Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Primary-care-based episodes of care and their costs in a three-month follow-up in Finland

J. Heinonen[a], T.H. Koskela[b], E. Soini[c] and O.P. Ryynänen[d,e]

[a]School of Medicine, University of Tampere, Tampere, Finland; [b]Department of General Practice, University of Tampere, Finland; [c]ESiOR Oy, Kuopio, Finland; [d]Faculty of Health Sciences, University of Eastern Finland, Finland; [e]Unit of Primary Health Care, Kuopio University Hospital, Finland

ABSTRACT

Objective To explore patient characteristics, resource use, and costs related to different episodes of care (EOC) in Finnish health care.
Design Data were collected during a three-month prospective, non-randomized follow-up study (Effective Health Centre) using questionnaires and an electronic health record.
Setting Three primary health care practices in Pirkanmaa, Finland.
Subjects Altogether 622 patients were recruited during a one-week period. Inclusion criteria: the patient had a doctor's or nurse's appointment on the recruiting day and agreed to participate. Exclusion criteria: patients visiting a specialized health guidance clinic for pregnant women, children, and mothers.
Main outcome measures Patient characteristics, resource use, and costs based on the ICPC-2 EOC classification.
Results On average, the patients had 1.22 EOCs during the three months. Patient characteristics and resource use differed between the EOC chapters. Chapter L, "Musculoskeletal", had the most episodes (17%). The most common (8%) single EOC was "upper respiratory infection". The mean cost of of an episode (COE) was €389.56 (standard error 61.11) and the median COE was €165.00 (interquartile range €118.46–288.56) during the three-month follow-up. The most expensive chapter was K, "Circulatory", with a mean COE of €909.85. The most expensive single COE was in chapter K, €32 545.56. The most expensive 1% of the COEs summed up covered 36% of the total COEs.
Conclusion Patient characteristics, resource use, and costs differed between the ICPC-2 chapters, which could be taken into account in service planning and pricing. Future studies should incorporate more specific diagnoses, larger data sets, and longer follow-up times.

KEY POINTS

- The most common episodes were under the ICPC-2 "Musculoskeletal" chapter, but the highest mean and single-episode costs were related to the "Circulatory" chapter.
- The mean (median) cost of episodes that started in primary care was €390 (€165) during the three-month follow-up.
- Patient characteristics, resource use, and costs differed significantly between the ICPC-2 chapters. The most expensive 1% of the episodes covered 36% of the total costs of all the episodes.

Introduction

An episode of care (EOC) in primary health care (PHC) is defined as a health problem needing testing, diagnosis, care, or follow-up from its first presentation by the patient to a family doctor, nurse, or acute policlinic until completion of the last health care (HC) contact related to it [1].

An EOC differs from an episode of disease – a health problem from its onset through to its resolution – and also from an episode of illness, i.e. a period during which a person suffers from symptoms [2]. The cost of an episode (COE), disease, illness, or care should be differentiated, because they apply to different populations and have different contents.

An EOC is the appropriate unit for assessing important attributes of PHC such as continuity, coordination, outcomes, and satisfaction [3]. An EOC can be defined with an International Classification of Primary Care (ICPC) episode title code [1]. The ICPC was developed by the WONCA (World Organization of Family Doctors) International Classification Committee and designed to

describe the three basic elements of an EOC in publicly funded HC: reason for encounter (RFE), diagnostic label, and diagnostic and therapeutic intervention [4–6]. The last diagnosis made (i.e. diagnostic label) during an EOC is the current episode title [1], which may vary over time. It should not be confused with the RFE, an agreed statement of the reason(s) why a person enters the HC system [1,7–9].

Due to comorbidity, different episodes frequently exist at the same time [2]. Okkes and colleagues noticed that differences in the annual number of EOCs and encounters per patient were small between countries. However, there were large differences in resource consumption per EOC. The most prominent differences were related to prescriptions of antibiotics, oral contraceptives, and cardiovascular medication, and treatment of gastrointestinal tract complaints. [12] These together with international price differences (unit costs) in HC services can cause large differences in the COEs between countries and demonstrate the importance of national COE evaluations.

There are no previous publications dealing with ICPC-2-based EOCs in Finland. COEs are relatively unknown in Finland and elsewhere. Due to limited resources, and for the purposes of health economic evaluation, the types of EOCs appearing in PHC and related resource consumption and costs are becoming important. The lack of published knowledge related to PHC resources has been noticed in Finnish studies [13–22]. However, just a few Finnish studies have assessed disease-based PHC costs based on relatively comprehensive data [13,22–24], and usually with a focus on a single patient group without EOCs.

The aim of this study was to explore patient characteristics, resource use, and costs related to different ICPC-2-based EOCs in the Finnish PHC setting during a three-month time period.

Material and methods

The Effective Health Centre (EHC) study (with funding from the Pirkanmaa Hospital District) was a prospective three-month follow-up study (so-called institutional study) carried out during 2011 in three different PHC practices in Pirkanmaa, Finland [25]. The study sought to recruit as many patients as possible during a one-week period in each practice. Patients with an appointment with a nurse or a doctor on the recruiting day were included, and patients visiting a specialized health guidance clinic for pregnant women, children, and mothers were excluded. The recruitment date was the starting point (index day) for a three-month follow-up period of EOCs.

In total, 622 patients and 32 doctors participated in the EHC study. The study sample includes 41% (622/1520) of all the patients who had an appointment in the study practices during the recruitment phase [25].

The patient- and HC-personnel-reported data were collected using tailored questionnaires. If they agreed to participate, the patients filled in a questionnaire given to them by a research assistant before or after their appointment. In addition, data were collected with patient consent from an electronic health record (EHR).

The EOCs were divided into main groups (A, B, D, etc.) based on the ICPC-2 chapter title codes. The episodes were labelled with the last diagnosis made during the three-month EOC, which was the EOC chapter used in the analysis [1]. Resource use (visits in PHC and secondary health care (SHC), examinations, laboratory tests, referrals, treatments, and hospitalizations) (see Table 3) was collected from EHR retrospectively by two researcher physicians who read the patient EHRs from the three-month follow-up period. The resources are presented as means together with their standard errors (SE), because the mean is the expected value of distribution [26] and means can be used in arithmetic calculations (e.g. summed up).

Resource costing was done from the perspective of the HC payer, and the COEs include only direct HC costs. Unit costs were based on the official Pirkanmaa health district, Tampere health centre, and Fimlab laboratory list prices (tariffs) from 2013 (Supplementary Appendix I available online). The data were checked for general consistency and any illogical results were checked and corrected. The ICPC-2-based costs were bootstrapped [14] to establish robust confidence intervals for skewed distributions. SPSS™ V20 (IBM Corp., Armonk, NY, USA) and Stata™ V10 (Stata Corp LR., College Station, TX, USA) statistical software were used in the data analysis.

Study permission was granted by the research committee of the City of Tampere and the chief physician of one clinic not located in Tampere. Due to the nature of this study, there was no need to apply for permission from the hospital district's ethics committee.

Results

EOCs were determined for 99% (618/622) of the study patients. The patients were typical Finnish HC patients regarding their age, occupational status, and chronic diseases (Table 1). The mean age was 49 years (median 55.0, interquartile range IQR 27.0–69.5). A long-term disease was the RFE for 31% (193) of the patients.

The 618 patients had 752 EOCs altogether. On average, the patients had 1.22 EOCs. The number

Table 1. Patient characteristics of the included patients ($n = 618$: Patients with an episode of care).[1]

Characteristic	
Gender, n (%):	618
Female	381 (62)
Age (mean age 48.60 years, standard error 0.98), n (%):	617
<30	162 (26)
30–64	244 (39)
>64	211 (34)
Housing, n (%):	538
With a partner	247 (46)
With children	25 (5)
With a partner and children	66 (12)
With others	32 (6)
Alone	168 (31)
Employment, n (%):	538
Working full time or part time	153 (28)
Unemployed	66 (12)
Retired	262 (49)
Other, e.g. student, childcare at home	56 (10)
Occupation, n (%):	538
Employee	262 (49)
An entrepreneur	61 (11)
An agricultural entrepreneur	4 (1)
A lower-level clerical worker	74 (14)
An upper-level clerical worker	65 (12)
Other	69 (13)
Financial situation, n (%):	538
Good	96 (18)
Fairly good	119 (22)
Average	215 (40)
Fairly poor	78 (14)
Poor	27 (5)
Chronic disease, n (%):	608
At least one	362 (60)
Hypertension	170 (28)
Osteoarthritis (hip or knee)	91 (15)
Depression	48 (8)
Diabetes	70 (12)
Asthma or chronic obstructive pulmonary disease	71 (12)
Heart disease	88 (14)
Cancer	20 (3)

Note: [1]Proportion is counted from the available data.

of EOCs divided into ICPC-2 chapters is presented in Figure 1. The greatest number of EOCs (130) was in the "Musculoskeletal" chapter. The most common (63) single EOC was "upper respiratory infection".

According to a doctor's or nurse's judgement, the phase of the primary EOC on the recruiting day was labelled as a "new episode" for 52% (326) of the patients that presented to HC for the first time for this new health problem, and the rest of the episodes were labelled as a "pre-existing episode" presenting with a problem that had required HC previously. Altogether 40% (304) of the EOCs continued after the follow-up period. Table 2 gives the patients' characteristics by EOC chapter.

Table 3 lists the resources used to calculate mean and total costs of the EOCs. The mean cost of the EOCs was €389.56 (SE 61.11) and the median was €165.00 (IQR €118.46–288.56) during the three-month follow-up. The mean costs and 95% confidence intervals by EOC chapter are presented in Figure 2. The most expensive

group, on average, was "Circulatory". The mean cost of PHC per episode was €237.21. The exact costs and arithmetic confidence intervals are available (Supplementary Appendix II available online).

The most expensive 1% of the EOCs covered 36% (€105 787.45/€293 335.73) of the total costs in the data. The most expensive single episode was in the "Circulatory" chapter: €32 545.56.

Discussion

Considerable differences were found in patient characteristics, resource use, and costs related to different EOCs. The most expensive 1% of the EOCs covered 36% of the total costs, which may be of interest to the Finnish municipal payer for HC services. The highest number of episodes was "Musculoskeletal". However, the highest mean and single-episode costs were related to chapter K, "Circulatory". The dual source of costs (PHC and SHC) is an important cause of variation.

The benefits of this study are the precise time during which the data were collected, the amount of exact information collected from the EHR together with the patient- and clinician-reported data, and the use of valid unit cost data. By these methods it was possible to obtain accurate descriptive costs based on the ICPC-2 EOC titles. For example, some register studies ignore the exact data coverage time, i.e. some of the patients are lost during follow-up.

However, this study had some limitations. First, the data-collection period was limited to three months. An EOC is a longitudinal concept and this study may be regarded as cross-sectional when considering long-term EOCs. Since the time frame was relatively short, there was a residual risk that some EOC follow-ups were censored. However, this study was initially targeted to assess the short-term cost-effectiveness of different types of PHC service production systems. A longer follow-up period or a larger data set was not feasible due to the accurate and detailed data collection required and the lack of data-collection resources and EHR data. Furthermore, a three-month follow-up can be suitable for capturing the costs of most acute short-term EOCs and also the acute phase of long-term EOCs.

Second, the data were collected at the beginning of the year when respiratory infections are overrepresented, which, however, should not bias the resource use or mean costs of the EOC chapter. The problem related to changes in the patient material can be corrected in the future by choosing a one-year follow-up period and follow-ups with a predefined patient
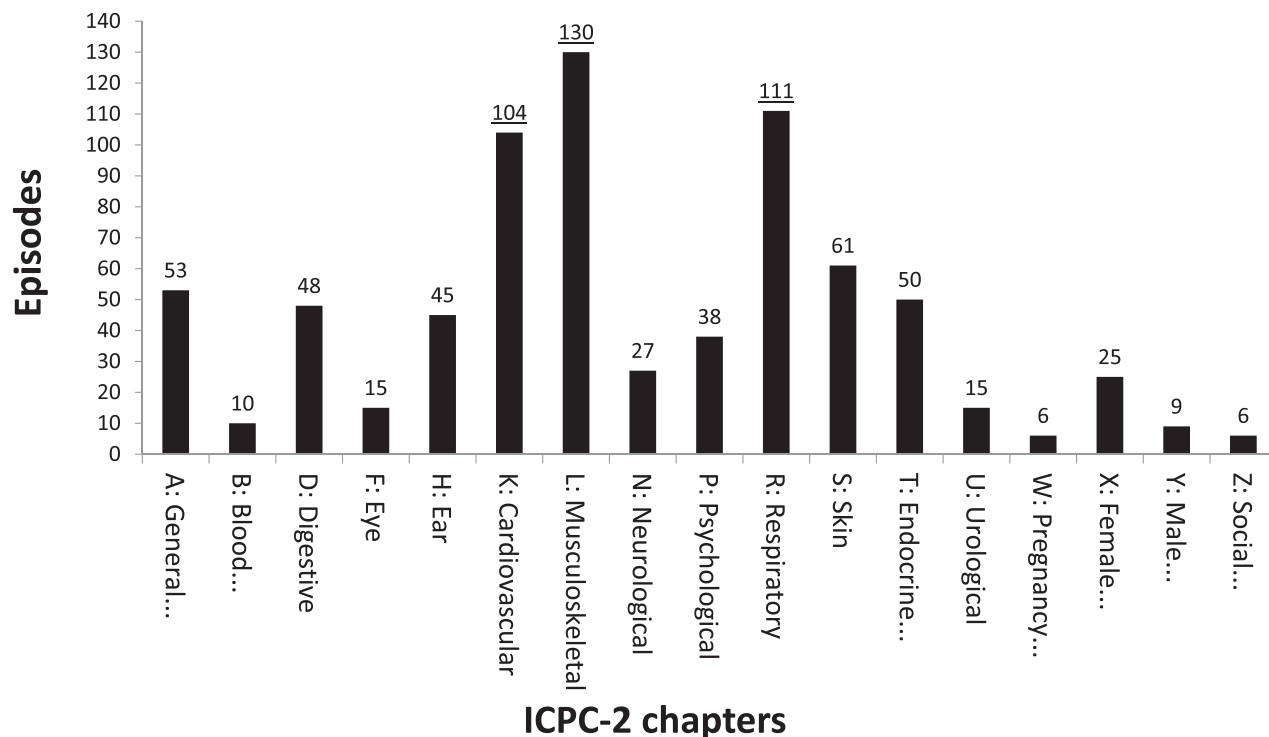
Figure 1. The number of episodes of care divided into ICPC-2 chapters.

Table 2. Episode characteristics.[1]

ICPC-2 chapter (n)	Mean age (standard error)	Female (%)	At least one emergency or other urgent visit (%)	At least one chronic disease (%)	A pre-existing episode (%)
A: General and Unspecified (53)	52.6 (3.4)	36 (68)	7 (13)	30 (57)	25 (47)
B: Blood, Blood Forming Organs and Immune Mechanism (10)	60.1 (5.6)	7 (70)	0 (0)	7 (70)	5 (50)
D: Digestive (48)	46.2 (3.6)	32 (67)	8 (17)	30 (63)	15 (31)
F: Eye (15)	44.6 (6.8)	8 (53)	2 (13)	7 (47)	8 (53)
H: Ear (45)	36.1 (4.6)	26 (58)	6 (13)	14 (31)	26 (58)
K: Cardiovascular (104)	66.2 (1.4)	65 (63)	7 (7)	80 (77)	81 (78)
L: Musculoskeletal (130)	52.3 (1.7)	82 (63)	18 (14)	88 (68)	82 (63)
N: Neurological (27)	55.1 (4.6)	18 (67)	2 (7)	19 (70)	13 (48)
P: Psychological (38)	48.0 (3.3)	24 (63)	0 (0)	27 (71)	25 (66)
R: Respiratory (111)	33.4 (2.2)	68 (61)	23 (20)	45 (41)	36 (32)
S: Skin (61)	51.4 (2.9)	39 (64)	6 (10)	38 (62)	23 (38)
T: Endocrine/Metabolic and Nutritional (50)	62.2 (2.3)	25 (50)	0 (0)	43 (86)	43 (86)
U: Urological (15)	59.5 (4.7)	10 (67)	3 (20)	10 (67)	6 (40)
W: Pregnancy, Childbearing, Family Planning (6)	28.8 (3.4)	6 (100)	0 (0)	3 (50)	1 (17)
X: Female Genital (25)	48.6 (3.9)	25 (100)	1 (4)	14 (56)	9 (36)
Y: Male Genital (9)	50.9 (10.5)	0 (0)	0 (0)	5 (56)	5 (56)
Z: Social Problems (6)	77.8 (5.4)	4 (67)	0 (0)	6 (100)	3 (50)
All episodes (753)	50.5 (0.9)	475 (63)	83 (11)	466 (62)	406 (54)

Notes: [1]The episodes are represented through the patients they include. Note that a patient may belong to several episodes (range 1–3). Thus, for example, the mean age of the cases in the episodes does not match up to the mean age of the patients.

entering–exiting timeline [22]. Third, not all the episodes lasted for the entire follow-up period. However, they did not restart, and most acute conditions resolve within three months. Thus, the resource and cost data are valid for the expected three-month timeline. This should be accounted for when the results are interpreted or when resource use is extrapolated.

Fourth, the recruiting method prevented full coverage of all available patients. Despite this, 41% of the patients participated, which is acceptable coverage for a study including patient- and clinician-reported data. Furthermore, due to patient-reported outcomes, written consent was needed. This may have caused some selection bias, where some patient groups systematically

Table 3. Means and standard errors (in parentheses) of the resources.[1]

Resource	Primary care visits				Primary care calls		Primary care ward	Examinations			Secondary care		
ICPC chapter	Doctor	Nurse	On-call doctor	Other[2]	Doctor	Nurse	Days	Labora-tory tests	Imaging[3]	Special[4]	Visits[5]	Ward days	Procedures
A	0.7925 (0.1122)	0.8679 (0.2302)	0.1698 (0.0645)	0.0000 (0.0000)	0.4151 (0.1125)	0.1132 (0.0695)	0.2453 (0.2453)	3.1132 (0.6684)	0.1509 (0.0681)	0.0943 (0.0487)	0.0377 (0.0264)	0.3585 (0.3585)	0.0189 (0.0189)
B	0.9000 (0.1795)	0.7000 (0.2603)	0.0000 (0.0000)	0.0000 (0.0000)	0.4000 (0.1633)	0.0000 (0.0000)	0.0000 (0.0000)	2.8000 (1.4283)	0.3000 (0.2134)	0.1000 (0.1000)	0.1000 (0.1000)	0.0000 (0.0000)	0.0000 (0.0000)
D	1.1042 (0.1124)	0.1875 (0.0643)	0.2083 (0.0727)	0.0000 (0.0000)	0.4375 (0.1070)	0.2708 (0.0976)	0.0000 (0.0000)	4.0417 (0.7372)	0.1250 (0.0567)	0.1250 (0.0482)	0.1042 (0.0536)	0.0417 (0.0417)	0.0417 (0.0292)
F	1.1333 (0.13333)	0.0667 (0.0667)	0.1333 (0.0909)	0.0000 (0.0000)	0.0000 (0.0000)	0.1333 (0.1333)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0667 (0.0667)	0.2000 (0.1069)	0.0000 (0.0000)	0.0000 (0.0000)
H	0.9778 (0.1167)	0.4444 (0.1033)	0.2000 (0.0985)	0.0000 (0.0000)	0.1556 (0.0546)	0.0667 (0.0492)	0.0000 (0.0000)	0.0889 (0.0429)	0.0000 (0.0000)	0.0667 (0.0376)	0.1111 (0.0571)	0.0000 (0.0000)	0.0222 (0.0222)
K	1.2115 (0.0793)	0.6154 (0.1025)	0.0865 (0.0338)	0.0000 (0.0000)	0.3558 (0.0772)	0.3269 (0.1698)	0.1250 (0.0882)	4.6538 (0.5134)	0.0769 (0.0296)	0.0865 (0.0309)	0.0481 (0.0211)	0.5385 (0.3811)	0.0481 (0.0317)
L	1.2769 (0.0927)	0.2077 (0.0564)	0.2154 (0.0608)	0.3615 (0.1048)	0.4077 (0.0662)	0.0462 (0.0215)	0.0000 (0.0000)	1.1231 (0.3064)	0.5154 (0.0759)	0.0231 (0.0132)	0.1846 (0.0359)	0.0000 (0.0000)	0.0154 (0.0108)
N	1.1481 (0.1158)	0.1111 (0.0616)	0.1111 (0.0815)	0.3333 (0.3333)	0.3704 (0.2274)	0.0741 (0.0741)	0.0000 (0.0000)	2.2593 (1.1076)	0.2963 (0.1171)	0.1481 (0.0697)	0.2222 (0.1111)	0.0000 (0.0000)	0.0000 (0.0000)
P	1.5000 (0.1799)	1.3421 (0.6189)	0.0000 (0.0000)	0.5000 (0.2223)	0.4211 (0.1443)	0.1316 (0.0858)	0.0000 (0.0000)	1.7632 (0.5787)	0.0000 (0.0000)	0.0526 (0.0367)	0.1053 (0.0505)	0.0000 (0.0000)	0.0000 (0.0000)
R	1.1351 (0.1004)	0.4234 (0.0608)	0.2793 (0.0560)	0.0090 (0.0090)	0.1712 (0.0477)	0.0991 (0.0338)	0.0000 (0.0000)	1.2162 (0.2989)	0.1802 (0.0465)	0.0180 (0.0127)	0.0811 (0.0290)	0.0631 (0.0547)	0.0090 (0.0090)
S	0.9672 (0.0809)	1.3770 (0.5090)	0.0984 (0.0385)	0.0000 (0.0000)	0.0984 (0.0385)	0.0492 (0.0279)	0.1311 (0.1312)	0.6230 (0.3585)	0.0164 (0.0164)	0.0164 (0.0164)	0.0656 (0.0396)	0.4426 (0.3685)	0.0164 (0.0164)
T	1.0000 (0.0756)	1.1400 (0.2374)	0.0000 (0.0000)	0.1000 (0.0429)	0.3000 (0.0714)	0.1400 (0.0640)	0.0000 (0.0000)	4.5600 (0.5556)	0.0200 (0.0200)	0.0200 (0.0200)	0.0600 (0.0339)	0.0000 (0.0000)	0.0200 (0.0200)
U	0.7333 (0.1817)	0.5333 (0.1652)	0.2000 (0.1069)	0.0000 (0.0000)	0.2667 (0.1182)	0.7333 (0.5387)	0.0000 (0.0000)	2.4667 (0.5845)	0.2000 (0.1069)	0.1333 (0.0909)	0.1333 (0.0909)	0.0000 (0.0000)	0.1333 (0.1333)
W	1.1667 (0.1667)	0.1667 (0.1667)	0.0000 (0.0000)	0.0000 (0.0000)	0.1667 (0.1667)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.1667 (0.1667)	0.0000 (0.0000)	0.1667 (0.1667)
X	1.0000 (0.1000)	0.3200 (0.1800)	0.0400 (0.0400)	0.0000 (0.0000)	0.2000 (0.1000)	0.0000 (0.0000)	0.0000 (0.0000)	1.1200 (0.4333)	0.6000 (0.1732)	0.2000 (0.0817)	0.2400 (0.1046)	0.0000 (0.0000)	0.0400 (0.0400)
Y	1.2222 (0.1470)	0.3333 (0.2357)	0.0000 (0.0000)	0.0000 (0.0000)	0.1111 (0.1111)	0.3333 (0.3333)	0.0000 (0.0000)	0.6667 (0.1667)	0.1111 (0.1111)	0.0000 (0.0000)	0.1111 (0.1111)	0.0000 (0.0000)	0.0000 (0.0000)
Z	1.0000 (0.2582)	0.3333 (0.3333)	0.0000 (0.0000)	0.0000 (0.0000)	0.1667 (0.1667)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.1667 (0.1667)	0.0000 (0.0000)	0.0000 (0.0000)
All	1.1155 (0.0315)	0.5817 (0.0620)	0.1474 (0.0177)	0.1076 (0.0252)	0.2948 (0.0245)	0.1408 (0.0292)	0.0452 (0.0236)	2.1527 (0.1503)	0.1873 (0.0196)	0.0598 (0.0090)	0.1089 (0.0125)	0.1474 (0.0662)	0.0239 (0.0067)

Notes: [1]The number of episodes in each chapter is shown in Table 2. [2]Includes visits to a physiotherapist, dietician, foot therapist, and mental health worker. [3]Includes radiography, ultrasonography, and MRI. [4]Includes e.g. spirometry, tolerance test, Holter monitoring, and scopes. [5]Includes visits to the hospital emergency room, a dispensary outpatient clinic and a specialist.
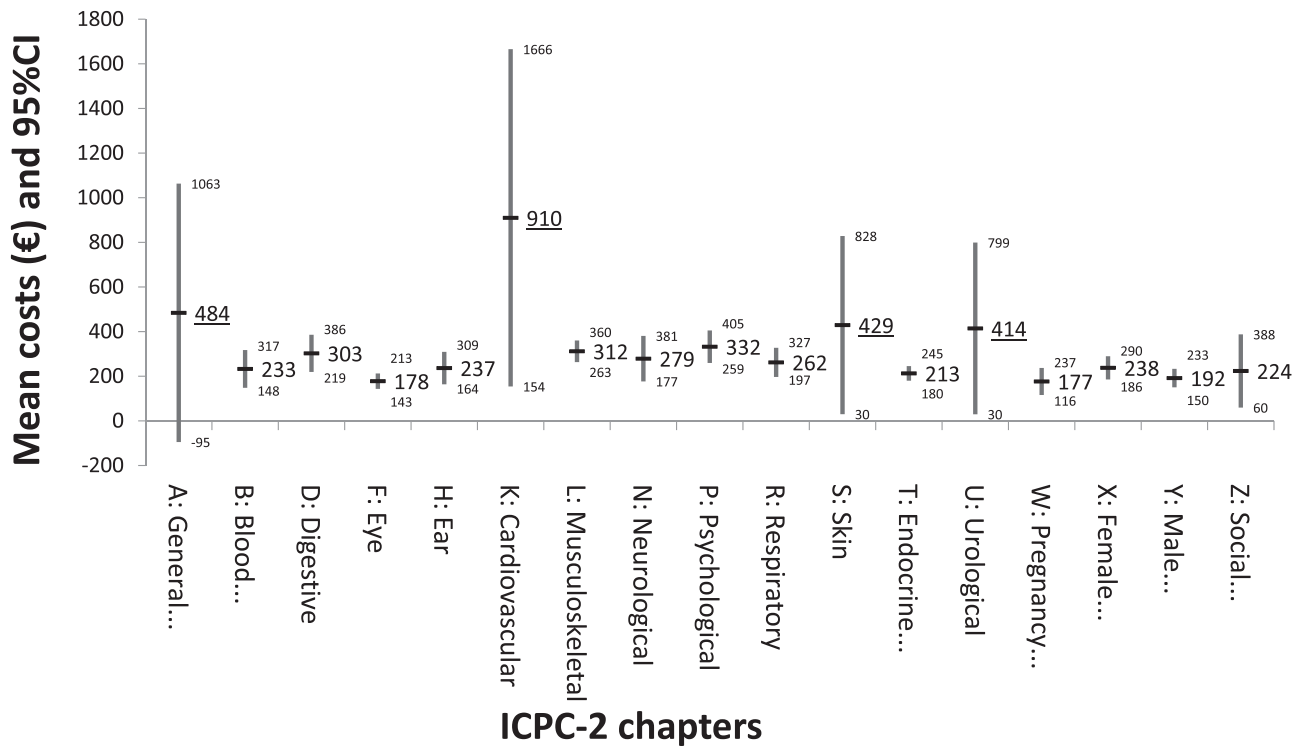
Figure 2. Mean costs and their 95% bootstrapped confidence intervals related to ICPC-2 chapters.
Note: Bootstrapping is a resampling technique used to mimic the "true" distribution where the sample was collected.

dropped out. Unfortunately, ICPC-2 codes of the RFEs were not coded systematically into the EHR in the study health centres at the time of the study. However, in 2014 documenting of the RFEs had increased to 66% in the study health stations at Tampere. The top four RFEs in 2014 were upper respiratory tract infection, high blood pressure, back pain, and diabetes. There was no obvious bias in the study sample regarding the RFEs.

Fifth, the data were recorded manually, and local unit costs were collected from a few sources due to lack of a single unit cost source. However, national unit costs can underestimate (local) costs; indexing to the present value does not seem to handle the problem very well, and local costs can be more precise for a particular resource [21,22]. For this reason, and also due to a lack of unit costs for many resources, a national unit cost list was not used as the key unit cost source.

Lastly, the targeted analytical perspective was HC payers. However, in practice the perspective was limited to the HC service provider's perspective, with most costs being the provider's tariffs. Drug costs (mostly paid by the social insurance institution) were excluded due to limitations in their reporting, a lack of reimbursement data, and the probable small impact on total EOC costs. Furthermore, travel costs, illness allowances and other benefits, and production losses (presenteeism, absenteeism) would have been important for a societal perspective, but sick-leave data were not collected.

When considering the generalizability and applicability of the results, earlier studies were reviewed. Based on the current study, a patient is likely to visit his/her doctor around 4–5 times per year. Based on a UK study, a patient visits his/her doctor an average of 5.3 times per year [27] and is likely to present with three to four symptoms at the same encounter [28]. Soler and colleagues studied the prevalence and incidence of RFEs and EOCs in three countries. They discovered that RFEs seem to be more consistently distributed between populations than EOCs [1], i.e. symptoms are distributed equally but care is not. Furthermore, the relationship between RFE and diagnostic label is very similar regardless of the country [29], with some differences in the size ranges of the relationships [30]. Consequently, the results of this study may be applicable to a wider setting from the perspective of visit frequency/resource consumption.

The practical implication of the results for a clinician, a health economist, or decision-makers is that they describe the spectrum of EOCs in PHC and show how resources and costs are distributed between different types of EOCs and what patient characteristics are in a particular ICPC-2 chapter.

Finally, based on the experience gained from this study, further studies should include more specific diagnoses, extended follow-up times, and larger data sets. Automatic EHR data collection may solve these challenges.

References

1. Soler JK, Okkes I, Oskam S, van Boven K, Zivotic P, Jevtic M, Dobbs F, Lamberts H. An international comparative family medicine study of the Transition Project data from the Netherlands, Malta and Serbia. Is family medicine an international discipline? Comparing incidence and prevalence rates of reasons for encounter and diagnostic titles of episodes of care across populations. Fam Pract 2012;29:283–98.
2. Lamberts H, Hofmans-Okkes I. Episode of care: A core concept in family practice. J Fam Pract 1996;42:161–9.
3. Donaldson M, Yordy K, Vanselow N, eds. Defining primary care: An interim report. Washington, DC: Institute of Medicine, National Academy Press; 1994.
4. Lamberts H, Wood M editors. ICPC, International Classification of Primary Care. Oxford: Oxford University Press; 1987.
5. Lamberts H, Wood M, Hofmans-Okkes I, editors. The International Classification of Primary Care in the European community. Oxford: Oxford University, Press; 1993.
6. Klinkman MS, Green LA. Using ICPC in a computer-based primary care information system. Fam Med 1995;27:449–56.
7. Greenlick MR. Episodes of care classification. In: Grady ML, editor. Primary care research: Theory and methods. Rockville, MD: Agency for Health Care Policy and Research; 1991. p. 83.
8. Hornbrook MC, Hurtado RV, Johnson RE. Health care episodes: Definition, measurement and use. Med Care Rev 1985;42:163–218.
9. Solon JA, Feeney JJ, Jones SH, Rigg RD, Sheps CG. Delineating episodes of medical care. Am J Public Health Nations Health 1967;57:401–8.
10. Busse R, Geissler A, Aaviksoo A, Cots F, Häkkinen U, Kobel C, Mateus C, Or Z, O'Reilly J, Serdé L, Street A, Swan Tan S, Quentin W. Diagnosis related groups in Europe: Moving towards transparency, efficiency, and quality in hospitals? BMJ 2013;346:f3197.
11. Moeller DJ, Evans J. Episode-of-care payment creates clinical advantages. Manag Care 2010;19:42–5.
12. Okkes IM, Polderman GO, Fryer GE, Yamada T, Bujak M, Oskam SK, Green LA, Lamberts H. The role of family practice in different health care systems: A comparison of reasons for encounter, diagnoses, and interventions in primary care populations in the Netherlands, Japan, Poland, and the United States. J Fam Pract 2002;51:72–3.
13. Hallinen T, Martikainen JA, Soini EJ, Suominen L, Aronkytö T. Direct costs of warfarin treatment among patients with atrial fibrillation in a Finnish health care setting. Curr Med Res Opin 2006;22:683–92.
14. Keränen J, Soini EJ, Ryynänen OP, Hietaniemi K, Keränen U. Economic evaluation comparing From Home To Operation same day admission and preoperative admission one day prior to the surgery process: A randomized, controlled trial of laparoscopic cholecystectomy. Curr Med Res Opin 2007;23:2775–84.
15. Tamminen K, Laine J, Soini E, Martikainen J, Kankaanranta H. Cost-effectiveness analysis of budesonide/formoterol maintenance and reliever therapy versus fixed combination treatments for asthma in Finland. Curr Med Res Opin 2008;24:3453–61.
16. Hallinen TA, Soini EJ, Eklund K, Puolakka K. Cost-utility of different treatment strategies after the failure of tumour necrosis factor inhibitor in rheumatoid arthritis in the Finnish setting. Rheumatology 2010;49:767–77.
17. Soini EJ, Davies G, Martikainen JA, Hu HX, Tunceli K, Niskanen L. Population-based health-economic evaluation of the secondary prevention of coronary heart disease in Finland. Curr Med Res Opin 2010;26:25–36.
18. Soini EJ, Martikainen JA, Nousiainen T. Treatment of follicular non-Hodgkin's lymphoma with or without rituximab: Cost-effectiveness and value of information based on a 5-year follow-up. Ann Oncol 2011;22:1189–97.
19. Soini EJ, Hallinen TA, Puolakka K, Vihervaara V, Kauppi MJ. Cost-effectiveness of adalimumab, etanercept, and tocilizumab as first-line treatments for moderate-to-severe rheumatoid arthritis. J Med Econ 2012;15:340–51.
20. Soini EJ, Martikainen JA, Vihervaara V, Mustonen K, Nousiainen T. Economic evaluation of sequential treatments for follicular non-Hodgkin lymphoma. Clin Ther 2012;34:915–25.
21. Soini EJ, Leussu M, Hallinen T. Administration costs of intravenous biologic drugs for rheumatoid arthritis. Springerplus 2013;2:531.
22. Hallinen T, Soini E, Asseburg C, Kuosmanen P, Laakkonen A. Warfarin treatment among Finnish patients with atrial fibrillation: Retrospective registry study based on primary health care data. BMJ Open 2014;4:e004071.
23. Paloneva J, Koskela S, Kautiainen H, Vanhala M, Kiviranta I. Consumption of medical resources and outcome of shoulder disorders in primary health care consulters. BMC Musculoskelet Disord 2013;14:348.
24. Honkasalo MT, Linna M, Sane T, Honkasalo A, Elonheimo O. A comparative study of two various models of organising diabetes follow-up in public primary health care: The model influences the use of services, their quality and costs. BMC Health Serv Res 2014;14:26.

25. Kangaspunta V, Koskela T, Soini E, Ryynänen OP. Potilaiden arvioon terveyskeskuskäynnin hyödystä vaikuttavat tekijät [Factors impacting on the perceived usefulness of a patient's health centre visit]. Finn Med J 2014;22:1654–9.

26. Soini EJ. Cost-utility and expected value of perfect information related to trabectedin in the treatment of metastatic soft-tissue sarcoma: The publicly funded comments explored. Ann Oncol 2011;22:1465–6.

27. Hippisley-Cox J, Fenty J, Heaps M. Trends in consultation rates in general practice 1995 to 2006: Analysis of the QRESEARCH database. Nottingham: Information Centre for Health & Social Care, National Health Service; 2007.

28. Allander E. Distribution of doctor's consultations, operations, and symptoms with special relevance to social factors: Report on a Swedish nation-wide health survey. Scand J Soc Med 1974;2:37–46.

29. Soler JK, Okkes I, Oskam S, van Boven K, Zivotic P, Jevtic M, Dobbs F, Lamberts H. An international comparative family medicine study of the Transition Project data from the Netherlands, Malta, Japan and Serbia: An analysis of diagnostic odds ratios aggregated across age bands, years of observation and individual practices. Fam Pract 2012;29:315–31.

30. Soler JK, Okkes I, Oskam S, van Boven K, Zivotic P, Jevtic M, Dobbs F, Lamberts H. An international comparative family medicine study of the Transition Project data from the Netherlands, Malta and Serbia: Is family medicine an international discipline? Comparing diagnostic odds ratios across populations. Fam Pract 2012;29:299–314.