

Differences between recorded diagnoses of patients of an emergency department and office-hours primary care doctors: a register-based study in a Finnish town

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ABSTRACT

To determine the extent to which it is possible to provide continuity of primary care for those who visit Emergency Departments (EDs) we studied how recorded diagnoses in primary care differ, depending on whether the patient is met in an ED or a primary care office-hours practice. In the present, 12-year follow-up study a report generator of the Electronic Health Record-system provided monthly figures for the number of different recorded diagnoses using the International Classification of Diagnoses (10th edition, ICD-10) and the total number of ED doctors and office-hour visits to General Practitioners (GPs). The 20 most common diagnoses covered 48.1% of the visits with recorded diagnoses to the office hour GPs and 45.9% of the visits to the doctors of the ED. Of these 20 diagnoses, 10 were common in both systems. These 10 diagnoses constituted about 30% of the diagnoses given by ED doctors. Furthermore, five out of the six most common diagnoses were the same in the ED and office-hours practices. The doctors in EDs and office-hour GPs treat quite similar patient material. This may provide organisational ways to reorganise the work of primary care and to guarantee continuity of care for those who may benefit from it.

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Introduction

Continuity of care has been reported to be essential for the successful treatment of older patients in primary care [1,2]. Continuity of care has been suggested to be one of the main tools with which primary care supports the welfare of its patients [3]. Continuity of care seldom occurs if treatment is strongly based on EDs [4–6].

Background

There are patients whose diagnoses should be treatable in primary care without emergency facilities and who benefit if their health problems are treated with continuity of care by their primary health care provider [6,7]. To optimise the functions of primary care, attention should be paid to putative qualitative differences and similarities in the contents of the work, including diagnostics, of primary care office-hours general practitioners (GPs) and doctors in primary care EDs, both of which take care of unselected patients [8,9]. Modern electronic health records (EHR) require the recording of diagnoses into the system, and this allows us to

study how recorded diagnoses in primary care differ, depending on whether the patient is met in an ED or in an office-hours practice. The information obtained provides some relevant insight into the issue of how patient groups differ between EDs and office-hours primary care. Knowing the extent to which cases diagnosed in EDs are treatable in primary care may allow us to plan cooperation between these two partners and enhance the continuity of care in primary health care [6,7].

Methods

The present work is a retrospective longitudinal quasi-experimental study in the primary health care of the fourth largest city in Finland. This study was performed in the primary care ED-system (described in detail earlier in 8 and 9) and office-hours GP practices in Vantaa city, where in 2008 there were about 200,000 inhabitants. Finnish primary health care is mostly non-profit, and municipalities, which fund this activity with taxes, also maintain the electronic health record systems.

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Office-hour activities are performed in municipal health centres. From 2002 to 2011 Vantaa followed a so-called “own doctor system” where every inhabitant of Vantaa had a named personal primary care GP in his/her own health centre. Between 2012 and 2014, this personal GP was provided only to those who were over 75 years old, or to patients who had a recorded diagnosis of chronic disease or had visited a primary care physician more than three times during the preceding year. The ED system had two departments. The first evaluation was usually performed by the primary care ED system and if treatment in secondary care was necessary the patients were referred to the ED of the university clinic of Helsinki University (HUS) in the Peijas or Meilahti hospitals. Thus, the low acuity patients came first to the primary care ED system of the city of Vantaa. The diagnostic equipment in the primary care ED in Vantaa was almost at the level of the adjacent secondary care ED (Peijas) which meant that the primary care physicians had abundant possibilities to make diagnoses in the EDs. Both office-hours medical officers and outsourced physicians who were all primary care physicians served as staff in the ED. As a complementary, profit-driven system there is a well-equipped but expensive private primary health care system which is not equally available to all Finnish citizens. It is funded by insurances, employers (occupational health) or patients’ own money and it takes care of a small part of the population [9].

The data of all patient visits to the physicians of Vantaa primary care ED and office-hours practices were obtained from the Graphic Finstar EHR system (GFS, Logica LTD, Helsinki, Finland). GFS provided a specific place in the EHR where the appropriate diagnosis codes of the 10th version of the International Classification of Diseases (ICD-10) could be entered during the patients’ visits to the doctors of the ED and GPs. The system assisted the doctors in finding a proper diagnosis code or allowed the doctor to use the right code for the desired diagnosis directly, as described in detail earlier [10,11]

This study was carried out directly from the patient register without identifying the patients or ED doctors. The register keepers (the health authorities of Vantaa) and the scientific ethical board of Vantaa City (TUTKE) granted permission (VD/8059/13.00.00/2016) to carry out the study.

The report generator of the GFS-system provided monthly figures for the number of different recorded diagnoses and the total number of ED doctor and GP visits. This made it possible to calculate percentages for the recording of diagnoses without identifying individual doctors or patients. For analysis, the ICD-10-

diagnoses were collected to an accuracy of three digits. Distributions of the primary diagnoses recorded in the ED system and office-hours practices were the main outcome for analysis in the present study. The 20 most common diagnoses were analysed in detail. The proportion of the visits with recorded diagnoses in both practices was the secondary outcome.

In February 2008, an electronic reminder (ER) was installed in the GFS system. After that time, the reminders were always active till the end of the follow-up period (December 2014). The GFS-system prompted the ED doctors to enter a diagnosis every time they wanted to close a case [10,11] The follow-up period started in February 2002 and ended in December 2014. In February 2015, the primary care ED was totally outsourced to Helsinki University Hospital (HUS) due to a general restructuring of the local ED system in the HUS-area.

The obtained data were analysed by comparing the recording of the diagnoses during the follow-up period. The comparisons of the proportions of the 20 most common diagnoses in EDs against office-hours practices were performed with χ^2 -test. The comparisons of yearly prevalence of those 10 ICD-10-diagnoses which were most common in both the ED and office-hour practices were performed using paired t-test or Wilcoxon signed rank-test. Differences in the process of recording diagnoses were studied with Two-Way ANOVA followed by Bonferroni test. $P < 0.05$ was considered to indicate a statistically significant difference.

Results

In the ED, there were altogether 605,000 recorded visits and 350,134 of these visits had a recorded diagnosis. In the office-hours practices, these figures were 2,473,715 and 1,527,867, respectively. Thus, during the follow-up 61.8% of the visits to the office-hours GPs and 57.8% to the doctors of the ED were marked with an ICD-10-diagnosis.

The 20 most common diagnoses covered 48.1% of the visits with recorded diagnoses in the case of the office-hour GPs, and 45.9% in the case of the doctors in the ED (Tables 1 and 2). Of these 20 ICD-10- diagnoses, acute upper respiratory infections of multiple and unspecified sites (J06), dorsalgia (M54), acute bronchitis (J20), conjunctivitis (H10), acute sinusitis (J01) and other soft tissue disorders, not elsewhere classified (M79) were more often recorded in office-hours practices (all $P < 0.001$, Tables 1 and 2).

Ten of the 20 most commonly recorded diagnoses from each list were found in practices of both office-hours GPs and doctors in the ED. In the ED, 104,176

Table 1. One hundred most commonly recorded diagnoses in the ED. ICD-10 codes, numbers of cases and percentage of recorded diagnoses are presented.

Diagnosis	ICD-10	N	%	Diagnosis	ICD-10	N	%
Acute upper respiratory infections of multiple and unspecified sites	J06	20,381	5,8	Syncope and collapse	R55	1549	0,4
Abdominal and pelvic pain	R10	16,843	4,8	Pain, not elsewhere classified	R52	1543	0,4
Suppurative and unspecified otitis media	H66	15,717	4,5	Otitis externa	H60	1532	0,4
Dorsalgia	M54	13,845	4,0	Haemorrhage from respiratory passages	R04	1526	0,4
Open wound of head	S01	9401	2,7	Convulsions, not elsewhere classified	R56	1500	0,4
Acute bronchitis	J20	9306	2,7	Urticaria	L50	1497	0,4
Other gastroenteritis and colitis of infectious and unspecified origin	A09	6917	2,0	Shoulder lesions	M75	1462	0,4
Mental and behavioural disorder due to use of alcohol	F10	6879	2,0	Acute tubulo-interstitial nephritis	N10	1457	0,4
Pain in throat and chest	R07	6520	1,9	Dislocation, sprain and strain of joints and ligaments of knee	S83	1436	0,4
Dislocation, sprain and strain of joints and ligaments at ankle and foot level	S93	6160	1,8	Dislocation, sprain and strain of joints and ligaments of shoulder girdle	S43	1430	0,4
Open wound of wrist and hand	S61	5927	1,7	Viral and other specified intestinal infections	A08	1401	0,4
Cystitis	N30	5919	1,7	Cellulitis	L03	1398	0,4
Acute tonsillitis	J03	5785	1,7	Other dorsopathies, not elsewhere classified	M53	1393	0,4
Conjunctivitis	H10	5499	1,6	Atopic dermatitis	S20	1371	0,4
Acute sinusitis	J01	5375	1,5	Other headache syndromes	G44	1358	0,4
Other soft tissue disorders, not elsewhere classified	M79	4508	1,3	Atrial fibrillation and flutter	I48	1260	0,4
Intracranial injury	S06	4240	1,2	Superficial injury of lower leg	S81	1206	0,3
Malaise and fatigue	R53	4078	1,2	Problems related to lifestyle	Z72	1160	0,3
Abnormalities of breathing	R06	3694	1,1	Other functional intestinal disorders	K59	1147	0,3
Fracture of forearm	S52	3672	1,0	Disorders of vestibular function	H81	1135	0,3
Nonsuppurative otitis media	H65	3605	1,0	Fracture of rib(s), sternum and thoracic spine	S22	1085	0,3
Dizziness and giddiness	R42	3516	1,0	Foreign body on external eye	T15	1066	0,3
Urinary tract infection, site not specified	N39	3475	1,0	Heart failure	I50	996	0,3
Pneumonia, organism unspecified	J18	3361	1,0	Angina pectoris	I20	992	0,3
Headache	R51	3221	0,9	Epilepsy	G40	980	0,3
Depressive episode	F32	3062	0,9	Schizophrenia	F20	939	0,3
Fracture at wrist and hand level	S62	3055	0,9	Open wound of ankle and foot	S91	936	0,3
Maltreatment syndromes	T74	2888	0,8	Dyspepsia	K30	923	0,3
Superficial injury of wrist and hand	S60	2768	0,8	Tachycardia, unspecified	R00	914	0,3
Acute laryngitis and tracheitis	J04	2760	0,8	Reaction to severe stress, and adjustment disorders	F43	913	0,3
Erysipelas	A46	2669	0,8	Calculus of kidney and ureter	N20	893	0,3
Acute pharyngitis	J02	2630	0,8	Internal derangement of knee	M23	889	0,3
Fever of other and unknown origin	R50	2615	0,7	Superficial injury of forearm	S50	851	0,2
Other anxiety disorders	F41	2605	0,7	Phlebitis and thrombophlebitis	I80	843	0,2
Dislocation of finger	S63	2292	0,7	Open wound of forearm	S51	813	0,2
Fracture of lower leg, including ankle	S82	2193	0,6	Delirium, not induced by alcohol and other psychoactive substances	F05	811	0,2
Asthma	J45	2024	0,6	Superficial injury of abdomen, lower back and pelvis	S30	799	0,2
Fracture of shoulder and upper arm	S42	2009	0,6	Otalgia and effusion of ear	H92	790	0,2
Migraine	G43	1919	0,5	Other disorders of fluid, electrolyte and acid-base balance	E87	767	0,2
Superficial injury of lower leg	S80	1876	0,5	Oedema, not elsewhere classified	R60	751	0,2
Nausea and vomiting	R11	1816	0,5	Diverticular disease of small intestine with perforation and abscess	K57	742	0,2
Adverse effects, not elsewhere classified	T78	1795	0,5	Chronic obstructive pulmonary disease with acute lower respiratory infection	J44	718	0,2
Superficial injury of ankle and foot	S90	1770	0,5	Keratitis	H16	692	0,2
Fracture of foot, except ankle	S92	1740	0,5	Injury of Achilles tendon	S86	686	0,2
Other cardiac arrhythmias	I49	1676	0,5	Dislocation, sprain and strain of joints and ligaments at neck level	S13	684	0,2
Essential (primary) hypertension	I10	1668	0,5	Cholelithiasis	K80	669	0,2
Superficial injury of head	S00	1594	0,5	Other enthesopathies	M77	665	0,2
Cutaneous abscess, furuncle and carbuncle of face	L02	1586	0,5	Haemorrhoids	I84	662	0,2
Influenza with pneumonia, virus not identified	J11	1583	0,5	Bacterial pneumonia, not elsewhere classified	J15	662	0,2
Cough	R05	1559	0,4	Superficial injury of shoulder and upper arm	S40	658	0,2

visits resulted in one of these 10 diagnoses. This represents a proportion of 29.7% of all the visits with a recorded diagnosis, and 17.2% of all the visits to the ED in total. In the office-hours practices, 501,662 visits were recorded with one of these 10 diagnoses. This represents a proportion of 32.8% of all the visits with

a recorded diagnosis, and 20.3% of all the visits to office-hours practices in total.

Among these 10 diagnoses, the absolute number of diagnosed patients in each diagnosis category was consistently higher in office-hours practices than in the ED (Table 3). Five out of the six most-commonly recorded

diagnoses were the same in both ED and office-hours practices. The main diagnoses with a higher proportion of ICD-10-diagnoses recordings in the ED than in the office-hours practices were abdominal and pelvic pain, other gastroenteritis and colitis of infectious and unspecified origin, and acute tonsillitis. The remaining diagnoses from the list of 20 most commonly recorded in the ED were pain in throat and chest ($N = 11,238$ or 0.73% of the recorded diagnoses in the office-hours practices), abnormalities in breathing ($N = 7177$, 0.47%), malaise and fatigue ($N = 6030$, 0.39%), cystitis ($N = 5738$, 0.38%), and mental and behavioural disorder due to use of alcohol ($N = 2992$, 0.2%). Minor trauma diagnoses, such as dislocation, sprain and strain of joints and ligaments to ankle and foot ($N = 9639$, 0.63%), fracture of forearm ($N = 4009$, 0.26%), open wound of wrist and hand ($N = 3249$, 0.21%) and open wound of head ($N = 2465$, 0.16%) were also more frequently recorded in the ED (see [Tables 1 and 2](#) for comparison).

There were occasional years when the rate of recording diagnoses was higher in one or other of the studied practices ($p < 0,001$, time X practice-interaction, Two-Way ANOVA). In the years 2003, 2004, 2005 the percentage of visits with recorded diagnoses was higher in the ED than in the office-hours practices ($p < 0.05$). In the years 2007, 2008 and 2014 this percentage was higher in the office-hours practices than in the ED ($p < 0.05$). There was, however, no general difference in the rate of recording diagnoses in visits to office-hour GPs or doctors of EDs (for practice-factor, $P = 0.158$). The recording of diagnoses was enhanced after the years 2002–2007, e.g., after implementing ERs, in both practices studied (for time-factor, $P < 0.001$, [Figure 1](#)).

Discussion

The most commonly recorded diagnoses were practically the same in the ED and office-hours practices. There were some diagnoses, mostly concerning minor traumas, which were primarily recorded in the ED but not to the same extent in the office-hours practices. Certain symptomatic diagnoses (group-R in ICD-10-classification) were also more often recorded in the ED. The ERs enhanced recording of diagnoses equally well in the ED and office-hours practices.

Although data from the private sector are missing, the data of the present work are comprehensive. It is also quite extensive and therefore it compensates many putative biases of this type of study. It contains every diagnosis recorded in office-hours visits to GPs or ED doctors between 2002 and 2014. Although the data are relatively old, they are still the most relevant that can

be obtained in Finland because reasons to visit an ED of GP and/or diagnoses are not often recorded in Finnish primary care. In fact, more than one-third of the encounters had no diagnosis code in the present study. This is not unusual in Finnish primary care. According to the very latest official Finnish statistics [12] less than two-thirds of visits to Finnish primary health care include the reason for the visit or the diagnosis. Furthermore, the reason for the visit is not recorded in structural manner and therefore this data is difficult to analyse. Naturally, the present data does not exclude the possibility that the given diagnosis is not adequate, as has been suggested to be the case in about 15% of the primary care doctor consultations [13]. There is always a slight possibility that internal validity of diagnoses varies when comparing those made in the ED and office-hours practices. Using International Classification for Primary Care (ICPC) might also give a slightly different distribution in diagnostics. However, Finnish doctors in primary care do not frequently use ICPC. We do not know the ultimate reason. One factor could be that training of physicians specialised in general practicing (called yleislääketieteen erikoislääkäri in Finnish) takes also place in secondary and tertiary health care. ICD-10 is solely used in specialised health care. Furthermore, the Social Insurance Institution of Finland (KELA), the main financing institute of Finnish health care, uses mainly ICD-10-codes. Therefore, ICD-10 may be more used than ICPC in Finnish primary care.

The analysis was carried out at a 3-digit aggregated level of ICD-10 and this caused some loss of details in the data. Considering the accuracy of the ICD-10-code we had to make a compromise to keep the sizes of the different diagnosis-related groups adequate for statistical comparisons.

The lack of data about individual doctors and patients is also a flaw of this study. The lack of this data inhibits us from drawing conclusions about whether there were doctors who regularly recorded inappropriate diagnoses despite the ERs. Furthermore, recording diagnoses does not necessarily mean that the clinician would take any actions to treat the problem he/she observed [14]. Thus, treating some of the diagnosed cases in the other of the settings studied here may be suboptimal for some patients. The present results can with certainty be applied only to primary health care. Furthermore, patients will often self-select to office-hours primary care if they perceive a minor problem and to the ED, if major. Thus, the patient-perceived acuity and severity are not always the same although, in the end, the diagnosis itself may be. Furthermore, we do not know to which extent the

Table 2. One hundred most commonly recorded diagnoses in office-hours GPs' practices. ICD-10 codes, numbers of cases and percentage of recorded diagnoses are presented.

Diagnosis	ICD-10	N	%	Diagnosis	ICD-10	N	%
Acute upper respiratory infections of multiple and unspecified sites	J06	142,039	9,3	Haemorrhoids	I84	6205	0,4
Dorsalgia	M54	81,174	5,3	Fever of other and unknown origin	R50	6119	0,4
Suppurative and unspecified otitis media	H66	60,288	3,9	Malaise and fatigue	R53	6030	0,4
Acute sinusitis	J01	50,089	3,3	Medical observation and evaluation for suspected diseases and conditions	Z03	5847	0,4
Acute bronchitis	J20	48,219	3,2	Cystitis	N30	5738	0,4
Essential (primary) hypertension	I10	47,373	3,1	Other functional intestinal disorders	K59	5572	0,4
Abdominal and pelvic pain	R10	34,660	2,3	Localised swelling, mass and lump of skin and subcutaneous tissue	R22	5489	0,4
Non-insulin-dependent diabetes mellitus	E11	32,740	2,1	Other cardiac arrhythmias	I49	5217	0,3
Conjunctivitis	H10	32,406	2,1	Seborrhoeic keratosis	L82	5209	0,3
Depressive episode	F32	27,040	1,8	Dyspepsia	K30	5079	0,3
Other soft tissue disorders, not elsewhere classified	M79	25,877	1,7	Examination and observation for unspecified reason	Z04	4926	0,3
Gonarthrosis [arthrosis of knee]	M17	23,721	1,6	Synovitis and tenosynovitis	M65	4820	0,3
Shoulder lesions	M75	22,843	1,5	Erysipelas	A46	4811	0,3
Asthma	J45	20,524	1,3	Pneumonia, organism unspecified	J18	4768	0,3
Cough	R05	16,979	1,1	Dermatophytosis	B35	4724	0,3
Other dorsopathies, not elsewhere classified	M53	15,269	1,0	Other disorders of urinary system	N39	4624	0,3
Other gastroenteritis and colitis of infectious and unspecified origin	A09	13,994	0,9	Gastro-oesophageal reflux disease	K21	4414	0,3
Other anxiety disorders	F41	13,847	0,9	Fibroblastic disorders	M72	4391	0,3
Otitis externa	H60	13,090	0,9	Dislocation, sprain and strain of joints and ligaments at wrist and hand level	S63	4331	0,3
Acute tonsillitis	J03	12,916	0,8	Fracture at wrist and hand level	S62	4255	0,3
Examination and encounter for administrative purpose	Z02	12,105	0,8	Hordeolum and chalazion	H00	4196	0,3
Other enthesopathies	M77	11,953	0,8	Other hypothyroidism	E03	4088	0,3
Pain in throat and chest	R07	11,238	0,7	Other chronic obstructive pulmonary disease	J44	4082	0,3
Acute pharyngitis, unspecified	J02	9672	0,6	Other inflammation of vagina and vulva	N76	4021	0,3
Dislocation, sprain and strain of joints and ligaments at ankle and foot level	S93	9639	0,6	Fracture of forearm	S52	4009	0,3
Other joint disorders, not elsewhere classified	M25	9528	0,6	Hyperplasia of prostate	N40	4003	0,3
Atopic dermatitis	L20	9392	0,6	Coxarthrosis [arthrosis of hip]	M16	3870	0,3
Soft tissue disorders related to use, overuse and pressure	M70	9350	0,6	Oedema, not elsewhere classified	R60	3714	0,2
Nonsuppurative otitis media	H65	9161	0,6	Gout	M10	3699	0,2
Nonorganic sleep disorders	F51	8919	0,6	Dislocation, sprain and strain of joints and ligaments of knee	S83	3641	0,2
Cellulitis	L03	8775	0,6	Impetigo	L01	3596	0,2
Vasomotor and allergic rhinitis	J30	8648	0,6	Superficial injury of wrist and hand	S60	3541	0,2
Headache	R51	8507	0,6	Diseases of capillaries	I78	3539	0,2
Atrial fibrillation and flutter	I48	8072	0,5	Acne	L70	3504	0,2
Other headache syndromes	G44	8063	0,5	Adverse effects, not elsewhere classified	T78	3371	0,2
Acute laryngitis and tracheitis	J04	8046	0,5	Superficial injury of lower leg	S80	3347	0,2
Disorders of lipoprotein metabolism and other lipidaemias	E78	7726	0,5	Enthesopathies of lower limb, excluding foot	M76	3337	0,2
Other dermatitis	L30	7636	0,5	Open wound of wrist and hand	S61	3249	0,2
Internal derangement of knee	M23	7575	0,5	Recurrent depressive disorder	F33	3236	0,2
Influenza with pneumonia, virus not identified	J11	7513	0,5	Superficial injury of ankle and foot	S90	3182	0,2
General examination and investigation of persons without complaint and reported diagnosis	Z00	7208	0,5	Disorders of vestibular function	H81	3125	0,2
Reaction to severe stress, and adjustment disorders	F43	7193	0,5	Urticaria	L50	3114	0,2
Dyspnoea	R06	7177	0,5	Seropositive rheumatoid arthritis	M05	3086	0,2
Cutaneous abscess, furuncle and carbuncle of face	L02	7161	0,5	Mononeuropathies of upper limb	G56	3052	0,2
Dizziness and giddiness	R42	7130	0,5	Psoriasis	L40	3046	0,2
Pain, not elsewhere classified	R52	6969	0,5	Nail disorders	L60	3020	0,2
Other special examinations and investigations of persons without complaint or reported diagnosis	Z01	6635	0,4	Otalgia and effusion of ear	H92	3020	0,2
Migraine	G43	6360	0,4	Angina pectoris	I20	3014	0,2
Insulin-dependent diabetes mellitus	E10	6304	0,4	Mental and behavioural disorders due to use of alcohol	F10	2992	0,2
Chronic ischaemic heart disease	I25	6270	0,4	Melanocytic naevi	D22	2984	0,2

patients are the same in the EDs and office-hours practices.

R-codes in the ICD-10-system were recorded more often in the ED than in the office-hours practices. The physicians of the ED have greater time pressure in

several aspects than those in the office-hours practices. It is possible that the reason for excessive use of R-codes in the ED could be that the physicians tried to find those who were severely ill and required more specific diagnoses for acute treatment. If they found out

Table 3. Comparisons of yearly prevalence of the 10 most often recorded diagnoses common to both ED and office-hours practices. Mean±Standard Deviation or Median (25%-75% Interquartile Range) are shown. ** stands for $p < 0.01$ or *** for $p < 0.001$ in paired t-test or Wilcoxon signed rank-test (if the median is shown as an estimate).

ICD-Code	Diagnosis	Office-Hour GPs N % of visits with diagnosis % of all visits	ED doctors N % of visits with diagnosis % of all visits
J06	Acute upper respiratory infections of multiple and unspecified sites	10,926 ± 2073 9.86 ± 1.95 5.78 ± 1.28	1568 ± 652*** 6.04 ± 2.59*** 3.29 ± 0.74***
M54	Dorsalgia	6244 ± 1422 5.64(4.84–6.33) 3.31 ± 0.87	1065 ± 221*** 4.24(3.47–4.70)*** 2.36 ± 0.56***
H66	Suppurative and unspecified otitis media	4638 ± 979 4.16 ± 0.77 2.46 ± 0.59	1209 ± 383*** 4.71 ± 1.72 2.57 ± 0.37
J01	Acute sinusitis	3853 ± 477 3.62 ± 1.12 2.03 ± 0.29	723 ± 224*** 1.63 ± 1.18*** 0.81 ± 0.42***
J20	Acute bronchitis	3709 ± 732 3.46 ± 1.04 1.96 ± 0.42	716 ± 376*** 2.79 ± 1.49** 1.47 ± 0.45**
R10	Abdominal and pelvic pain	2666 ± 1268 2.17 ± 0.31 1.43 ± 0.72	1296 ± 566*** 4.66 ± 1.27*** 3.13 ± 1.89***
H10	Conjunctivitis	2493 ± 646 2.21 ± 0.38 1.32 ± 0.38	423 ± 145*** 1.68 ± 0.72** 0.90 ± 0.24**
M79	Other soft tissue disorders, not elsewhere classified	1991 ± 1272 1.55 ± 0.52 1.07 ± 0.71	347 ± 241*** 1.20 ± 0.66*** 0.87 ± 0.72***
A09	Other gastroenteritis and colitis of infectious and unspecified origin	1076 ± 148 1.10 ± 0.33 0.57 ± 0.08	532 ± 121*** 2.02 ± 0.43*** 1.18 ± 0.28***
J03	Acute tonsillitis	950(839–1169) 0.92 ± 0.29 0.52 ± 0.11	351(265–593)*** 1.78 ± 1.10** 0.89 ± 0.31**

Proportion of visits with recorded diagnoses in office-hours practices and Emergency Departments 2002–2014

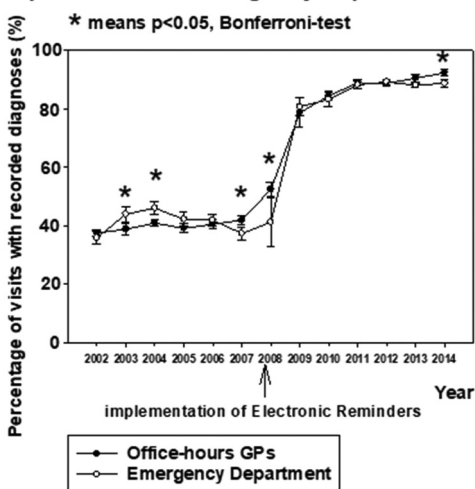


Figure 1. Yearly proportions of visits with recorded diagnosis in the ED and in office-hours practices 2002–2014. Mean and 95% Confidence Intervals (brackets) are shown.

that the patient's case did not require emergency actions they did not necessarily perform very specific diagnostics but aimed to guide the patient to the office-hours physicians. Thus, they left more refined diagnostics to office-hours colleagues who had more time and who were responsible for continuing with the treatment in any case if the problem was not totally solved in the ED.

According to Finnish guidelines for GPs [15], almost all of the 10 most commonly recorded diagnoses in the ED and office-hours practices, except severe cases of abdominal and pelvic pain, might have been treatable solely in the office-hours practices. As continuity of care is seldom applied in EDs when compared with office-hours primary care [4–6], organising distribution of work differently

between these two health care providers might enhance this continuity [4,16]. It is not only the continuity of care by certain individual care providers which matters but also provider-adjusted regularity of the contacts [17]. To support this view, a large global study (34 countries during the years 2011 to 2013) found that adequate access to primary care decreased ED visits [18]. Similarly, better access to primary care decreased the use of EDs by older adults in a large US study [19]. Functionally adequate primary care may also improve the efficacy of ED functions as strong and advanced Dutch primary care prevented long ED stays in that country, in comparison with other western countries [20]. Thus, better communication and planning between EDs and primary care might improve both continuity and quality of care [21,22]. This means better communication in the redirecting of patients and division of labour and in transferring of individual patient data.

Disregarding the putative organisational improvements in enhancement of functions of office-hours primary care, there will always be some persons who do not appreciate the possibility for continuity of care provided by primary health care. There are reports suggesting that the preference shown by patients for using EDs is not necessarily always caused by lack of primary care nor by the time of day that the complaint began [23]. It may thus be that EDs may also have “customers of their own” and that those patients are not likely to use ordinary daytime primary health care services for various miscellaneous reasons [8,24]. These reasons may be, for example, social [25] or related to the location of the ED [26,27]. Simple convenience factors may also increase the use of EDs [27].

According to the present study, the majority of patients visiting the doctors of EDs and office-hours GPs consists of quite similar patient material. The present data based on recorded diagnoses suggest that maximally about 30% of the visits treated in the ED could be left

to the office-hours GPs where continuity of care could be better guaranteed [4–6]. Thus, part of ED treatments could be performed by PCPs as well, but this should be validated in prospective studies in the future.

Moorin RE, Youens D, Preen DB, Harris M, Wright CM. Association between continuity of provider-adjusted regularity of general practitioner contact and unplanned diabetes-related hospitalisation: a data linkage study in New South Wales, Australia, using the 45 and Up Study cohort. *BMJ Open* 2019;9:e027158.

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Data availability statement

The data is available from the corresponding author with a reasonable request.

Disclosure of potential conflicts of interest

No potential conflict of interest was reported by the author(s).

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