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Who visits primary health care general practitioners and why? A register-based study in a Finnish city

Mika T. Lehto [a,b], Timo Kauppila[a,b], Hannu Kautiainen[a,c], Ossi Rahkonen[d], Merja K. Laine[a,e] and Kaisu Pitkälä[a]

[a]Department of General Practice and Primary Health Care, University of Helsinki and Helsinki University Hospital, Helsinki, Finland; [b]Vantaa Health Centre, Vantaa, Finland; [c]MedCare LTD, Äänekoski, Finland; [d]Department of Public Health, University of Helsinki, Helsinki, Finland; [e]Folkhälsan Research Center, Helsinki, Finland

ABSTRACT

This is a register-based study that examines the distribution of diagnoses made by general practitioners (GPs) in the public primary health care of the city of Vantaa, Finland. Data were gathered from the electronic health record (EHR) system and consisted of every record entered into the EHR system between 1 January 2016 and 31 December 2018. Both absolute numbers and relative proportions of the 10th edition of International Classification of Diseases (ICD-10) diagnosis recordings were reported and calculated. Among GP visits, the 88 most common diagnoses covered 75% of all diagnoses. The most common diagnoses were related to the musculoskeletal (3.8%, ICD code M54) and respiratory systems (6.0%, ICD-10 code J06). Primary health care GP services were mostly used by children (age <5 years) and older adults (>65 years). Health examinations – mostly children's and maternity clinics appointments/visits – covered 20% of the GP office visits. Women between the ages 15–79 years had relatively more GP visits compared to men. The 88 most commonly recorded diagnoses covered the majority of the GP visits. Health examinations for the healthy were an important part of GPs' work. In an urban Finnish city, GP services were predominantly used by children and older adults.

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Introduction

In primary health care, the recording of diagnoses is needed to ensure accurate treatment actions, planning activities and resource allocation [1–3]. Improving the recording of chronic diseases may serve as one of the means of improving the quality of care [1,3]. Recording diagnoses can promote diagnostic thinking and thus enhance rational assessment of treatment options, which can lead to better treatment outcomes and improve patient safety [4]. It can also facilitate the use of computer-based clinical decision support systems [4]. Regular recording of diagnoses also supports pre- and postgraduate medical education by clarifying the required competence, knowledge, and skills in general practice [5].

General practitioners (GPs) tend to develop an intuitive sense of the prevalence of the diseases and health-related disorders that they encounter [6]. Diagnostic recordings and the subsequent data regarding diseases and health-related disorders in GPs' practice have been mostly inconsistent due to the varying classification systems [6–9]. Obtaining detailed information on diseases, health-related disorders, and other reasons for visiting the primary health care environment would make it possible, among other things, to focus medical education on the main challenges in the clinical practice of GPs. An Australian study, conducted in 2013, reported that the 30 most common diagnoses covered about half of the health problems treated by GPs [6]. To cover 75% of the diagnoses, GPs need to have knowledge of more than 100 diseases or health-related disorders [6]. It is noteworthy, however, that the diagnostic profile of the primary health care population may change over time [10] and between populations in different countries [11]. Furthermore, diagnostic activities may be influenced by geographical factors [12], and the diagnoses themselves may differ by regional culture and/or religion [13].

Finland is a Nordic welfare state, and the Finnish health care system shares similar characteristics to other Nordic countries as well as the UK and Canada. The health care services are provided primarily in the public sector, and these services are mainly financed

CONTACT Mika T. Lehto mika.lehto@helsinki.fi Department of General Practice and Primary Health Care, University of Helsinki and Helsinki University Hospital, Tukholmankatu 8 B, Helsinki 00014, Finland

with tax income. However, some differences also exist. The Finnish public health care system is being carried over by two separate, although partially intertwined, subsystems, the primary health care (PHC) and the specialised health care (SHC). As part of the public PHC, Finland also has a prevention-oriented system for small children (children's clinic) as well as pupils and students attending public schools (school clinic). This system is organised to provide the Finnish children and adolescents with health check-ups at regular intervals until adulthood. Most of the doctors working in these clinics are GPs. Additionally, a private sector provides occupational health care (OHC) services to employed citizens and some employers also provide its staff's health care as a form of benefit. To a lesser extent, some people have private insurance coverage and/or use private sector by personally covering the expenses [14].

By studying the recorded diagnostic data from patients' physician visits, we also obtain information about patients using public primary health care. The aim of this study was to examine the distribution of diagnoses made by general practitioners (GPs) in the public primary health care in the city of Vantaa, Finland.

Materials and methods

This study is a register-based study, which was performed in the public primary health care system of the city of Vantaa, Finland. With a population of 223,027 (1 January 2018), Vantaa was the fourth most populated city in Finland and a part of Helsinki metropolitan area. Data were gathered from the electronic health record (EHR) system used in primary health care in the city of Vantaa, and it includes every record entered in the EHR by GPs between 1 January 2016 and 31 December 2018. The most common primary diagnoses in GP visits were recognised at an accuracy of the three first characters based on the 10th version of International Classification of Diseases (ICD-10) classification system.

In Finland, public primary health care is a non-profit activity for the organisations providing the services. GPs in public primary health care work as civil servants in the service of the municipal health administration. The GPs have a gate-keeping role in the primary care, and the patients are referred to specialised care only if their treatment in the primary care is insufficient. The services are organised as outpatient encounters in public health care centres. Municipalities finance public primary health care, including the EHR system, mainly through tax income.

Data from the Vantaa health centre were obtained from the Graphic Finstar (GFS) EHR system (GFS, CGI LTD, Helsinki, Finland). Diagnostic data have been entered in the GFS system as structured data based on the ICD-10 coding system. The ICD-10 diagnoses were entered in the GFS system during the patients' visits to GPs. If needed, the GFS system assisted the GP in finding a correct ICD-10 code. The ICD-10 code with at least the three first letters and/or numbers was chosen and decided on by the GP. In 2008, Vantaa health care services initiated the use of electronic reminders for recording the diagnoses with ICD-10 codes, and after the implementation of these reminders the recording rate of diagnoses has consistently exceeded 90% [15].

In the present study, the main outcome was the primary (first) diagnostic code recorded in primary health care GP office visits. The age and sex of each patient was recorded. Both absolute numbers and relative proportions of diagnosis recordings were reported and calculated. Individual patients' personal identification numbers were pseudonymized before constructing dataset and performing analysis. The GPs also received pseudonymized identification numbers.

The register keeper (the health authorities of Vantaa, VD/4713/13.00.00/2019) and the ethical board of the Medical Faculty of the University of Helsinki (nro 4/2019) granted permission to carry out the study.

Statistical analyses

The descriptive statistics were presented as means with SDs or as counts and cumulative sum with percentages. The number of visit rates to GPs were calculated as a function of 5-year age group and sex, and then summarised as visits per 1,000 population person-years (pyrs). Visit rates (per 1,000 pyrs) with 95% confidence intervals (CI) were calculated assuming a Poisson distribution. All analyses were performed using STATA software, version 17.0 (StataCorp LP, CollegeStation, TX).

Results

During the 3-year study period, public primary health care GP services in the city of Vantaa were used by 163,375 individuals. Of these individuals 92,164 (56%) were women and 71,211 (44%) were men. The coverage of users of GP visits per Vantaa population was 71.4%. In total, 627,386 GP consultations (office visits) were recorded. Among these visits, the average diagnostic recording rate was 93.5%. Of recorded GP office visits, 61% of patients were women.

During the follow-up period, a total of 1,393 different diagnoses were documented in the Graphic Finstar EHR system. The 24 most commonly recorded diagnoses

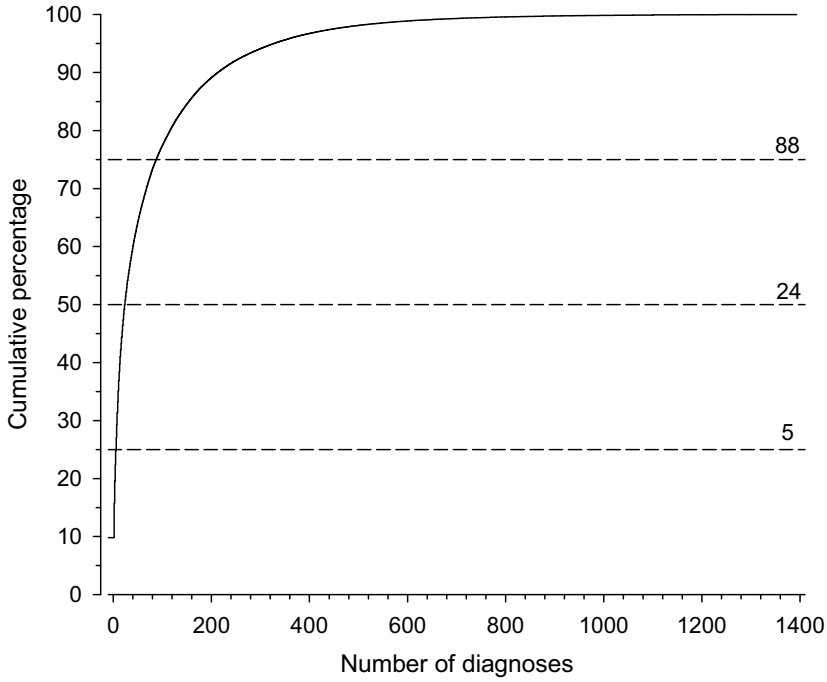

Figure 1. Cumulative percentage of visits to GPs represented as a function of number of different diagnoses recorded. Median and quartiles (25th and 75th percentiles) of distribution are shown with dashed lines.

GP = general practitioner.

covered 50% of all GP visits, and the 88 most commonly recorded diagnoses covered 75% of all recorded diagnoses of GP office visits (Figure 1).

Health examinations (ICD-10 codes Z00–ZZB) covered 19.8% of GP office visits. Of these visits, 49.3% were statutory (e.g. visits to children's or maternity clinics or school health care in public schools as part of the preventive health care system in Finland). Among groups of diseases and mental health – related disorders, musculoskeletal system – related diagnoses (ICD-10 codes M00-M99; $n = 87{,}890$ [14.0%]) and respiratory system – related diagnoses (J00-J99; $n = 76{,}132$ [12.1%]) were the most common. Symptom-based diagnoses (ICD-10 codes R00-R99) were the third most commonly recorded and covered 10.8% ($n = 68{,}060$) of all recorded GP office visits (Figure 2, Table 1).

Among individual diseases and mental health – related disorders, upper respiratory tract infections (ICD-10 code J06; 6.0%) and back pain (ICD-10 code M54; 3.8%) were the most commonly recorded diagnoses. Among symptom-based diagnoses (ICD-10 codes R00-R99), abdominal and pelvic pain (ICD-10 code R10) was the most frequent diagnosis used. Depression (ICD-10 code F32) and anxiety (ICD-10 code F41) were the most commonly recorded mental health – related diagnoses (Table 2).

Public primary health care services were most often used by children under 5 years old and adults over 65 years of age (Figure 3). Women aged 15–79 years had relatively more GP office visits compared to men of the same age. After the age of 80 years there was no significant difference in primary health care use between women and men. In younger and older age groups, sex differences were not found (Figure 2). Among women and men, the mean number of GP office visits was 508/1,000 pyrs (95% CI: 505 to 510) and 376/1,000 pyrs (95% CI: 374 to 378), respectively.

Among women, musculoskeletal (ICD-10 code M00-M99), respiratory (ICD-10 code J00-J99), genitourinary (ICD-10 code N00-N99) and symptomatic diagnoses (ICD-10 code R00-R99) were the most common. Among men, cardiovascular (ICD-10 code I00-I99), psychiatric (ICD-10 code F00-F99), dermatologic (ICD-10 code L00-L99), endocrinologic diagnoses (ICD-10 code E00-E90), as well as accidents and injuries (ICD-10 code S00-T98) were the most common (Figure 3).

Discussion

Of 1393 different primary recorded diagnoses, 88 most common diagnoses covered three in four of all GP visits. Health examination was the most frequently recorded diagnosis group, followed by musculoskeletal and respiratory system-related diagnoses and symptom-based diagnoses. Among individual diagnosis groups, upper respiratory tract infections and back pain were the most frequent. Primary health care GP services were most often used by children under 5 years

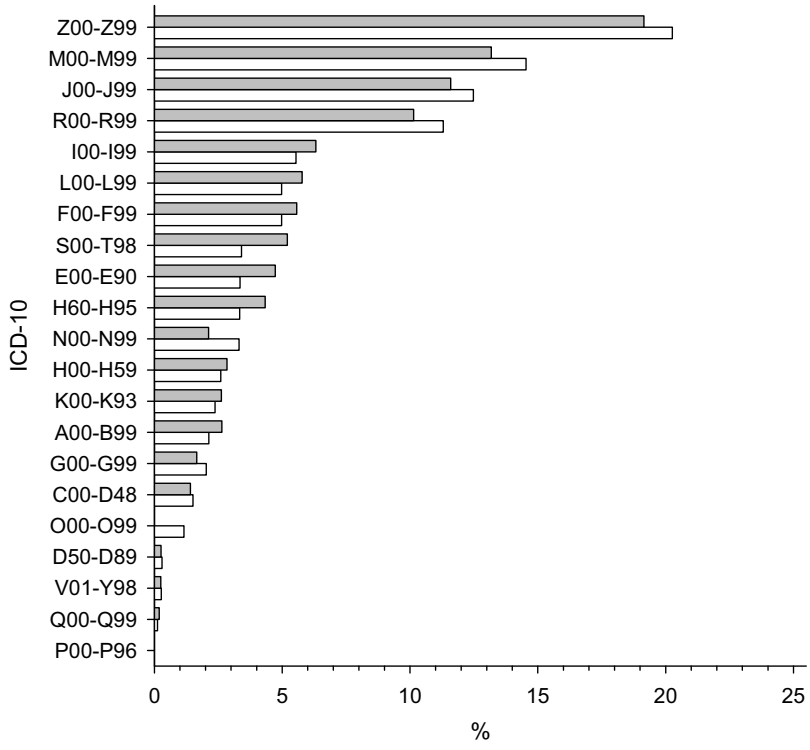

Figure 2. Percentage of different recorded ICD-10 diagnostic groups. Data for women and men are represented separately.
ICD-10 = International Classification of Diseases (10th edition).

Table 1. Prevalence of recorded diagnoses by ICD-10 code groups in women ($n = 383{,}292$) and men ($n = 244{,}094$) in the public primary health care of the city of Vantaa, Finland, between years 2016 and 2018.

ICD-10 Group	Definition	Women, n (%)	Men, n (%)	All, n (%)
A00–B99	Certain infectious and parasitic diseases	8 156 (2.1)	6 453 (2.6)	14 609 (2.3)
C00–D48	Neoplasms	5 802 (1.5)	3 433 (1.4)	9 235 (1.5)
D50–D89	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	1 141 (0.3)	623 (0.3)	1 764 (0.3)
E00–E90	Endocrine, nutritional, and metabolic diseases	12 857 (3.4)	11 544 (4.7)	24 401 (3.9)
F00–F99	Mental and behavioural disorders	19 079 (5.0)	13 605 (5.6)	32 684 (5.2)
G00–G99	Diseases of the nervous system	7 784 (2.0)	4 052 (1.7)	11 836 (1.9)
H00–H59	Diseases of the eye and adnexa	9 951 (2.6)	6 924 (2.8)	16 875 (2.7)
H60–H95	Diseases of the ear and mastoid process	12 797 (3.3)	10 559 (4.3)	23 356 (3.7)
I00–I99	Diseases of the circulatory system	21 247 (5.5)	15 428 (6.3)	36 675 (5.8)
J00–J99	Diseases of the respiratory system	47 844 (12.5)	28 288 (11.6)	76 132 (12.1)
K00–K93	Diseases of the digestive system	9 099 (2.4)	6 397 (2.6)	15 496 (2.5)
L00–L99	Diseases of the skin and subcutaneous tissue	19 106 (5.0)	14 105 (5.8)	33 211 (5.3)
M00–M99	Diseases of the musculoskeletal system and connective tissue	55 717 (14.5)	32 173 (13.2)	87 890 (14.0)
N00–N99	Diseases of the genitourinary system	12 683 (3.3)	5 186 (2.1)	17 869 (2.8)
O00–O99	Certain conditions originating in the perinatal period	4 461 (1.2)	8 (0.0)	4 469 (0.7)
P00–P96	Congenital malformations, deformations and chromosomal abnormalities	34 (0.0)	49 (0.0)	83 (0.0)
Q00–Q99	Congenital malformations, deformations and chromosomal abnormalities	478 (0.1)	458 (0.2)	936 (0.1)
R00–R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	43 297 (11.3)	24 763 (10.1)	68 060 (10.8)
S00–T98	Injury, poisoning and certain other consequences of external causes	13 088 (3.4)	12 695 (5.2)	25 783 (4.1)
V01–Y98	External causes of morbidity and mortality	1 029 (0.3)	608 (0.2)	1 637 (0.3)
Z00–ZZB	Factors influencing health status and contact with health services	77 642 (20.3)	46 743 (19.1)	124 385 (19.8)

ICD-10 = International Classification of Diseases, 10th edition.

old and adults over 65 years of age. After the age of 65 years, the use of primary health care started to increase in both sexes. The relative proportions of recorded diagnoses differed between sexes in almost every diagnosis category.

One of the strengths of this study was the equal access to primary health care services due to the Finnish free-of-cost health care system and the subsequent full coverage of service use among the population, although, as a limitation, the data from the city of Vantaa is not entirely

Table 2. The most common recorded diagnoses by ICD-10 codes in the public primary health care of the city of Vantaa, Finland, between years 2016 and 2018. In the study period, public primary health care services were used by 163,375 individuals. ICD-10 = International Classification of Diseases, 10th edition.

ICD-10 Group	Definition	N	%	Age mean (SD)
Z00	General examination and investigation of persons without complaint and reported diagnosis	61 377	9.8	6 (11)
J06	Acute upper respiratory infections of multiple and unspecified sites	37 315	6.0	27 (23)
M54	Dorsalgia	24 090	3.8	48 (20)
I10	Essential (primary) hypertension	17 506	2.8	67 (13)
R10	Abdominal and pelvic pain	15 299	2.4	41 (22)
E11	Type 2 diabetes	14 284	2.3	65 (13)
M79	Other soft tissue disorders, not elsewhere classified	14 177	2.3	51 (22)
H66	Suppurative and unspecified otitis media	12 813	2.0	11 (17)
Z34	Supervision of normal pregnancy	11 859	1.9	30 (5)
Z02	Examination and encounter for administrative purposes	11 638	1.9	47 (26)
Z30	Contraceptive management	11 224	1.8	30 (9)
H10	Conjunctivitis	9 323	1.5	27 (26)
J01	Acute sinusitis	8 507	1.4	44 (19)
F32	Depressive episode	8 196	1.3	39 (17)
F41	Other anxiety disorders	7 107	1.1	35 (16)
Z39	Care and examination of lactating woman	7 098	1.1	32 (6)
M75	Shoulder lesions	6 561	1.1	57 (18)
J45	Asthma	6 438	1.0	51 (23)
M17	Gonarthrosis (arthrosis of knee)	6 391	1.0	67 (12)
J20	Acute bronchitis	6 121	1.0	46 (24)
R05	Cough	6 119	1.0	43 (28)
Z03	Medical observation and evaluation for suspected diseases and conditions	5 043	0.8	37 (28)
R07	Pain in throat and chest	4 886	0.8	50 (23)
R23	Other skin changes	4 918	0.8	58 (21)

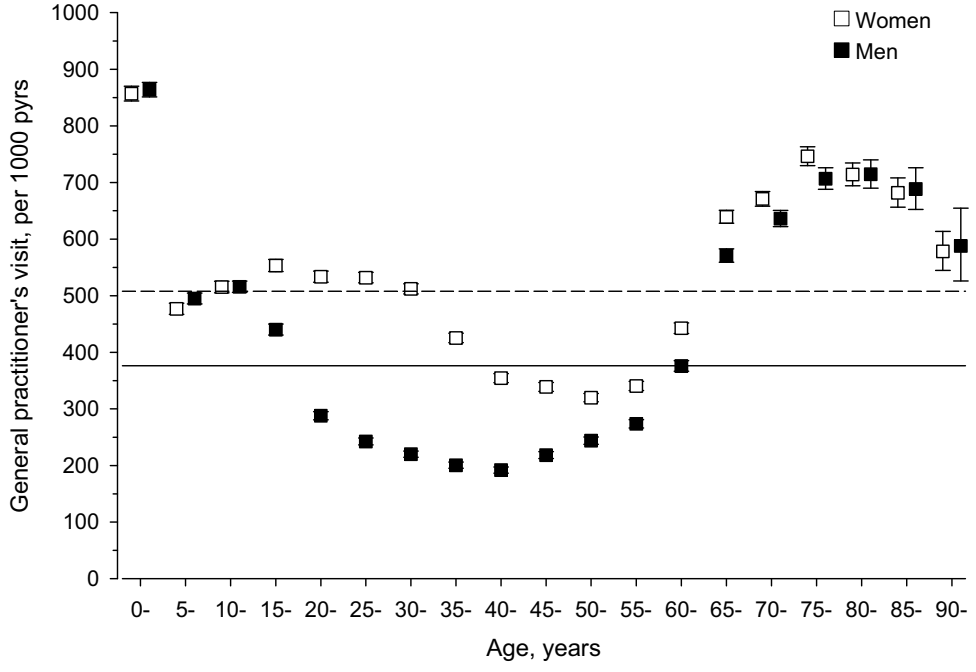

Figure 3. Number of visits to GPs represented as a function of age and sex. Number of visits (per 1,000 pyrs) with 95% confidence intervals.

GP = general practitioner; pyrs = person-years.

representative for the whole country. The proportion of 15- to 64-year-olds in 2018 was 67% in Vantaa whereas in Finland the proportion was 62%. Additionally, the proportions of the population under the age of 15 and over the age of 64 also differed between Vantaa and the whole country, having been 18% vs. 16% and 15% vs. 22%, respectively. The proportion of foreign citizens in Vantaa is higher compared to the entire country (12% vs. 5% in 2018). The population's (15+ years) educational background is comparable to the rest of the country [16].

Another limitation is that our study covers only three years, and the most frequent diagnoses may change over longer time periods [17].

With diagnosis recording rates exceeding 90%, the data of the present work are fairly comprehensive. It contains every primary diagnosis code recorded in office visits to GPs in public primary health care services in the city of Vantaa during the study period 2016–18. However, recording the diagnosis does not necessarily mean that the GP took any actions to treat the problem they observed [18] which is a limitation of this study. Furthermore, there is no guarantee that all the observed diagnoses are recorded [19]. Naturally, these present findings do not exclude the possibility that the given diagnosis is inaccurate, as has been suggested to be the case in about 15% of GP consultations [20]. As a limitation, the study only assesses primary diagnoses recorded into the EHR system, whereas the GPs may have addressed several additional problems during the same visit, which they may have recorded as a secondary diagnosis or left the diagnosis unrecorded altogether. Due to the aforementioned reasons as well as the infrequent recording of secondary diagnoses in our data, we excluded the secondary diagnoses from our analysis. Finally, this study only addresses patients visiting public primary health care and diagnoses recorded by GPs in this setting. There are numerous other health care professionals working in the Finnish public health care, e.g. health nurses, nurses, and physiotherapists. However, their diagnosis recording practices are variable, and therefore it is difficult to draw any conclusions on the diagnostic profiles of these patients. Moreover, as the occupational health care and, more broadly, the private sector are not publicly funded activities, we do not have access to these data, and thus they are excluded from this study.

Our data may be compared with Australian study presenting diagnoses in primary health care [6]. Instead of the term “diagnoses”, Cooke et al. used the concept “commonly managed problems”. In the Australian study the 102 most frequently managed problems accounted for 75% of all problems managed by the GPs. This is well in line with our data: 88 different recorded diagnoses accounted for 75% of problems that were managed in office visits. However, the overall distribution of managed problems in the Australian GPs’ offices did not quite resemble the distribution of recorded diagnoses observed in our data because the number of preventive visits and check-ups/examinations was considerably smaller in the Australian data (10% vs 15%). Despite different recording methods of the reason for the visits to the GPs, the distribution of these managed problems in the Australian data was otherwise relatively similar to that of our recorded ICD-10 diagnoses. When considering the variety of the skills required when working as a GP in Finnish public primary health care, the most common recorded diagnoses cover a majority of all recorded diagnoses, while the cumulative number of different diagnoses begins to increase rapidly after the 100 most frequently recorded ones.

When the International Classification of Primary Care (ICPC) system was used to record reasons to visit GPs in a Danish study [9], the distribution of ICPC groups resembled the distribution of our diagnosis groups quite similarly (Table 1). In a Finnish study performed with the ICD-9 system [7], the number of different diagnoses required to cover 25% of the visits to GPs was eight, while in our data that number was five. The overall distribution of diagnosis groups resembled the distribution in our data [7,8]. In a Finnish pilot study [21] performed by using the ICD-10 system, the number of different diagnoses required to cover 50% of the visits to GPs was 40, while it was 24 in our data. However, the overall distribution of recorded diagnoses did not resemble the distribution of recorded diagnoses observed in the present data. Acute respiratory diseases were clearly more common (20%) because the ICD-10 system with four characters (a letter and three numbers) was used and Z-group diagnoses were excluded in that study [21]. In summary, this all suggests that a GP must establish a routine to manage at least 100 different health problems to be able to work efficiently in public primary health care. Yet, this does not mean that GPs could ignore diagnoses which are not included in these most recorded ones.

Due to the comprehensive free-of-cost children’s clinic system, the Finnish public primary health care system reaches the population under the age of five years broadly [22] as our findings also pointed out. This children’s clinic activity encompasses frequent health examinations including various preventive actions, for example vaccinations, and it is required based on legislation and orders given by the Finnish government [23]. The high percentage of small children using the children’s clinic, 99.6% according to the estimate made by the Finnish Institute for Health and Welfare, also explains why the proportion of recorded diagnoses belonging to ICD-10-group Z was so high in the present data. The high volume of this activity in the present study implies the importance of preventive medicine in children’s health care. This also shows that working in children’s clinics is an important part of a Finnish GP’s professional skills.

The data demonstrate that women were utilising public health care more frequently. This sex difference

in usage of primary health care has previously been shown to exist in other countries. For example, several reports [24–26] suggest that women use primary care more often than men. In line with that, attitudes towards consulting GPs on health problems are reported to be more accepting among women than men [27–29]. However, it has also been suggested that the sex difference in the use of Finnish public primary health care occurs simply because more men have occupational health care arranged in the private sector [30], and this arrangement predominantly takes place in the age group between 20 and 65 years of age. Sex differences in the distribution of diagnoses were also evident in this study.

The usage of primary health care started to increase in both sexes after the age of 65 years, and after the age of 80 years there was no significant difference in primary health care usage between women and men. This increase has also been reported to occur in the neighbouring country of Sweden [24–26], as well as elsewhere in Europe [31]. A putative explanation is that visits to GPs in older age are essential, as this age group is more often susceptible to chronic diseases, such as cardiovascular or endocrine diseases, and where GPs' role in treatment is significant [8,32]. Furthermore, the likelihood of multimorbidity and incidence of chronic diseases increases with age, leading to more frequent demand of health care in general [31].

Four different symptom-based diagnoses – abdominal – pelvic pain, cough, throat and chest pain, and symptoms and signs of diseases of the skin – were included among 50% of the most common diagnoses recorded. Altogether, they constituted more than 10% of all recorded diagnoses. In previous Finnish studies with the ICD-9 system, the percentage of these symptomatic diagnoses was 13% [7,8]. In a former pilot study with ICD-10, at an accuracy of four characters these diagnoses constituted only 3% of all diagnoses [29]. Thus, the results have been inconsistent, and our study observations support a higher prevalence of symptomatic diagnoses. This relatively large group of diagnoses without clear definition of the disease underlying these symptoms deserves further studies.

Conclusions

Fewer than 100 different diagnoses covered the majority of all recorded GP office visits. Health examination, musculoskeletal and respiratory system-related diagnoses and symptom-based diagnoses were the most common. The public primary health care system coverage is vast for people under the age of five and over 65 years. The former is greatly due to the presence of comprehensive preventive health care, whereas the latter is a result of the increasing likelihood of multimorbidity and incidence of chronic diseases in the older population.

Disclosure statement

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ORCID

Mika T. Lehto http://orcid.org/0000-0001-7315-2118

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