

Postprint Version	1.0
Journal website	http://www.ejcancer.info/article/S0959-8049(12)00572-2/abstract
Pubmed link	http://www.ncbi.nlm.nih.gov/pubmed/22897842
DOI	10.1016/j.ejca.2012.07.011

This is a NIVEL certified Post Print, more info at <http://www.nivel.eu>

For which health problems do cancer survivors visit their General Practitioner?

M.J. HEINS^A, J.C. KOREVAAR^A, P.M. RIJKEN^A, F.G. SCHELLEVIS^{A, B}

a Netherlands Institute for Health Services Research (NIVEL), Utrecht, The Netherlands

b Department of General Practice/EMGO Institute for Health and Care Research, VU University Medical Center, Amsterdam, The Netherlands

ABSTRACT

Primary health care use of cancer patients is increased, even years after active treatment. Insight into the reasons for this could help in developing and improving guidelines and planning of health care, which is important given the expected increase in cancer survivors. Using data from the Netherlands Information Network of Primary Care, we selected 1056 adult breast cancer, 419 prostate cancer and 400 colorectal cancer patients diagnosed between 2001 and 2006. We compared diseases and complaints for which they contacted their General Practitioner (GP) 2–5 years after diagnosis to age and sex matched non-cancer controls from the same practice. Cancer patients consulted their GP more often than controls for acute symptoms such as abdominal pain and fatigue (18% more in breast cancer, 26% more in prostate cancer) and infections, such as cystitis or respiratory infections (45% in breast cancer and 17% in colorectal cancer). Consultations for chronic diseases and psychosocial problems were slightly increased: breast cancer patients had more contacts related to diabetes (55%), sleep disturbance (60%) and depression (64%), prostate cancer patients had more contacts related to hypertension (53) and chronic obstructive pulmonary disease (COPD, 34%). Adverse drug effects were almost twice as often observed in prostate and colorectal cancer patients than in controls. Fear of cancer recurrence was noted as the reason for consulting the GP in only 20 patients. Concluding, increased primary health care use in cancer survivors is mostly related to common infections and acute symptoms, which may be due to direct effects of cancer treatment or increased health concerns.

1. INTRODUCTION

As survival rates for cancer are increasing [1], [2] and [3] the number of long-term cancer survivors will also increase. A large part of these patients still experiences the consequences of cancer and its treatment long after the active treatment period.⁴ In countries with a strong primary care system, such as the United Kingdom (UK) and the Netherlands, these health

problems will most likely be presented to the General Practitioner (GP) and even several years after diagnosis primary health care use in cancer patients is higher than in non-cancer patients. [5], [6], [7], [8] and [9] Long-term care for cancer survivors has therefore become an increasing part of GPs' consultations, which makes it important to know the health related needs of these patients in the years after cancer treatment. This may be helpful for developing and improving guidelines for aftercare of cancer patients in primary care and for planning health care.

There may be several reasons why cancer survivors have increased health care use. First, it may be directly related to consequences of cancer and its treatment. Some consequences, such as pain, fatigue and cognitive problems, develop during treatment and may persist thereafter for more than 5 years. Other cancer-related health problems may develop even years after the end of active treatment. These include second cancers, osteoporosis and cardiopulmonary effects. [4] and [10] Consequences may be specific for certain cancer types or cancer treatments. Survivors of breast cancer, for example, have an increased risk to develop musculoskeletal pain and heart failure, [11] and [12] prostate cancer survivors often report urinary problems and sexual dysfunction, [13] and [14] whereas colorectal cancer is associated with bowel problems and diabetes. [12] and [15]

The increase in health care use may also be related to comorbid chronic conditions, such as high blood pressure or diabetes, which are more prevalent in patients with cancer.¹⁶ Genetic and lifestyle factors that are related to cancer may also put them at risk for other diseases. Cancer and its treatment may further increase the risk for chronic conditions and may make patients more vulnerable to the effects of these conditions.¹⁷ On the other hand, Earle and Neville¹⁸ found that cancer patients are less likely to receive recommended care for their chronic comorbid conditions.

Psychosocial problems, such as anxiety and depression, are common in cancer survivors. [10], [19] and [20] These problems may also lead to an increase in health care use. Khan et al. showed that more than 5 years after diagnosis of cancer the number of primary care consultations related to anxiety and depression was not increased,²¹ but these problems may be more prevalent earlier after diagnosis. Finally, cancer patients may visit their GP more often for common symptoms because of increased health concerns and fear of cancer recurrence.

This overview shows there may be several reasons why cancer survivors have more primary care contacts than non-cancer patients. However, we do not know which part of the increased health care use can be attributed to which reason. Using data from a large Dutch general practice registry, we therefore explored the diseases and complaints for which cancer patients contact their GP 2–5 years after the cancer diagnosis. In the Netherlands, based on a Dutch oncology guideline, most patients will have been referred back to the GP as they have finished active treatment by this time, but primary health care use is still increased. The Netherlands has a relatively strong primary care system with low-barrier and low-cost care,²⁶ comparable to that in the UK and the Scandinavian countries. The GP acts as a gatekeeper to secondary care and, contrary to secondary care, GP contacts are fully reimbursed by the mandatory health insurance. GPs are therefore likely to be the first point of contact for health problems that cancer survivors experience. We focused on patients with breast, prostate or colorectal cancer because of the high incidence and relatively long survival of these cancer types. We distinguished the following categories of reasons for contact: cancer-related, acute symptoms, infection, chronic diseases, psychosocial issues and other diseases and complaints.

2. PATIENTS AND METHODS

2.1. Study population and database

For this study we used the LINH-database (Landelijk Informatienetwerk Huisartsenzorg-Netherlands Information Network of General Practice), which holds longitudinal data derived from the Electronic Medical Records (EMR) containing data about general practice contacts, diseases and complaints, prescriptions and referrals of approximately 700,000 individuals. Data are collected in a representative network of 92 general practices spread throughout the Netherlands. Diseases and complaints are coded using the ICPC-I (International Classification of Primary Care). Data were available from 2001 to 2009.

From this database, we selected patients diagnosed with breast cancer (ICPC code X76), prostate cancer (ICPC code Y77) or colorectal cancer (ICPC code D75) between January 2001 and December 2006 who were at least 18 years old at diagnosis, were not diagnosed with another type of cancer within 6 years and had at least 3 years of data available after diagnosis. Each index patient was matched to two control patients without a diagnosis of cancer in their EMR from the same practice, of the same age (± 5 years) and sex. The date of cancer diagnosis of the index patient was used as the inclusion date for the control patient. Control patients also had to have at least 3 years of data available after the moment of matching. Available data on contacts with the practice and diseases and complaints from inclusion up to 5 years after the diagnosis were extracted. We selected only those years in which patients had been registered in the practice during the whole year. We excluded practices which had provided data for less than 48 weeks per year or did not fulfil minimal quality requirements (accuracy of diagnostic codes and data about the type of contact in at least 50% of the years).

The study was carried out according to the precepts of the Helsinki Declaration, Dutch legislation on privacy and the regulations of the Dutch Data Protection Authority. According to Dutch legislation obtaining informed consent is not necessary for observational research.

2.2. Clusters of diseases and complaints

ICPC codes of diseases and complaints presented to the GP were grouped into six clusters: cancer-related diseases and complaints, acute symptoms, infection, chronic diseases, psychological/social and other diseases and complaints. Most clusters were derived from a previously used grouping.²² We adapted this grouping by leaving out benign neoplasms in the cluster cancer-related diseases and complaints and adding a cluster 'psychological/social' based on the ICPC chapters P and Z. Because the original cluster 'chronic diseases' was deemed too wide, five chronic diseases were selected from a larger list of chronic diseases,²³ based on their prevalence in the general population and their potential impact on health care use. These were: ischaemic heart disease/heart failure (K74-77); Cerebrovascular accident/Transient ischemic attack CVA/TIA (K89/90); chronic obstructive pulmonary disease (COPD)/asthma (R91, R95/96); rheumatoid arthritis/arthrosis (L88-91); diabetes mellitus (T90).

2.3. STATISTICAL ANALYSES

Based on the number of diseases and complaints linked to office visits, home visits or telephone consultations between 2 and 5 years after diagnosis of cancer, the annual number of contacts was calculated for each cluster. As a GP could indicate up to three diseases and complaints per contact, one contact could be related to multiple clusters. Differences between patients and matched controls were tested using t-tests for independent samples (two-sided). Subsequently, for each cluster we determined which diseases and complaints were more frequent in patients than in controls. We compared the number of contacts per ICPC code between patients and matched controls by calculating an incidence rate ratio (IRR), i.e. the ratio of the rate of an event (in this case a consultation) occurring in cases and

controls. Finally, we also looked specifically at some ICPC-codes that have previously been related to the type of cancer or to cancer in general. All analyses were stratified by cancer type. A p-value below 0.05 was considered statistically significant. Analyses were performed using STATA® SE version 11.2.

3. RESULTS

In our sample, between January 2001 and December 2006, 2387 adult patients were diagnosed with breast cancer, 1251 patients were diagnosed with prostate cancer and 1392 with colorectal cancer. In total, we excluded 2784 patients: 571 patients were diagnosed with another type of cancer within 6 years after the index cancer diagnosis and 2213 patients did not have 3 years of follow-up data available after the diagnosis (mostly because their practice stopped participation (59%) or they died (20%)). The resulting 1256 breast cancer patients, 503 prostate cancer patients and 487 colorectal cancer patients were matched to two control patients.

Mean age at diagnosis was 58 years in breast cancer patients, 70 years in prostate cancer patients and 67 years in colorectal cancer patients. Almost half (47%) of the latter group was male. Breast and prostate cancer patients had a significantly higher prevalence of chronic diseases than controls, especially diabetes in breast cancer patients (10% in patients versus 8% in controls) and osteoarthritis in prostate cancer patients (10% in patients versus 5% in controls). The prevalence of chronic diseases in colorectal cancer patients was similar to controls (see Table 1).

[TABLE 1.]

The mean number of contacts specifically related to cancer was 0.4 (SD 1.7) per year for breast cancer patients, 0.7 (SD 2.2) per year for prostate cancer patients and 0.6 (SD 4.3) per year for patients with colorectal cancer. Compared to controls, breast and prostate cancer patients contacted their GP significantly more often with acute symptoms (18% and 26% more often, respectively), whereas patients with breast and colorectal cancer contacted their GP more often than controls for an infection (45% and 17% more, respectively). Finally, breast cancer patients contacted their GP 17% more often than controls for 'other' diseases and complaints not belonging to one of the other five clusters (see Fig. 1). Overall, the number of contacts for psychosocial problems and chronic diseases was not higher in cancer patients than in controls.

[FIG. 1.]

In Table 2, Table 3 and Table 4, the most common diseases and complaints that occurred more frequently in cancer patients than in their matched controls are listed. We selected up to three diseases and complaints per cluster. Breast cancer patients contacted their GP significantly more often for back pain and abdominal pain, for common infections such as urinary tract and respiratory tract infections, and for psychological problems such as sleep problems and depression. Patients with prostate cancer contacted their GP more often for cystitis and back pain, as well as for constipation and for common chronic diseases such as COPD and complicated hypertension. Patients with colorectal cancer had more GP contacts for back pain and abdominal pain and for common infections, such as cystitis and skin infections.

[TABLE 2.] [TABLE 3.] [TABLE 4.]

Besides these general diseases and complaints, we also looked at some specific diseases and complaints that have previously been related to the type of cancer or to cancer in general

(Table 5). Contacts for chest symptoms and heart failure were more frequent in breast cancer patients, colorectal cancer patients more often contacted their GP for constipation, but prostate cancer patients did not contact their GP significantly more often for urinary problems (except for cystitis) or erectile dysfunction. Contacts for fatigue were more common in all cancer types, although the difference with controls was only statistically significant in prostate cancer patients. Adverse drug effects were more prevalent in both prostate cancer and colorectal cancer patients and showed a trend towards a higher prevalence in breast cancer patients. Fear of cancer, both for the same type or cancer in general, was only sporadically recorded as a reason for the encounter.

[TABLE 5.]

4. DISCUSSION

Increased primary health care use in cancer survivors is mostly related to acute symptoms and infections. Contacts for acute symptoms in breast and prostate cancer patients were often related to abdominal and back pain, and to fatigue. The increased number of contacts for infections in breast and colorectal cancer patients was mostly related to common infections, such as cystitis and respiratory infections. Both findings may be a direct effect of cancer treatment. Fatigue and abdominal pain may develop during treatment and persist thereafter⁴ and common infections may be due to a weakened immune system, which has been reported as a late effect of cancer treatment.²⁴ Patients also contacted their GP more often for adverse drug effects, which may also indicate late effects of cancer treatment. Alternatively, patients may contact their GP more easily for common symptoms because of increased health concerns. Direct fear of cancer recurrence was hardly recorded as reason for a GP visit, though.

Health care use for chronic diseases seems slightly higher in cancer patients, which can be explained by the higher prevalence of e.g. diabetes in breast cancer patients. The number of consultations for psychosocial problems was also slightly higher, especially in breast cancer patients, who had more contacts with the GP for sleep problems and depression than controls. This is in contradiction with the findings of Khan et al., who found no increase in consulting for depression in cancer survivors.²¹ But they looked at the percentage of patients with a consult for depression, not the number of consults. Mikkelsen et al. conducted a survey among cancer survivors and found that although many of them experienced psychosocial problems, such as fear of recurrence of cancer or problems within the family, these problems were rarely discussed with the GP or other medical care providers.²⁵ This is reflected in the only slightly higher number of consultations for psychosocial problems we found. When a GP suspects psychosocial issues in a patient, he or she may therefore take a proactive approach in discussing these problems.

We studied a large sample of patients over a relatively long period with minimal selection bias, as the practices in LINH are representative for the Netherlands and all patients registered in the participating practices could be included. Recording of contacts is most likely accurate as practices also used their electronic medical files for reimbursement. Quality of the registered data, e.g. percentage of missing diagnostic codes, was checked and practices not meeting quality criteria in at least 50% of the years that they participated were excluded. However, completeness and accuracy of diagnoses could not be verified. GPs may have made mistakes in ICPC codes, e.g. due to incorrect coding of a complaint or due to typing errors, but it is unlikely that coding errors would differ systematically between patients and controls, thus these errors will only have decreased the difference between patients and controls.

We only selected ICPC-codes related to symptoms or diagnoses, so those related to preventive care, treatment procedures, test results or referral were not included. We may therefore have missed standard cancer-related follow-up consults. However, GPs could

indicate more than one ICPC-code per contact and may also have recorded the cancer diagnosis in these consultations besides the code for the treatment procedure or test result.

In our analyses we did not exclude the terminal phase. Diseases and complaints during this period are likely to be different,²⁷ which may have led to an increase in acute problems in cancer patients. However, the number of patients who died within our follow-up period (2–5 years after the diagnosis) was relatively low: 184 cancer patients (8%) and 181 matched controls (4%).

In conclusion, primary health care use in cancer survivors is mainly higher for common acute symptoms, such as back or abdominal pain, and common infections. This may be due to late effects of cancer treatment, increased health concerns or both. The number of GP contacts related to chronic disease and psychosocial problems is also slightly increased in cancer survivors, but is not a major cause for the increase in health care use. Guidelines for aftercare of cancer patients should emphasise the need for GPs to be alert for possible late effects of cancer treatment, even years after active treatment has finished.

Conflict of interest statement

None declared.

Role of the funding source

This study was funded by the Alpe d'HuZes/Dutch Cancer Society. They had no role in study design, data collection, data analysis, data interpretation or writing of the paper. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

REFERENCES

- 1 A. Verdecchia, S. Francisci, H. Brenner et al. Recent cancer survival in Europe: a 2000–02 period analysis of EURO CARE-4 data. *Lancet Oncol*, 8 (9) (2007), pp. 784–796
- 2 S. Siesling, O. Visser, T.K. Luth et al. Survival of adult cancer patients in the Netherlands increases: 5-year survival increased with 12% between 1989-1993 and 2004-2008 [Volwassen kankerpatiënten overleven langer in Nederland 5-jaarsoverleving 12% toegenomen tussen 1989-1993 en 2004-2008] *Ned Tijdschr Geneeskd*, 155 (2011), p. A3169
- 3 H.E. Karim-Kos, L.A. Kiemeneij, M.W. Louwman, J.W. Coebergh, Vries E. de. Progress against cancer in the Netherlands since the late 1980s: an epidemiological evaluation. *Int J Cancer*, 130 (12) (2012), pp. 2981–2989
- 4 K.D. Stein, K.L. Syrjala, M.A. Andrykowski, Physical and psychological long-term and late effects of cancer. *Cancer*, 112 (11 Suppl.) (2008), pp. 2577–2592
- 5 F. Joly, M. Henry-Amar, P. Arveux et al. Late psychosocial sequelae in Hodgkin's disease survivors: a French population-based case-control study. *J Clin Oncol*, 14 (9) (1996), pp. 2444–2453
- 6 N.F. Khan, E. Watson, P.W. Rose. Primary care consultation behaviours of long-term, adult survivors of cancer in the UK. *Br J Gen Pract*, 61 (584) (2011), pp. 197–199
- 7 F. Mols, K.A. Helfenrath, A.J.J.M. Vingerhoets, J.W. Coebergh, L. van de Poll-Franse. Increased health care utilization among long-term cancer survivors compared to the average Dutch population: A population-based study. *Int J Cancer*, 121 (4) (2007), pp. 871–877
- 8 C. Nord, A. Mykletun, L. Thorsen, T. Bjoro, S.D. Fossa. Self-reported health and use of health care services in long-term cancer survivors. *Int J Cancer*, 114 (2) (2005), pp. 307–316

- 9 C.F. Snyder, K.D. Frick, K.S. Peairs et al. Comparing care for breast cancer survivors to non-cancer controls: a five-year longitudinal study. *J Gen Intern Med*, 24 (4) (2009), pp. 469–474
- 10 C.B. Harrington, J.A. Hansen, M. Moskowitz, B.L. Todd, M. Feuerstein. It's not over when it's over: long-term symptoms in cancer survivors – a systematic review. *Int J Psychiatry Med*, 40 (2) (2010), pp. 163–181
- 11 P.A. Ganz, J.H. Rowland, K. Desmond, B.E. Meyerowitz, G.E. Wyatt. Life after breast cancer: understanding women's health-related quality of life and sexual functioning. *J Clin Oncol*, 16 (2) (1998), pp. 501–514
- 12 N.F. Khan, D. Mant, L. Carpenter, D. Forman, P.W. Rose. Long-term health outcomes in a British cohort of breast, colorectal and prostate cancer survivors: a database study. *Br J Cancer*, 105 (S1) (2011), pp. S29–S37
- 13 M.G. Sanda, R.L. Dunn, J. Michalski et al. Quality of life and satisfaction with outcome among prostate-cancer survivors. *N Engl J Med*, 358 (12) (2008), pp. 1250–1261
- 14 D.C. Miller, M.G. Sanda, R.L. Dunn et al. Long-term outcomes among localized prostate cancer survivors: health-related quality-of-life changes after radical prostatectomy, external radiation, and brachytherapy. *J Clin Oncol*, 23 (12) (2005), pp. 2772–2780
- 15 S.D. Ramsey, K. Berry, C. Moinpour, A. Giedzinska, M.R. Andersen. Quality of life in long term survivors of colorectal cancer. *Am J Gastroenterol*, 97 (5) (2002), pp. 1228–1234
- 16 K.S. Ogle, G.M. Swanson, N. Woods, F. Azzouz. Cancer and comorbidity. *Cancer*, 88 (3) (2000), pp. 653–663
- 17 M. Hewitt, J.H. Rowland, R. Yancik. Cancer survivors in the united states: age, health, and disability. *J Gerontol A Biol Sci Med Sci*, 58 (1) (2003), pp. M82–M91
- 18 C.C. Earle, B.A. Neville. Under use of necessary care among cancer survivors. *Cancer*, 101 (8) (2004), pp. 1712–1719
- 19 S.E. Harrison, E.K. Watson, A.M. Ward et al. Primary health and supportive care needs of long-term cancer survivors: a questionnaire survey. *J Clin Oncol*, 29 (15) (2011), pp. 2091–2098
- 20 T.H. Mikkelsen, J. Sondergaard, A.B. Jensen, F. Olesen. Cancer rehabilitation: psychosocial rehabilitation needs after discharge from hospital? *Scand J Prim Health Care*, 26 (4) (2008), pp. 216–221
- 21 N.F. Khan, A.M. Ward, E. Watson, P.W. Rose. Consulting and prescribing behaviour for anxiety and depression in long-term survivors of cancer in the UK. *Eur J Cancer*, 46 (18) (2010), pp. 3339–3344
- 22 Groenewegen PP, de Bakker DH, van der Velden J. Nationale studie naar ziekten en verrichtingen in de huisartspraktijk. Basisrapport verrichtingen in de huisartspraktijk. [Dutch national survey of general practice. Report on interventions in general practice]. Utrecht, Netherlands; 1992.
- 23 J. O'Halloran, G.C. Miller, H. Britt. Defining chronic conditions for primary care with ICPC-2. *Fam Pract*, 21 (4) (2004), pp. 381–386
- 24 D.H. Kang, M.T. Weaver, N.J. Park, B. Smith, T. McArdle, J. Carpenter. Significant impairment in immune recovery after cancer treatment. *Nurs Res*, 58 (2) (2009), pp. 105–114
- 25 T. Mikkelsen, J. Sondergaard, I. Sokolowski, A. Jensen, F. Olesen. Cancer survivors' rehabilitation needs in a primary health care context. *Fam Pract*, 26 (3) (2009), pp. 221–230

26 W. Schafer, M. Kroneman, W. Boerma et al. The Netherlands: health system review. *Health Syst Transit*, 12 (1) (2010), p. v-228

27 N. Wit, R. van den Broek, I. Thomeer, W. Stalman. Terminale zorg aan oncologische patiënten in de huisartsenpraktijk; frequentie, inhoud en ervaren belasting [Terminal care for oncology patients in general practice] *Huisarts en Wet*, 46 (2) (2003), pp. 901–906

TABLES AND FIGURE

Table 1

Demographic characteristics at inclusion and prevalence of chronic diseases in the period between 0 and 2 years after inclusion of patients and matched controls by cancer type.

	Breast cancer		Prostate cancer		Colorectal cancer	
	Patients (n = 1256)	Controls (n = 2512)	Patients (n = 503)	Controls (n = 1006)	Patients (n = 487)	Controls (n = 973)
Age (years)	58.5 (13.1)	58.3 (13.5)	70.6 (9.1)	70.4 (8.9)	66.8 (12.3)	66.6 (12.4)
Sex (male)	0 (0%)	0 (0%)	503 (100%)	1006 (100%)	231 (47%)	461 (47%)
Chronic diseases						
Ischaemic heart disease/heart failure	325 (26%)	597 (24%)	191 (38%)	339 (34%)	171 (35%)	335 (34%)
CVA/TIA	15 (1%)	30 (1%)	18 (4%)	30 (3%)	12 (2%)	23 (2%)
Chronic obstructive pulmonary disease (COPD)/Asthma	79 (6%)	166 (7%)	61 (12%)	93 (9%)	41 (8%)	72 (7%)
Arthritis	88 (7%)	146 (6%)	51 (10%)***	50 (5%)	30 (6%)	64 (7%)
Diabetes	128 (10%)*	207 (8%)	69 (14%)	126 (13%)	65 (13%)	104 (11%)
Previous malignancy	18 (1%)	0 (0%)	15 (3%)	0 (0%)	15 (3%)	0 (0%)
Any of the above	474 (38%)*	851 (34%)	275 (55%)**	462 (46%)	235 (48%)	444 (46%)

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

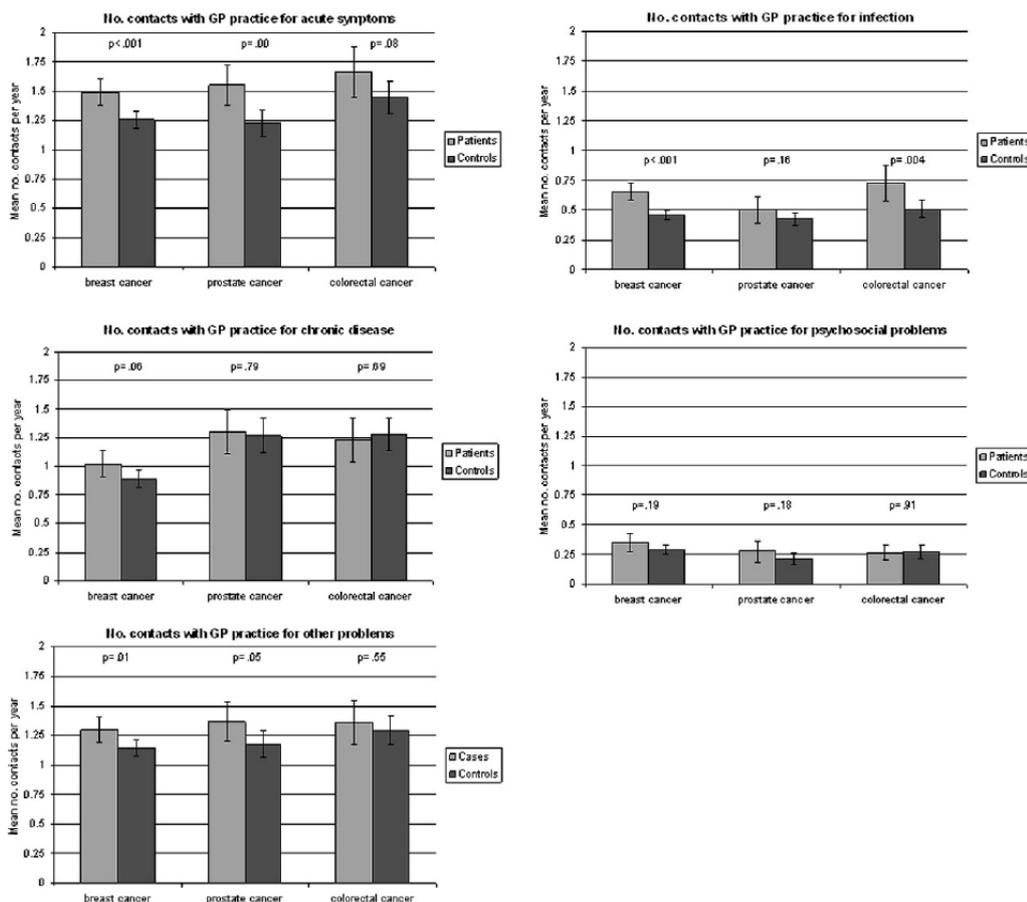


Fig. 1. Frequency of diagnoses made during primary care contacts 2–5 years after diagnosis/inclusion by cluster and cancer type.

Table 2

Top three diagnoses by cluster that are made significantly more frequently during General Practitioner (GP) contacts in breast cancer patients 2–5 years after diagnosis ($n = 1256$).

Cluster	International Classification of Primary Care (ICPC)		No. breast cancer patients (%)	No. contacts in breast cancer patients per 1000 patient years	IRR (95% Confidence Interval (CI))
Acute symptoms	R05	Cough	161 (13%)	94	1.3 (1.1–1.6)
	D06	Abdominal pain localised	94 (7%)	66	1.9 (1.5–2.3)
	L02	Back symptom/complaint	85 (7%)	55	1.5 (1.2–1.8)
Infection	U71	Cystitis/urinary infection	197 (16%)	181	1.4 (1.3–1.6)
	R74	Upper respiratory infection acute	111 (9%)	54	1.3 (1.1–1.6)
	R78	Acute bronchitis/bronchiolitis	95 (8%)	71	1.6 (1.3–1.9)
Chronic disease	T90	Diabetes mellitus	145 (12%)	364	1.6 (1.4–1.7)
Psychosocial	P06	Sleep disturbance	76 (6%)	60	1.6 (1.3–2.0)
	P76	Depression	65 (5%)	71	1.6 (1.4–2.0)

IRR = incidence rate ratio; indicates the relative increase in contacts compared to non-cancer controls.

Table 3
Top three diagnoses by cluster that are made significantly more frequently during General Practitioner (GP) contacts in prostate cancer patients 2–5 years after diagnosis ($n = 503$).

Cluster	International Classification of Primary Care (ICPC)		No. prostate cancer patients (%)	No. contacts in prostate cancer patients per 1000 patient years	IRR (95% Confidence Interval (CI))
Acute symptoms	D12	Constipation	47 (9%)	87	2.4 (1.7–3.2)
	A04	Weakness/fatigue general	44 (9%)	82	3.0 (2.1–4.1)
	L02	Back symptom/complaint	33 (7%)	504	1.5 (1.1–2.2)
Infection	R71	Cystitis/urinary infection	41 (8%)	117	2.2 (1.7–2.9)
Chronic disease	K87	Hypertension complicated	38 (8%)	154	1.5 (1.3–1.9)
	R95	Emphysema/Chronic obstructive pulmonary disease (COPD)	36 (7%)	108	1.3 (1.1–1.7)
Other	L99	Musculoskeletal disease	38 (8%)	55	1.6 (1.1–2.2)
	A85	Adverse effect of medical agent	32 (6%)	38	1.8 (1.1–2.7)

IRR = incidence rate ratio: indicates the relative increase in contacts compared to non-cancer controls.

Table 4
Top three diagnoses by cluster that are made significantly more frequently during GP contacts in colorectal cancer patients 2–5 years after diagnosis ($n = 487$).

Cluster	International Classification of Primary Care (ICPC)		No. colorectal cancer patients (%)	No. contacts in colorectal cancer patients per 1000 patient years	IRR (95% Confidence Interval (CI))
Acute symptoms	R05	Cough	68 (14%)	121	1.4 (1.1–1.8)
	D06	Abdominal pain localised	39 (8%)	67	1.9 (1.3–2.7)
	L02	Back symptom/complaint	32 (7%)	62	1.5 (1.1–2.1)
Infection	U71	Cystitis/urinary infection	70 (14%)	285	1.9 (1.6–2.2)
	S74	Dermatophytosis	28 (6%)	47	2.4 (1.6–3.7)
Other	A85	Adverse effect of medical agent	28 (6%)	39	1.9 (1.2–3.0)

IRR = incidence rate ratio: indicates the relative increase in contacts compared to non-cancer controls

Table 5
Frequency of specific diagnoses 2–5 years after diagnosis by cancer type.

Cluster	International Classification of Primary Care (ICPC)		No. patients (%)	No. contacts per 1000 patient years	IRR (95% Confidence Interval (CI))
Breast cancer	L04	Chest symptom/complaint	73 (6%)	40	1.4 (1.1–1.8)
	K77	Heart failure	28 (2%)	46	1.7 (1.3–2.1)
	A04	Weakness/tiredness general	103 (8%)	57	1.1 (0.9–1.4)
	A85	Adverse effect of medical agent	58 (5%)	25	1.1 (0.8–1.5)
	A26	Fear of cancer	3 (0%)	14	2.7 (0.5–18.3)
	X26	Fear of breast cancer	14 (1%)	7	1.3 (0.7–2.4)
Prostate cancer	U05	Urination problems	14 (3%)	168	1.3 (0.7–2.46)
	Y07	Erectile dysfunction	7 (1%)	7	0.7 (0.3–1.6)
	A04	Weakness/tiredness general	44 (9%)	82	3.0 (2.1–4.1)
	A85	Adverse effect of medical agent	32 (6%)	38	1.8 (1.1–2.7)
	A26	Fear of cancer	1 (0%)	2	n/a
Colon cancer	Y26	Fear of genital cancer male	0 (0%)	0	n/a
	D11	Diarrhoea	24 (5%)	37	1.6 (1.0–2.5)
	T90	Diabetes mellitus	62 (13%)	352	1.1 (1.0–1.3)
	A04	Weakness/tiredness general	33 (7%)	63	1.2 (0.8–1.6)
	A85	Adverse effect of medical agent	28 (6%)	39	1.9 (1.2–3.0)
A26	Fear of cancer	2 (0%)	3	6.2 (0.5–322.7)	
A26	Fear of cancer of digestive system	0 (0%)	0	n/a	

IRR = incidence rate ratio: indicates the relative increase in contacts compared to non-cancer controls.