Consultation frequency in general practice before cancer diagnosis in relation to the patient's usual consultation pattern: A population-based study

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ABSTRACT

Background: Cancer patients who usually consult the general practitioner (GP) rarely are generally diagnosed with more advanced stages of cancer. This subgroup of cancer patients may thus postpone relevant healthcare seeking.

Aim: We aimed to investigate the rates of daytime face-to-face consultations in general practice before a cancer diagnosis in patients with different categories of 'usual' consultation frequency.

Material and methods: We conducted a population-based comparative study using register data on all 123,934 first-time cancer patients aged 50–90 years who were diagnosed in 2009–2013 in Denmark. Usual consultation rates were based on number of consultations from 19 to 36 months before cancer diagnosis. We predicted the marginal monthly consultation rates for up to 18 months before diagnosis. These were based on the estimated (mean) rates of consultations with corresponding 95% confidence intervals (CIs), which were calculated by negative binomial regression analysis with robust variance estimation.

Results: Patients with cancer began to increase their consultation frequency four to six months before their cancer diagnosis. The average monthly consultation rates varied slightly across usual consultation groups; rates were lowest among male 'frequent' consulters (0.28 (95% CI: 0.27;0.29)) and highest among female 'frequent' consulters (0.35 (95% CI: 0.34;0.37)). The additional number of consultations was 1–2 for all combinations of usual consultation frequency, sex, and cancer type (except for female breast cancer and 'average' consulters with lung or prostate cancer).

Conclusion: Patients with cancer begin to increase their consultation frequency in general practice before a cancer diagnosis independently of their usual consultation frequency.

1. Introduction

The prognosis of cancer has shown wide international and regional differences. Variations are also seen between patient groups; this has been associated with different disease stages at diagnosis [1–5]. The poor cancer prognosis from more developed disease has been suggested to be partly attributable to a sub-group of patients with lower healthcare-seeking behaviour, which may lead to the diagnosis of more advanced and fatal cancers [2].

A recent study showed that people who usually consult their general practitioner (GP) rarely have higher one-year all-cause mortality after a cancer diagnosis than people who usually consult their GP regularly [6]. The study also showed that the patients who usually consulted the GP rarely were diagnosed with more advanced cancer; this suggests that this subgroup of cancer patients may postpone seeking medical care

[6,7].

As tumours generally grow exponentially [8], it is reasonable to assume that the patient would seek medical advice as the underlying disease evolves and leads to increasingly severe symptoms. This could explain why patients with yet undiagnosed cancer tend to seek medical advice more often at their GP in the three to six months before the cancer diagnosis [9–12]. The well-established increase in GP consultations [9–12] encompasses many different healthcare-seeking behaviours and diagnostic strategies, but it remains to be investigated whether an individual's usual healthcare-seeking pattern in general practice is associated with the consultation frequency shortly before a cancer diagnosis.

We aimed to investigate the rates of daytime face-to-face consultations in general practice during the 18 months before a cancer diagnosis in patients with different usual GP consultation frequency. We

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hypothesised that patients who usually consult their GP rarely have a later onset of increased healthcare seeking and a lower increase in GP consultations than patients who usually consult their GP regularly.

2. Material and methods

We conducted a population-based comparative study based on prospectively recorded register data. Information was collected from Danish national registers and linked at the individual level through the Danish personal registration number (PRN), which is assigned to all residents in Denmark.

2.1. Setting

The study took place in Denmark, where the publicly funded healthcare system provides free access to diagnostic procedures and treatment for all residents. Almost all residents ($> 98\%$) are registered with a general practice. GPs act as gatekeepers to the rest of the healthcare system, except for emergencies and private practicing otorhinolaryngologists and ophthalmologists who can be accessed directly [13].

2.2. Study population

Identification of patients, data collection, and drop-out analysis have been described in detail elsewhere [6]. In brief, we identified all first-time cancer patients aged 50–90 years diagnosed from 1 January 2009 to 31 December 2013 and registered in the Danish Cancer Register (DCR) with a cancer coded as C00-C99 (except C44) according to the International Classification of Diseases, 10th revision (ICD-10)) [14]. Patients under age 50 years were not included due to the low incidence of cancer before this age. Inclusion criteria were: no previous cancer (except for non-melanoma skin cancer), a valid PRN, Danish resident during the three years preceding the diagnosis, and listed with a Danish general practice. We included 123,943 eligible patients.

2.3. Outcome

The outcome was defined as daytime face-to-face consultations with a GP, including home visits, in the 18 months before the date of the cancer diagnosis. Data was extracted from the Danish National Health Service Register, which holds information on all contacts in general practice [15].

2.4. Exposure

The exposure was the patient's usual (i.e. normal or customary) consultation frequency in general practice. In accordance with our previous study, this was defined as the number of daytime face-to-face consultations with a GP, including home visits, in the 19–36 months before the date of the cancer diagnosis [6]. The usual consultation frequency was divided into three main categories according to the total number of face-to-face consultations in the 19–36 months before the cancer diagnosis: 'rare' consulters (0–1 consultations), 'average' consulters (2–9 consultations), and 'frequent' consulters (10 or more consultations).

2.5. Other variables

Demographic and socioeconomic information was collected from Statistics Denmark. Information on age and sex was derived from the PRN [16]. Household income was based on information from the year before the date of the cancer diagnosis and was categorised into three groups using the "*Organisation for Economic Cooperation and Development*" (OECD)-modified scale: 'low' (lowest tertile), 'average' (middle tertile), and 'high' (upper tertile). The highest attained level of

education was categorised into four groups according to the International Standard Classification of Education (ISCED) [17]: 'basic' (level I-II), 'short' (level III-IV), 'long' (level V-VI), and "unknown".

Comorbidity was defined using the Charlson Comorbidity Index (CCI) [18]. A CCI score was calculated for each patient on the basis of the diagnoses registered in the Danish National Patient Register (NPR) [19] during the ten years preceding study entry (i.e. 13-3 years before the date of the cancer diagnosis). Total CCI score was grouped into three levels: 'none' (score of 0), 'low' (score of 1–2), and 'severe' (score of ≥ 3).

2.6. Statistical analyses

Analyses were stratified by four main types of cancer according to the ICD-10: colorectal (C18-C20), lung (C34), female breast (C50), and prostate cancer (C61) and were also conducted for all cancers combined (including all other cancer types). The analyses were performed for each sex separately as gender differences exist in the use of general practice [9,10].

We calculated monthly (mean) rates of face-to-face consultations with corresponding 95% confidence intervals (CIs) by using a negative binomial regression model with robust variance estimation. Based on the estimated rates, we predicted the marginal monthly consultations up to 18 months before diagnosis for each consultation group (i.e. usually 'rare', 'average', and 'frequent' consulters). These analyses were adjusted for patient's age, comorbidity, marital status, educational level, and household income.

To determine the timing of the increase in consultation frequency, we tested when the predicted marginal consultation rate in a month was statistically significantly different from the month before; this was done to pinpoint the exact onset of the accelerated increase in consultation frequency. We applied Bonferroni correction to reduce the risk of type I errors from multiple testing during this procedure.

To further explore the increase in consultation frequency from the time when the patient started to request additional consultations until the diagnosis was made and to account for the consultation frequency just before the onset of the increased consultation frequency, we subtracted the average monthly rate of consultations during the corresponding time period just before the patient began to demonstrate increased consultation frequency.

In order to express the additional consultations originating from the onset of increased consultation frequency until cancer diagnosis, we predicted the total number of consultations from the onset of the increased healthcare seeking using the predicted average marginal rates of consultations for the period.

Stata statistical software v. 14 (StataCorp)® was used for all analyses.

3. Results

We included 123,943 eligible incident cancer patients; 58,827 (47.5%) of these were women. The included population had the following types of cancer: 17,138 (13.8%) colorectal cancer, 17,861 (14.4%) lung cancer, 18,396 (14.8%) female breast cancer, 19,348 (15.6%) prostate cancer, and 51,200 (41.3%) other cancer types. A total of 21,448 (17.3%) patients were categorised as 'rare' consulters; 8992 (15.3%) women and 12,456 (19.1%) men (Table 1).

The consultation rates showed the same overall pattern across 'rare', 'average', or 'frequent' consulters. The consultation rates were parallel; they had a horizontal beginning, followed by an increase three to six months before diagnosis, and ended in a steep increase in the last month before the diagnosis (Fig. 1). This pattern was broadly similar for all studied types of cancer, except for female breast cancer for which the consultation rates were fairly horizontal until the last month before diagnosis, where a steep rise in consultation rates was observed (Fig. 1).