The Danish Head and Neck Cancer Fast-track Program:

A tertiary cancer centre experience

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Abstract

Introduction: During the 1990s all Nordic countries except for Denmark experienced a general increase in 5-year survival rates for cancer patients. In 2007, the Danish National Board of Health in collaboration with national multidisciplinary cancer groups and the Danish Regions initiated fast-track clinical pathway solutions.

Objectives: The objectives of this study were 1) to present the setup of the Head and Neck Cancer (HNC) fast-track program at Odense University Hospital (OUH) as an example of the Danish model and 2) to present patient characteristics, diagnostic outcome, cancer detection rate and duration of the fast-track patient courses.

Materials and methods: From July 1st 2012 to September 1st 2015, all patients referred to the HNC fast-track program at OUH for diagnostics and treatment were consecutively included in the study resulting in 3,165 patient courses.

Results: The overall malignancy detection rate was 40.6% and for HNC it was 29.2%. The overall median fast-track course duration was 12 days (range 0-74). Overall 2,990 (94.5%) of 3,165 patients completed their fast-track course within the maximally permitted course duration.

Discussion and conclusion: Based on our findings it was concluded that: 1) a HNC fast-track program build on pre-booked slots for diagnostics and treatment is feasible and can secure acceptable course durations for more than 90% of patient courses, 2) by using private ENT specialists as a “filter-function”, an acceptable detection rate can be achieved.

Keywords: Head and Neck Cancer; Fast-track Program; Multidisciplinary; Denmark
Introduction

During the 1990s all Nordic countries except Denmark experienced a general increase in 5-year survival rates for cancer patients [1, 2]. Political awareness was established and possible causes were discussed in medical communities. Long waiting time from initial cancer symptoms to the start of treatment was proposed as the main reason for the poor Danish outcome. This assumption was based on a number of studies showing disease progression during waiting time [3-7]. In 2002 Fortin et al. addressed delay in radiotherapy to squamous-cell head and neck carcinoma (SCHNC) patients. They found a 15% reduction in survival rate for patients treated more than 40 days after the primary examination compared with patients treated within shorter time [3]. In 2007, Jensen et al. addressed the influence of waiting time on tumor volume and progression in SCHNC patients. For patients waiting more than 28 days, 70% had significant increases in tumor volume and 40% had tumor progression according to RECIST criteria [6].

In 2007, as a response to the long waiting times, the Danish National Board of Health in collaboration with national multidisciplinary cancer groups and the Danish Regions initiated fast-track clinical pathway solutions [8]. The primary aim of these fast-track programs was to reduce waiting time from first suspicion of cancer to start of treatment or elimination of suspicion to improve prognosis and decrease patient uncertainty.

Denmark was the first nation to introduce a national head and neck cancer (HNC) fast-track program based on systematic use of pre-booked slots for diagnostic
procedures and treatment. Odense University Hospital (OUH) is the main cancer centre for HNC in the Region of Southern Denmark (RSD). Here, the HNC fast-track program was introduced in 2007 and it was one of the first centres to introduce and implement a full scale fast-track program for HNC [9]. Today, it has been running for almost ten years, and substantial experience and patient data are available. The objectives of this study are 1) to present the organization of the HNC fast-track program at OUH as an example of the Danish model and 2) to present patient characteristics, diagnostic outcome, cancer detection rate and duration of the fast-track courses.

**Materials and method:**

This study has a prospective descriptive cohort design. From July 1st 2012 to September 1st 2015, all patients referred to the HNC fast-track program at OUH for diagnostics and treatment were consecutively included in the study. The period of approximately three years was considered as representative to illustrate the Danish fast-track program.

“Primary cancer” refers to a newly diagnosed malignant condition, while “recurrent cancer”, besides recurrent disease, also includes residual cancer after treatment. For all patient fast-track courses, data concerning patient age and sex, referring authority, course duration, histological diagnosis and treatment modality were registered in the local HNC quality database. Diagnostic outcomes were separated into either benign or malignant disease. Benign neoplasia and non-neoplastic diseases were categorised as benign. Malignant disease was divided into three categories: HNC,
malignant lymphoma and other cancers. The analysis system Medlog® (Medlog Systems, Crystal Bay, USA) was used for data registration and statistical analyses. Descriptive statistics were used.

The study was approved by the Danish Health and Medicines Authority (j.no. 3-3013-1577/1) and by the Danish Data Protection Agency (j.no. 16/9985).

**Results**

**HNC fast-track program structure**

Patients suspected of cancer in the head and neck region are accepted for enrolment in the Danish HNC fast-track program. The fast-track program is based on three cornerstones: 1) a set of alarm symptoms to the general practitioners (GPs), 2) improved qualification of cancer suspicion by the private ENT specialist and 3) maximum permitted course duration for each different phase of the fast-track program.

1) In Denmark, the suspicion of cancer in the head and neck region usually arises in a GP setting to whom the Danish National Board of Health has developed a set of alarm symptoms or “red flags” for possible HNC (www.sst.dk) (Table 1).

2) GP suspicion of cancer in the head and neck region triggers urgent referral to a private ENT specialist who will investigate the patient the same day or no later than the following day. If the private ENT specialist confirms the suspicion, the level of suspicion is raised to “well-founded suspicion” and the patient is referred to the local ENT department. The patient is now entrusted to the ENT department and is considered enrolled in the HNC fast-track program. As such, the patient must be
investigated in a hospital setting within six calendar days [8]. In RSD there are four
ENT departments including the HNC Centre at OUH. Patients can be diagnosed in all
four departments but all patients are receiving their treatment at OUH. The private
ENT specialist “filter”-function is possible in Denmark because of a relatively high
number of private ENT specialists (32/1 mill. inhabitants).

3) In the establishment of the HNC fast-track program in Denmark, a maximum
permitted course duration for each phase of the HNC fast-track program were defined
(Table 2). After the first visit, the patient must be diagnosed and receive her treatment
plan within fifteen calendar days. If the diagnosis is malignant, the patient must
receive surgical treatment within seven calendar days and if the treatment is
radiotherapy and/or chemotherapy within eleven calendar days. The total duration of
an individual fast-track program patient course may therefore at the most amount to
28 or 32 calendar days depending on the treatment modality.

The detailed logistics of the HNC fast-track program differ among ENT departments
in Denmark. However, the main components and phases are identical and follow a
national strategy. At the first visit at the ENT department, OUH, the patient will be
met by an ENT HNC specialist, who will perform a full clinical examination,
endoscopic and ultrasonic procedures, relevant fine-needle aspiration biopsies and
refer to diagnostic imaging, in most cases PET-CT scan [10]. At the HNC Centre
OUH, first visits can be booked on a Monday, Wednesday or Friday. The fast-track
program consists of pre-booked slots for imaging, dental examination and
investigation under general anaesthesia (Figure 1). After the initial investigations and
procedures, a histological diagnosis is awaited. The duration of this process varies, however the maximum permitted course duration of the diagnostic phase (fifteen calendar days) must be met. In case of benign histology, the HNC fast-track program is terminated.

In case of a malignant diagnosis, the patient will be seen in a multidisciplinary team conference (MDTC) setup. At the MDTC an ENT surgeon, an oncologist, a plastic surgeon, a nuclear medicine physician and a radiologist participate. On ad hoc basis, a maxillofacial surgeon, a pathologist, a neuro surgeon, a thoracic surgeon or other specialists are invited. Furthermore, a specialized nurse is always present.

To ensure a uniform, high quality approach, the specialists participating in the MDTC are always one of the same four ENT surgeons, one of the same three oncologists and one of the same three plastic surgeons, all with a special interest and skills in HNC. During the first 30 minutes of the MDTC, patient cases are briefly presented, the nuclear medicine physician and the radiologist present relevant imaging, there are a plenary discussion and a diagnostic conclusion based on histology and staging ending up in a tentative treatment plan for each patient. Hereafter, the radiologist and the nuclear medicine physician leave the MDTC and the clinicians are starting a 30 minute consultation with each patient and relatives. The number of patients varies from day to day, however, the consultations will continue until the last patient has been seen.

In addition to imaging and histology results, the multidisciplinary team performs a confirmatory clinical examination to reach a mutual decision on staging and performance. Based on this, potential treatment suggestions are presented to the
patient and the relatives resulting in an individualized treatment plan. Time and date for next visit related to treatment is immediately planned and handed to the patient, owing to the reserved, pre-booked slots in the fast-track program. Finally, registrations in the DAHANCA (Danish Head and Neck Cancer Group) database, the Danish Cancer Registry, information of scientific protocols, and other administrative registrations are performed. The nurse then consults the patient and relatives in a separate room for debriefing, rehabilitation and practical procedures.

To ensure a successful coordination of each fast-track patient course, a course coordinator function has been established. This function is a collaboration between a HNC secretary and a highly-specialized ENT surgeon from the MDTC group.

Patient data
Between 1st of July 2012 and the 1st of September 2015, 3,808 fast-track patient courses were initiated in the HNC fast-track program at OUH. Patients may have more than one HNC fast-track course. For 27 (0.8%) fast-track patient courses, the HNC fast-track program was not completed (25 patients refused or were not able to complete the fast-track program; of these, two patients died before completion). Six hundred and sixteen patients were diagnosed at one of the other three ENT departments in RSD before they were admitted to OUH to the MDTC. This resulted in 3,165 patient courses eligible for the present study (Figure 2).
Of the overall 3,165 courses, 2,464 (77.9%) were suspected of primary cancer and 701 (22.1%) were suspected of recurrent disease. Distribution according to sex, age, diagnosis and referring entity appears from Table 3.

Of the 3,165 patient courses, 1,285 (40.6%) courses ended up with a malignant diagnosis, of which 924 (71.9%) were HNC. Of the 3,165 patient courses 1,880 (59.4%) had a benign diagnosis.

In the 2,464 courses with patients suspected of primary cancer, 930 (37.7%) had a malignant diagnosis and 1,534 (62.3%) a benign diagnosis.

Finally, in the 701 courses of patients suspected of recurrent disease, 355 (50.8%) had a malignant diagnosis and 346 (49.2%) a benign condition.

The overall (benign and malignant) median fast-track course duration, from suspicion to start of initial treatment or termination of the program, was 12 days (range 0-74).

For patient courses suspected of primary cancer, it was 12 days (range 0-68) and for those suspected of recurrent HNC it was 13 days (range 0-74).

Of the overall 3,165 patient courses, 924 (29.2%) had a HNC diagnosis; of those, 472 (51.1%) were surgically treated and 337 (36.5%) received radiotherapy or chemoradiotherapy. In the remaining 115 (12.4%) courses, patients were treated surgically before admittance into the HNC fast-track program (mostly due to coincidentally found thyroid micro-carcinomas) or did not receive any treatment.

Overall 2,990 (94.5%) of 3,165 patients completed their course within the maximum permitted course duration. Of the 472 surgically treated patients, 441 (93.4%)
completed the fast-track program within the maximally permitted course duration. For the 337 patients receiving non-surgical treatment the number was 282 (83.7%).

**Discussion**

To our knowledge, this is the first presentation of a nationally established HNC fast-track program, taking care of the patient from GP suspicion to start of initial treatment or termination of the program. With this publication we want to share our experience with other centres that are diagnosing and treating HNC patients.

It might be difficult to separate patients with HNC from other malignant diseases in the head and neck region such as malignant lymphoma and metastatic cancer. Therefore, very broad inclusion criteria have been defined for the Danish HNC fast-track program, meaning that all patients with a suspicious lesion in the head and neck region are included in the program. Consequently, HNC only constitutes 71.9% of all malignant diagnosis.

One of the first nations to introduce standardized clinical pathways for HNC patients, was Great Britain introducing the Two-Week Wait (2WW) Rule in the year 2000 as an attempt to improve survival. In this model, patients are directly referred from the GP to the hospital. Today, the 2WW stands as one of the most audited and longest existing fast-track cancer programs [11, 12]. Nevertheless, some drawbacks have been addressed, such as a low cancer detection rate, inadequate alarm symptom guidelines for GPs and inappropriate allocation of resources [11-15]. To qualify HNC suspicion, private ENT specialists are included as a “filter-function” in the Danish HNC fast-
track program. Indeed, only 5% of our patients are referred directly from GPs. It is, however, important to note that Denmark is privileged by having a large population of private ENT specialists (32/1 million inhabitants) compared to other countries. Lately, fast-track programs comparable to the Danish model have emerged in the Nordic countries [16, 17]. Like the Danish fast-track program, the Swedish Standardized Care Pathways (SCP) seek to lower the course duration for cancer patients [18]. Interestingly, Sweden has some of the highest survival rates for cancer patients in the world [19, 20] and the primary motivation for the Swedish SCP was given from a political standpoint in which the course durations for cancer patients were unacceptably long, inducing uncertainty among patients [18]. Another program, inspired by Denmark has been launched in Norway in 2015 [17]. Moreover, a national fast-track strategy has been established in Finland. According to existing literature, only a few other European nations have commenced the establishment of HNC fast-track programs, notably in Spain and France [21-27].

In this study, the overall malignancy detection rate was 40.6% and for HNC it was 29.2%. An optimal detection rate is difficult to define; if it is too high, malignancy may be missed and if it is too low, a substantial number of individuals might be unnecessarily examined and foisted a cancer suspicion upon them. We believe that approximately thirty to fifty percent might be appropriate. However, we have no figures indicating the fraction of missed malignant diagnoses to justify this assumption.
In our fast-track program, patients and relatives are part of the MDTC. This is advantageous in multiple regards. First of all, the performance of the patient can be evaluated in a multidisciplinary setting by which the suggested treatment modalities may be adjusted accordingly. Secondly, the patient and relatives can be presented with pros and cons of available treatment options directly from the specialists who will be performing the treatment. This enables the patient to consent to a treatment on the basis of the highest possible level of information. Furthermore, this setup ensures that the patient will not encounter contradicting information from physicians during the treatment, which could be a source of confusion and insecurity for the patient as well as the health professionals.

According to a systematic review of the literature authored by Chen et al., one month waiting time may reduce HNC survival with approximately 16% (4). The Danish maximum permitted course duration for the HNC fast-track program are very tight (28 days for surgery and 32 days for chemo-radiotherapy), leaving limited time for necessary procedures. In our HNC fast-track program, 94.5% of the patient courses complied with the maximally permitted course duration, which may seem satisfying. However, based on the research from Chen et al., further optimizations of course durations seem justified.

Due to differences among nations concerning organization of health care systems, the Danish HNC fast-track program might not be directly applicable. However, we hope that some of the components in our system, such as unambiguous “red flags” and
education of GPs, pre-booked slots for diagnostic procedures and treatment, course coordination and the structure of our MDTC, may contribute to better courses for patients with suspicious lesions in the head and neck region.

**Conclusion**

Based on our findings it is concluded that: 1) a HNC fast-track program build on pre-booked slots for diagnostics and treatment is feasible and can secure acceptable course durations for more than 90% of patients, 2) by using private ENT specialists as a “filter-function”, an acceptable detection rate can be achieved. However, since one month of waiting time can reduce the survival with 16% in classical HNC, further progress concerning acceleration of the HNC fast-track program seems justified.

**Conflicts of interest:**

The authors of this article have no conflicts of interest to declare.


Legend to figures:

- Figure 1: HNC fast-track patient course with first visit at the HNC Center, OUH on a monday. (GA: General Anesthesia)

- Figure 2: Flowchart describing inclusion of patients in the study. (RSD: Region of Southern Denmark; OUH: Odense University Hospital)
<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Histological report ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENT exam</td>
<td>Coordination</td>
<td>Dental exam</td>
<td>Imaging conference</td>
<td>Patient information:</td>
</tr>
<tr>
<td>Clinical ultrasonic exam</td>
<td>Referrals sent</td>
<td>CT/MRI/PET-CT and/or chest x-ray</td>
<td>Procedures in GA:</td>
<td>Multidisciplinary team conference</td>
</tr>
<tr>
<td>Fiberoptic exam</td>
<td></td>
<td>Nutritional evaluation</td>
<td>Scopies</td>
<td>Diagnosis and treatment plan with booking of dates for next step</td>
</tr>
<tr>
<td>If indicated, fine-needle aspiration biopsy</td>
<td></td>
<td>Bloodtests and ECG</td>
<td>Biopsies</td>
<td>Ordinary visit if benign histology</td>
</tr>
<tr>
<td>Plan</td>
<td></td>
<td>Pre-OP anesthesiological exam</td>
<td>Drawing or photo</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Staging</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dental treatment</td>
<td></td>
</tr>
</tbody>
</table>
Figure 2

Patients enrolled in the RSD fast-track program and seen at OUH between 1st of July 2012 and 1st of September 2015
\[ n = 3,808 \]

NOT ASSESSED FOR ELIGIBILITY (Total = 27)
- Premature termination \[ n = 25 \]
- Death of patient before initiation of program \[ n = 2 \]

Assessed for eligibility
\[ n = 3,781 \]

EXCLUDED (Total = 616)
- Diagnosis at hospital other than OUH \[ n = 616 \]

Data available for analysis
\[ n = 3,165 \]
<table>
<thead>
<tr>
<th>TYPE OF HEAD AND NECK CANCER</th>
<th>SIGNS OR SYMPTOMS</th>
</tr>
</thead>
</table>
| Sino-nasal cancer           | • Unilateral nasal stenosis  
|                             | • Bloody secretion  
|                             | • Recurrent nasal hemorrhage  
|                             | • Nasal wounds  
|                             | • Tumor in nasal cavity  |
| Nasopharynx cancer          | • Unilateral, secretory otitis media  
|                             | • Affection of cranial nerves  
|                             | • Special attention on high risk ethnicity  |
| Cavum oris or oropharynx cancer | • Wounds in the oral cavity or oropharynx  
|                             | • Tumor in oral cavity of oropharynx  
|                             | • Pain radiation to ear  
|                             | • Enlarged, submandibular lymphnode  |
| Larynx or hypopharynx cancer | • Hoarseness  
|                             | • Difficulty swallowing/globulus  
|                             | • Pain radiation to ear  |
| Salivary gland cancer       | • Tumor in salivary gland  
|                             | • Growth of known salivary gland tumor  
|                             | • Tumor in salivary gland with simultaneous affection of the facial nerve  |
| Thyroid cancer              | • Tumor in the thyroid gland with simultaneous hoarseness  
|                             | • Rapid growth of known thyroid tumor  
|                             | • Hard, immobile tumor in the thyroid gland  |
| Neck metastases (Unknown primary) | • Enlarged lymphnodes with no infectious or benign cause  
|                             | • A lateral neck cyst in patients more than 40 years of age  |
Table 2 - Maximum time spans in the Danish HNC fast-track program

| Time from referral to first visit | 6 calendar days |
| Time from first visit to diagnosis | 15 calendar days |
| Time from diagnosis to start of initial treatment | Operation 7 calendar days |
| | Radio-chemotherapy 11 calendar days |
| Time from referral to start of initial treatment (KI) | Operation 28 calendar days |
| | Radio-chemotherapy 32 calendar days |
Table 3 - HNC fast-track program courses from 1st of July 2012 to 1st of September 2015.

<table>
<thead>
<tr>
<th></th>
<th>Suspected of primary disease</th>
<th>Suspected of recurrent disease</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 2,464 (77.9%)</td>
<td>n = 701 (22.2%)</td>
<td>n = 3,165</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1,219 (49.5%)</td>
<td>253 (36.1%)</td>
<td>1,472 (46.5%)</td>
</tr>
<tr>
<td>Male</td>
<td>1,245 (50.5%)</td>
<td>448 (63.9%)</td>
<td>1,693 (53.5%)</td>
</tr>
<tr>
<td>Age (yrs) (median (range))</td>
<td>62 (10 – 100)</td>
<td>65 (17 – 95)</td>
<td>63 (10 – 100)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HNC</td>
<td>636 (25.8%)</td>
<td>288 (41.1%)</td>
<td>924 (29.2%)</td>
</tr>
<tr>
<td>Malignant lymphoma</td>
<td>138 (5.6%)</td>
<td>29 (4.1%)</td>
<td>167 (5.3%)</td>
</tr>
<tr>
<td>Benign</td>
<td>1,534 (62.3%)</td>
<td>346 (49.4%)</td>
<td>1,880 (59.4%)</td>
</tr>
<tr>
<td>Cancer other than HNC</td>
<td>156 (6.3%)</td>
<td>38 (5.4%)</td>
<td>194 (6.1%)</td>
</tr>
<tr>
<td>Referring entity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP</td>
<td>136 (5.5%)</td>
<td>19 (2.7%)</td>
<td>155 (4.9%)</td>
</tr>
<tr>
<td>Private practising ENT specialist</td>
<td>1,060 (43.1%)</td>
<td>56 (8.0%)</td>
<td>1,116 (35.3%)</td>
</tr>
<tr>
<td>Hospital department</td>
<td>1,266 (51.4%)</td>
<td>625 (89.3%)</td>
<td>1,891 (59.8%)</td>
</tr>
</tbody>
</table>