended in the French guidelines. To highlight the various approaches to governing the implementation of MDTs, we highlighted the approaches adopted by 4 countries: France, Germany, Canada, and the United Kingdom.

#### *Canada*

Although most guidelines state that all MDT members should have specific knowledge on head and neck cancer, the Canadian guidelines provide additional details that include recommendations for the required education level, fellowships, practice hours, specialist certification, and minimum treatment volume for all core-team members. The recommended core team comprises a large number of specialties, including several that would be included only in the extended team in other countries (Table 1). The Canadian guidelines also include the specification of imaging equipment, pathology testing, chemotherapy and pharmacy requirements, radiation technologies, and speech and language rehabilitation facilities [32].

#### *France*

MDT meetings were made mandatory in France by the Health Ministry, as stated in the "circulaire of February 22nd, 2005," which outlines the legally binding quality requirements for an MDT. At least 3 physicians of different specialties are legally required, and, if the 3 specialists are not present, the meeting is not quorate and the decision is not considered valid. The 3 mandatory specialists are the ENT (ear, nose, and throat) surgeon, medical oncologist, and radiotherapist. Most teams also include a radiologist. The document notes that it is often preferable to have more specialties represented. All new cases must be presented to the MDT before treatment begins, and all modifications to treatment should be discussed. The opinion of the MDT, including the therapeutic plan and the name and qualifications of the participants, are recorded and archived in the patient file. If the treatment provided is different from what the MDT proposed, the physician must record the reasons for the departure from the plan [10].

#### *Germany*

The German Cancer Society has had certified centers of oncological care since 2003 [33], and the concept of the MDT is an important part of their approach. The process for tumor center certification is stated in the interdisciplinary guidelines of the German Cancer Society. To be certified as a head and neck cancer

**Table 3**  
Authors' perspective on implementing an MDT.

What was the impetus for setting up an MDT at your institution?

- MDTs at the authors' institutions were developed to provide the best clinical management decisions in a very rapidly evolving treatment scenario, ensuring the best results for patients. The MDT enables clinicians to discuss treatment strategies for difficult cases directly among different specialists, improves the ability to tailor treatment to the individual patient, and provides a learning environment for younger clinicians
- The MDT is a fundamental part of the Functional Unit approach in Spain, wherein all patients with head and neck cancer are seen by a team of specialists at the same time and place. Similarly, MDTs have been developed as part of a Comprehensive Cancer Center approach to improve clinical care, treatment planning, and clinical trial participation as well as to improve and to make head and neck cancer research a priority
- The MDT approach is a legal requirement in the United Kingdom and is subject to regular cycles of external peer review. Understanding the importance of the success of the MDT and the role of allied healthcare professionals—clinical nurse specialists, speech and language therapists, dietitians, and physical/occupational therapists—has given impetus to inclusion of these disciplines as core members of the MDT

What has been the main benefit to patients?

- A full team of allied healthcare professionals with access to appropriate diagnostic and therapeutic equipment provides a holistic treatment plan based on scientific evidence and adapted to the individual patient
- The time from first visit to diagnosis and to treatment can be shorter for patients who are seen by a well-organized MDT
- Patient and family satisfaction increase when they are immersed in a good organization
- Patients receive increased discussion of treatment options and access to innovative clinical trials
- Patients may trust a proposed treatment based on the collective recommendation of the MDT without the need to request a second opinion

What has been the main benefit to clinicians?

- Information is shared quickly and easily, and communication between specialists is improved. Clinicians can focus on their specialties and not have to manage issues outside of their competence, resulting in increased professional satisfaction
- MDT meetings provide a continuous learning environment that improves the training of fellows and the overall competence of the team; sharing of experience is especially helpful for difficult cases whereby team members can learn from their colleagues
- The experience of shared responsibility, knowledge, and skills for the care of patients with a difficult-to-treat disease gives reassurance to the clinician; sharing of the final treatment outcome for interesting cases aids learning
- The newest treatments and protocols can be discussed and proposed to our patients
- The organization decreases the inappropriate consumption of health resources
- The implementation of an MDT approach may improve patient recruitment to trials

How long did it take to set up the MDT?

- MDTs were designed and implemented at the authors' institutions over a range of time frames. Once all departments have made the decision to organize the MDT, the plan can be operative in as few as 3 months. On average, it took 2 years to fully implement the MDT at the authors' institutions

What factors were key to implementation?

- Institutional leadership is key, and the departments involved in the MDT must be in agreement. Once this has been achieved, the hospital must provide the necessary rules, guidelines, and structure. In addition, hospital management should have the MDT as a goal in their strategic plan
- The legal framework and the threat of removing patient referrals from institutes that did not run properly convened MDTs provided an impetus
- Successful MDTs in other cancers, especially gastrointestinal and breast cancers, served as excellent examples

What, if any, roadblocks did you face and how did you overcome them?

- The main roadblock was to change the clinician's mentality from one of owning the decision to a process of collective decision-making, relying on the opinion of multiple therapeutic departments. At one institution, specialists were encouraged to make an accurate database of their cases, which became available for all physicians on the MDT. This exercise made many more comfortable with the process of case discussion. At other institutions, modeling their team on successful MDTs in other cancer types immediately removed this roadblock
- The time required for weekly meetings was considered a major roadblock. An agreement to quickly discuss relatively simple cases and spend more time on difficult cases helped to resolve this issue
- Lack of motivation or functional rules and the need to have a common schedule and a room dedicated for an MDT were also noted as hurdles to be overcome

center, the site must meet requirements regarding the number of patients seen, and tumor board meetings need to take place at least once per week with a team consisting of a head and neck surgeon, an oral maxillofacial surgeon, a diagnostic radiologist, a pathologist, a radiation oncologist, a hematologist, and an oncologist. Additional specialists can be invited on an as-needed basis. The MDT decides on the initial treatment plan and determines potential follow-up therapy after completion of the primary therapy [34].

#### United Kingdom

Similarly, the recommended core team in the United Kingdom includes many specialists (Table 1) and advises on the core competencies of the team members and facilities. Specifically, surgery should normally be carried out in a hospital with a specialized head and neck unit by surgeons who dedicate at least half of their time to head and neck cancer and treat a minimum of 100 new cases of head and neck cancer per year. MDTs should be located in large well-resourced centers [7]. The UK system requires regular cycles of external and internal audits to ensure that MDTs are composed of the required groups of clinicians/allied healthcare professionals. The decision-making process is also scrutinized to ensure that decisions are being made in a consistent fashion and that they comply with generally accepted standards of care.

## Conclusions

The MDT approach has been successfully implemented in a number of countries where it is now considered the standard of care for diagnosis, staging, treatment planning, and patient management in head and neck cancers. Given the documented improvements in the use of guideline-directed approaches, reduced time to treatment, and improved outcomes that result from the use of an MDT, global implementation of the approach has the capacity to improve the lives of patients with head and neck cancer. Making country-specific (local language) guidelines on the structure and function of MDTs more available should help advance this call to action.

## Conflict of interest statement

*Honoraria:* MT, Merck Serono, Bristol-Myers Squibb, Eisai, Otsuka, Bayer; P Ceruse, Merck Serono; KH, Amgen, Merck Serono, AstraZeneca, Pfizer.

*Consultant or Advisory Role (compensated):* LL, Eisai, BMS, MSD, Merck Serono, Boehringer Ingelheim, Debiopharm, Novartis, AstraZeneca, Bayer, Roche; MT, Ono Pharmaceuticals, MSD, Bayer, Pfizer; P Ceruse, Merck Serono; KH, Amgen, Merck Serono, AstraZeneca, Pfizer, Lytix; RM, Merck Serono, Innate Pharma.

**Research funding:** LL, Eisai, MSD, Merck Serono, Boehringer Ingelheim, Novartis, AstraZeneca, Roche; MT, Eisai, MSD, Boehringer Ingelheim, AstraZeneca, Ono Pharmaceutical, Novartis, Bayer, NanoCarrier, Pfizer; KH, Amgen, Merck Serono, AstraZeneca, Pfizer, Boehringer Ingelheim; RM, Merck Serono.

**Speaker's Bureau:** KH, Amgen, Merck Serono.

**Travel Accommodations and Expenses:** LL, Merck Serono, Debiopharm, Sobi, Bayer; J-CL, Merck Serono; RM, Merck Serono.

**Employment:** P Chomette is an employee of Merck KGaA.

UK has declared no conflicts of interest.

## Ethical approval

Not required as we utilized already published reports in this review article.

## Acknowledgements

Medical writing assistance was provided by ClinicalThinking Inc, Hamilton, NJ, USA, and funded by Merck KGaA, Darmstadt, Germany.

## References

- [1] Gibson MK, Forastiere AA. Multidisciplinary approaches in the management of advanced head and neck tumors: state of the art. *Curr Opin Oncol* 2004;16:220–4.
- [2] Vokes E. Current treatments and promising investigations in a multidisciplinary setting. *Ann Oncol* 2005;16:vi25–30.
- [3] Gregoire V, Lefebvre JL, Licitra L, et al. Squamous cell carcinoma of the head and neck: EHNS–ESMO–ESTRO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann Oncol* 2010;21:v184–6.
- [4] National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in Oncology: Head and Neck Cancers. NCCN Clinical Practice Guidelines in Oncology. Version 1. <<http://www.nccn.org>>, 2015.
- [5] Mesia R, Pastor M, Grau JJ, et al. SEOM clinical guidelines for the treatment of head and neck cancer (HNC) 2013. *Clin Transl Oncol* 2013;15:1018–24.
- [6] Hansen HH, Bajarin DF, Muss HB et al. ESMO-ASCO global core curriculum for training in medical oncology. <<https://www.esmo.org>>, 2010.
- [7] National Institute for Health and Care Excellence. Improving outcomes in head and neck cancers: evidence update May 2012: a summary of selected new evidence relevant to NICE cancer services guidance 'Improving outcomes in head and neck cancers'. National Institute for Health and Care Excellence, 2004.
- [8] D'cruz A, Lin T, Anand AK, et al. Consensus recommendations for management of head and neck cancer in Asian countries: a review of international guidelines. *Oral Oncol* 2013;49:872–7.
- [9] Reich M, Leemans CR, Vermorken JB, et al. Best practices in the management of the psycho-oncologic aspects of head and neck cancer patients: recommendations from the European Head and Neck Cancer Society Make Sense Campaign. *Ann Oncol* 2014;25:2115–24.
- [10] Deneuve S, Babin E, Lacau-St-Guilly J, et al. Guidelines (short version) of the French Otorhinolaryngology – Head and Neck Surgery Society (SFORL) on patient pathway organization in ENT: the therapeutic decision-making process. *Eur Ann Otorhinolaryngol Head Neck Dis* 2015;132:213–5.
- [11] South Australian Head and Neck Cancer Pathway. Optimising outcomes for all South Australians diagnosed with head and neck cancer. <<https://www.sahealth.sa.gov.au>>, 2015.
- [12] Evans AC, Zorbas HM, Keaney MA, et al. Medicolegal implications of a multidisciplinary approach to cancer care: consensus recommendations from a national workshop. *Med J Aust* 2008;188:401–4.
- [13] Sidhom MA, Poulsen MG. Multidisciplinary care in oncology: medicolegal implications of group decisions. *Lancet Oncol* 2006;7:951–4.
- [14] Sidhom MA, Poulsen M. Group decisions in oncology: doctors' perceptions of the legal responsibilities arising from multidisciplinary meetings. *J Med Imaging Radiat Oncol* 2008;52:287–92.
- [15] Brunner M, Gore SM, Read RL, et al. Head and neck multidisciplinary team meetings: effect on patient management. *Head Neck* 2015;37:1046–50.
- [16] Loevner LA, Sonnens AI, Schulman BJ, et al. Reinterpretation of cross-sectional images in patients with head and neck cancer in the setting of a multidisciplinary cancer center. *AJNR Am J Neuroradiol* 2002;23:1622–6.
- [17] Wheless SA, McKinney KA, Zanation AM. A prospective study of the clinical impact of a multidisciplinary head and neck tumor board. *Otolaryngol Head Neck Surg* 2010;143:650–4.
- [18] Bergamini C, Locati L, Bossi P, et al. Does a multidisciplinary team approach in a tertiary referral centre impact on the initial management of head and neck cancer? *Oral Oncol* 2016;54:54–7.
- [19] Kelly SL, Jackson JE, Hickey BE, et al. Multidisciplinary clinic care improves adherence to best practice in head and neck cancer. *Am J Otolaryngol* 2013;34:57–60.
- [20] Starmer H, Sanguineti G, Marur S, Gourin CG. Multidisciplinary head and neck cancer clinic and adherence with speech pathology. *Laryngoscope* 2011;121:2131–5.
- [21] Murphy CT, Galloway TJ, Handorf EA, et al. Increasing time to treatment initiation for head and neck cancer: an analysis of the National Cancer Database. *Cancer* 2015;121:1204–13.
- [22] Murphy CT, Galloway TJ, Handorf EA, et al. Survival impact of increasing time to treatment initiation for patients with head and neck cancer in the United States. *J Clin Oncol* 2016;34:169–78.
- [23] van Harten MC, Hoebers FJ, Kross KW, et al. Determinants of treatment waiting times for head and neck cancer in the Netherlands and their relation to survival. *Oral Oncol* 2015;51:272–8.
- [24] Patil RD, Meinzen-Derr JK, Hendricks BL, Patil YJ. Improving access and timeliness of care for veterans with head and neck squamous cell carcinoma: a multidisciplinary team's approach. *Laryngoscope* 2016;126:627–31.
- [25] Nash R, Hughes J, Sandison A, et al. Factors associated with delays in head and neck cancer treatment: case-control study. *J Laryngol Otol* 2015;129:383–5.
- [26] Birchall M, Bailey D, King P. South West Cancer Intelligence Service Head and Neck Tumour Panel. Effect of process standards on survival of patients with head and neck cancer in the south and west of England. *Br J Cancer* 2004;91:1477–81.
- [27] Friedland PL, Bozic B, Dewar J, et al. Impact of multidisciplinary team management in head and neck cancer patients. *Br J Cancer* 2011;104:1246–8.
- [28] Wang YH, Kung PT, Tsai WC, et al. Effects of multidisciplinary care on the survival of patients with oral cavity cancer in Taiwan. *Oral Oncol* 2012;48:803–10.
- [29] Mullan BJ, Brown JS, Lowe D, et al. Analysis of time taken to discuss new patients with head and neck cancer in multidisciplinary team meetings. *Br J Oral Maxillofac Surg* 2014;52:128–33.
- [30] Stalfors J, Holm-Sjögren L, Schwieler A, et al. Satisfaction with telemedicine presentation at a multidisciplinary tumour meeting among patients with head and neck cancer. *J Telemed Telecare* 2003;9:150–5.
- [31] Ke KM, Blazebey JM, Strong S, et al. Are multidisciplinary teams in secondary care cost-effective? A systematic review of the literature. *Cost Eff Resour Alloc* 2013;11:7.
- [32] Winter A, Iro H, Wolff KD, Wesselmann S. Certification of head and neck tumor centers by the German Cancer Society: an overview. *HNO* 2013;61:914–20.
- [33] Erhebungsbogen Kopf-Hals-Tumorzentren in Onkologischen Zentren. <<http://www.onkozert.de>>, 2015.
- [34] Harris JR, Lau H, Surgeoner BV, et al. Health care delivery for head-and-neck cancer patients in Alberta: a practice guideline. *Curr Oncol* 2014;21:e704–14.