Duration of homelessness and its relationship to use of hospital and emergency department services in Helsinki, Finland

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Abstract

Aims: homelessness is associated with poor health outcomes and increased use of hospital and emergency department (ED) services. Little is known about the duration of homelessness in relation to health care service use. the aim of this study was to examine the use of hospital and ED services among the homeless in Helsinki, Finland, and for the first time, to examine the relationship between service use and duration of homelessness. Methods: Six hundred and eighty-three persons staying at least one night in a shelter between September 2009 and September 2010 were followed until the end of 2014. using negative binominal regression analysis we calculated the use of hospital and ED services and compared the use with that of a matched control group (N = 1361). We also analyzed service use in relation to the time spent homeless during follow-up. Results: the mean time spent homeless during the follow-up was 8.5 months, one third was temporarily homeless (less than 2% of the follow-up time), but recurrent episodes of homelessness were also common. The study group's incidence rate ratios for medical-surgical hospital days was 6.23 (95% CI: 4.73 to 8.21), for psychiatric hospital days 43.11 (95% CI: 23.02 to 80.74) and for ED visits 10.21 (95% CI: 8.77 to 11.90), compared with controls. The number of medical-surgical hospital days and ED visits/person-year increased as homelessness was prolonged, but the pattern was opposite for psychiatric hospital days. *Conclusions:* **Homeless persons are heavy users of hospital and ED services, and there is also increased use among those temporarily homeless.**

Keywords: *Homelessness, health care service use, longitudinal cohort study*

Background

It is well-documented that homelessness is associated with poor mental and physical health outcomes and high health care service use [1]. Studies on the use of emergency departments (ED) among the homeless have reported mean annual number of ED visits between 2 and 6 in homeless populations, depending on the study setup [2–6]. Similarly, the use of hospital services is high in this group [1,2,6–8].

As most of the prior research has been conducted in North America, little is known about hospital and ED use among the homeless in Europe. In addition, previous studies on health care service use in homeless populations have mostly used either self-reported data, had only short follow-ups, lacked a control group from the general population, recruited individuals from EDs or health care services for homeless, or focused only on certain sub-groups of homeless, all which limit their generalizability [2,4–6,8–17]. Finally, prior studies assessing the health care service use of representative samples of homeless persons have classified individuals as homeless at only one time point [3,7,14,16] and not examined how

health care services utilization is affected by the length of homelessness during a follow-up period. There are some data showing that supportive housing reduces the use of hospital [9-11] and ED [8,10–12,17] services, but this association between supportive housing and health care service use has not been reported in all studies [5,13].

Defining homelessness and sampling homeless populations has been a challenge for the research community. The European Federation of National Organisations Working with the homeless (FEANTSA) has developed the European typology of homelessness and Housing Exclusion (ETHOS) [18]. According to the ETHOS definition, homelessness is divided into 1) people living rough, 2) people in emergency accommodation, 3) people living in accommodation for the homeless, 4) people living in institutions, 5) people living in non-conventional dwellings due to lack of housing and 6) homeless people living temporarily in conventional housing with family and friends. however, as gathering representative samples of the homeless including all these categories and following

the housing situation over time is a difficult task, most quantitative studies have focused on the homeless in shelters or other services for the homeless [2,13,19,20].

In 1998 Kuhn and Culhane performed a cluster analysis on the homeless in shelters and, based on the findings, classified the homeless as transitionally, episodically and chronically homeless [20]. The transitionally homeless constitute the majority of shelter users: they are in the shelter system for only a short period, and rarely return to the shelter system. The episodically homeless people move in and out of shelters, while the chronically homeless have long stays in shelters (either more than one year or at least four stays during 2 years). Although homelessness is associated with increased morbidity irrespective of the duration of homelessness, the episodically and chronically homeless individuals have worse health outcomes than individuals who are homeless for a shorter period [1,21]. therefore, most interventions have focused on those chronically and episodically homeless, who represent about 20% of the homeless population at any given time [19,20,22–24]. Benjaminsen and Andrade, however, showed that in the Scandinavian setting the transitionally homeless have a higher tendency to suffer from mental illness and substance abuse than the transitionally homeless in the US [22].

In November 2009, at the year of sampling, the official number of homeless persons in Helsinki was estimated to be 3465 persons, out of whom 2460 persons stayed temporarily with friends and acquaintances and only 65 persons were sleeping rough or in shelters [25]. The Finnish housing services underwent significant changes during the years 2008–2015, replacing shelters with housing units, based on Housing First principles [24]. The program has been successful in reducing the total number of the homeless [24]. however, studies have also shown that only a few previous shelter users in Helsinki enter independent housing; they typically end up living in supported housing facilities, most of which use harm-reduction approaches and do not require adherence to treatment programs [26].

By combining data from different registers, we followed a representative cohort of 638 homeless per-sons in shelters, assessing the time spent homeless during the follow-up period and analyzing this in relation to the use of hospital and ED services. We hypothesized that those who are homeless for a longer duration use more hospital services and have more ED visits than those who are only temporarily homeless. Further, our hypothesis was that in the Finnish setting, a country with relatively extensive welfare policies and general access to health services,

not only the long-term homeless but also the temporarily homeless have high health care service needs.

The aims of the study were:

first, to describe the proportion of a cohort of 683 shelter users that are homeless and in shelters at any time point during a 4.5 year follow-up;

second, to describe the use of medical-surgical and psychiatric hospital services and ED by the whole cohort compared with an age- and gender-matched control group; and

third, to show how the amount of time spent homeless and in shelters during the follow-up is related to hospital service and ED use.

Methods

Data on shelter use was retrieved from the social service client register from the City of Helsinki. the study population consists of all homeless persons that stayed in Hietaniemenkatu shelter in Helsinki for at least one night between September 1st 2009 and September 1st 2010 (N = 826). This was the only homeless shelter in the city of Helsinki operating on a walk-in basis at that time. The other temporary accommodations provided for the homeless were more permanent placements that required a promissory note from a social worker. Thus, our data are a total sample of shelter users in the city of Helsinki during the inclusion year. The shelter had 52 beds in the emergency shelter, but accommodated more persons on mattresses during busy nights, and a further 52 beds in temporary accommodation with private rooms. There were no sobriety requirements for the shelter, but alcohol and drugs were not allowed at the premises. Clients had to report their personal identification codes when registering for the night. These codes are unique to all persons residing in Finland and the services of the shelter are not available for the non-resident and undocumented migrant population. The register data of all 826 persons who stayed in the shelter during the inclusion year were examined and compared with an age- and gender-matched group from the general population (ratio of 2:1, N = 1652). Since we only had access to the registers of the City of Helsinki and could determine shelter periods only for those residing in Helsinki, we excluded those who had moved away from Helsinki during follow-up (N = 143, 17.3% for the homeless and N = 336, 20.3% for the control group),

giving a study group of 683 persons and 1316 control persons.

The cohort was followed from their first night in the shelter during the inclusion year until the end of 2014, death, or emigration, whichever came first. We determined periods of homelessness for the cohort defined as months with at least two shelter nights in the emergency shelter, or at least seven nights in temporary accommodation per month. A whole week in temporary accommodation was set as the limit because the placement was terminated only after a person had not shown up for a week, thus the limit is comparable to at least one night in the shelter in a month.

Data on hospital episodes, hospital days, and ED visits were retrieved from the Care Register for Health Care, kept by the National Institute for health and Welfare, including dates for all hospital inpatient episodes and unit information as well as data on all visits to hospital EDs in Finland. We counted all ED visits (including both medical-surgical and psychiatric ED visits) and the days the members of the cohort spent in hospital, and grouped them into ED visits, hospital days in psychiatric units, and hospital days in medical-surgical units (i.e. all other than psychiatric hospital days), based on information on the medical specialty in the register. Inpatient detoxification in Finland is organized separately from psychiatric care, by the social services of the municipalities, and we did not have access to their registers. Similarly, we did not have access to the data of primary health care level emergency rooms that operated in Helsinki at the time, dealing with minor trauma and infections treatable on a primary health care level. Register data from Statistics Finland and the Central Population register were used for baseline information on socioeconomic status, education, place of domicile and time of death. The register data were linked using encrypted personal identification codes.

Statistical methods

The characteristics of the study population are presented as means with standard deviations (SD) and counts with percentages. Statistical comparisons between the groups were performed by t-test, bootstrap type t-test, or χ2 test when appropriate. We estimated the proportion of the study cohort homeless at each month starting from the first day in the shelter during the inclusion year until 62 months using a generalized estimating equation (GEE) model. health care utilization rates were calculated by dividing the total number of hospital days and ED visits by the total person-time at risk. Negative binominal regression analysis was used to estimate the use of

hospital and ED, as data showed signs of overdispersion. The effects of confounding factors were assessed separately for all variables and using three models: Model 1 is a crude model; in Model 2 we adjusted for age (continuous variable) and gender, as those who moved away from Helsinki were excluded from the data post matching; and in Model 3 we controlled additionally for baseline employment (employed or student vs. unemployed or on pension), marital status (married/in a registered partnership vs. not) and educational attainment (higher than the basic level of 9 years vs. not). The results are shown as incidence rate ratios (IRRs) with their 95% confidence intervals (CIs).

We examined health care service use in relation to the duration of homelessness by defining the percentage of time (in months) homeless during the follow-up. The health service use over percentage of time homeless during follow-up was estimated with unadjusted logistic and Poisson regression models, presented continuously as hospital days and emergency room visits per person-year and dichotomously as usage/no usage over percentage of time homeless with 95% CIs. We defined as temporarily homeless those who were homeless for less than 2% of the follow-up time (N = 210), the cut off was chosen as it represents those homeless for the first month only. To examine the health care use of those temporarily homeless, we separately performed negative binominal regression analysis on the temporarily homeless and calculated their IRRs for hospital days and ED visits, compared with all the controls. All analyses were performed using STATA 15.0 (StataCorp LP, College Station, TX).

Results

Persons staying in shelters were predominately males (82.9%) and had a mean age of 45.7 years (range 18–90). Only a few of the homeless were married, employed or had more than a basic level of education (Table I). Mortality in the homeless cohort was high, with a total of 127 homeless persons (18.6%) dying during follow-up compared with 42 (3.2%) in the control group. The mean duration of follow-up was 4.5 years for the homeless (a total of 3059.6 person-years) and 4.9 years in the control group (6468.4 person-years). The mean time spent homeless during the follow-up was 8.5 months (16% of follow-up time) in the study group. During the observation period 62.4% of the homeless had at least one hospital day in medical-surgical wards, 26.5% in psychiatric wards, and 83.9% had at least one visit to the ED (Table I).

Figure 1 shows the proportion of the cohort that was homeless in each month of the follow-up.

Table I. Population characteristics and hospital and emergency department use during follow-up among the homeless in Helsinki Finland, years 2009–2014.

|	Homeless, N = 683	Control group, N = 1316	p-value
Baseline characteristics			
Men, n (%)	566 (82.9)	1080 (82.1)	0.655
Age, mean (SD)	45.7 (12.8)	46.1 (12.7)	0.451
Married/in registered partnership, n (%)	38 (5.6)	625 (47.5)	<0.001
Employed	59 (8.6)	936 (71.1)	<0.001
Education years, mean (SD)	10.2 (1.7)	12.8 (3.0)	<0.001
Base level education only, n (%)	412 (60.3)	292 (22.2)	<0.001
Hospital and emergency department use during follow-up			
Persons with any medical/surgical hospital days, n (%)	426 (62.4)	371 (28.2)	<0.001
Medical/surgical hospital days/person-years, mean (SD)	7.16 (6.88)	1.16 (19.24)	<0.001
Persons with any psychiatric hospital days, n (%)	181 (26.5)	18 (1.4)	<0.001
Psychiatric hospital days/person-years, mean (SD)	7.89 (32.63)	0.18 (2.94)	<0.001
Persons with any emergency department visits, n (%)	573 (83.9)	438 (33.3)	<0.001
Emergency department visits/person-years, mean (SD)	1.94 (3.08)	0.21 (0.74)	<0.001

Note: SD=standard deviation
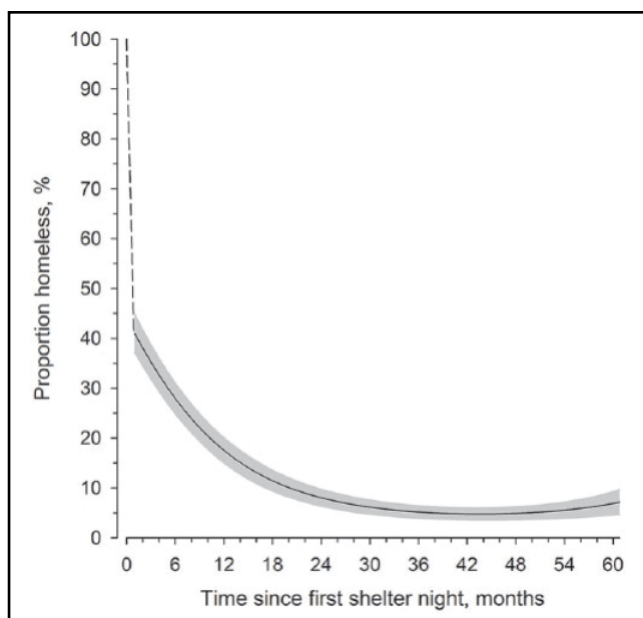
Figure 1. The proportion of the cohort that was homeless at each month during the follow-up (N = 683): Helsinki, Finland 2009–2014. The relation was assessed using a GEE with the quadratic term of time, logit link and binominal distribution and an exchangeable correlation structure. The gray area shows 95% confidence intervals.

The proportion homeless continued to decline for the first 2 years of follow-up, after which it stabilized between 5 and 10%. We found that while 228 (33.0%) persons were homeless only during the first month, and after that stayed somewhere else, a total of 193 persons still had periods of homelessness after 24 months (28% of total sample, 31.1% of those 621 persons still in the study at 24 months). Only eight persons were homeless for more than 50 months (corresponding to 1.4% of those 568 who were still in the study at 50 months). the distribution of time spent homeless during the follow-up is shown in Supplementary file A.

The health care use of all services examined was higher in the homeless cohort compared with the use in the control group, especially for psychiatric hospital days where the IRR was 43.11 (95% CI: 23.02 to 80.74) for the homeless (table II). Their IRR for medical-surgical hospital days was 6.23 (95% CI: 4.88 to 8.21) and for ED visits 10.21 (95% CI: 8.77 to 11.90). Adjusting for age and gender in Model 2 increased the likelihood of medical-surgical hospital and ED service use. Further adjusting for socio-demographic factors in Model 3 decreased the likelihood of using all examined health care services, but the IRRs remained high.

The annual hospital days and ED visits in relation to the percentage of time spent homeless differed drastically depending on the health care service in question: while the use of medical-surgical hospital and ED service increased as homelessness prolonged, the pattern was reversed for psychiatric hospital days (Figure 2). Supplementary file B shows the service use categorized dichotomously as usage vs. no usage in relation to the percentage of time spent homeless during follow-up. The separate negative binominal regression analysis on those temporarily homeless (less than 2% of the follow-up time) compared with the control group gave IRRs for medical-surgical hospital days of 5.11 (95% CI: 3.10 to 8.44), for psychiatric hospital days 34.19 (95% CI: 6.52 to 179.23) and for ED visits 6.48 (95% CI: 4.93 to 8.53) (data not shown).

Table II. Incidence rate ratios for hospital days and emergency department visits for homeless participants compared with age- and gender-matched control individuals in Helsinki, Finland 2009–2014.

	Hospital days		ED visits
	Medical/surgical IRR (95% CI)	Psychiatric IRR (95% CI)	IRR (98% CI)
Model 1			
Control group	1 (ref.)	1 (ref.)	1 (ref.)
Homeless	6.23 (4.73 to 8.21)	43.11 (23.02 to 80.74)	10.21 (8.77 to 11.90)
Model 2			
Control group	1 (ref.)	1 (ref.)	1 (ref.)
Homeless	9.01 (6.90 to 11.77)	43.90 (21.01 to 91.71)	10.66 (9.14 to 12.44)
Model 3			
Control group	1 (ref.)	1 (ref.)	1 (ref.)
Homeless	4.70 (3.32 to 6.64)	11.24 (5.82 to 21.70)	5.97 (4.88 to 7.30)

Model 1: crude model; Model 2: adjusted for age and gender; Model 3: adjusted for age, gender, employment, educational attainment, and marital status.

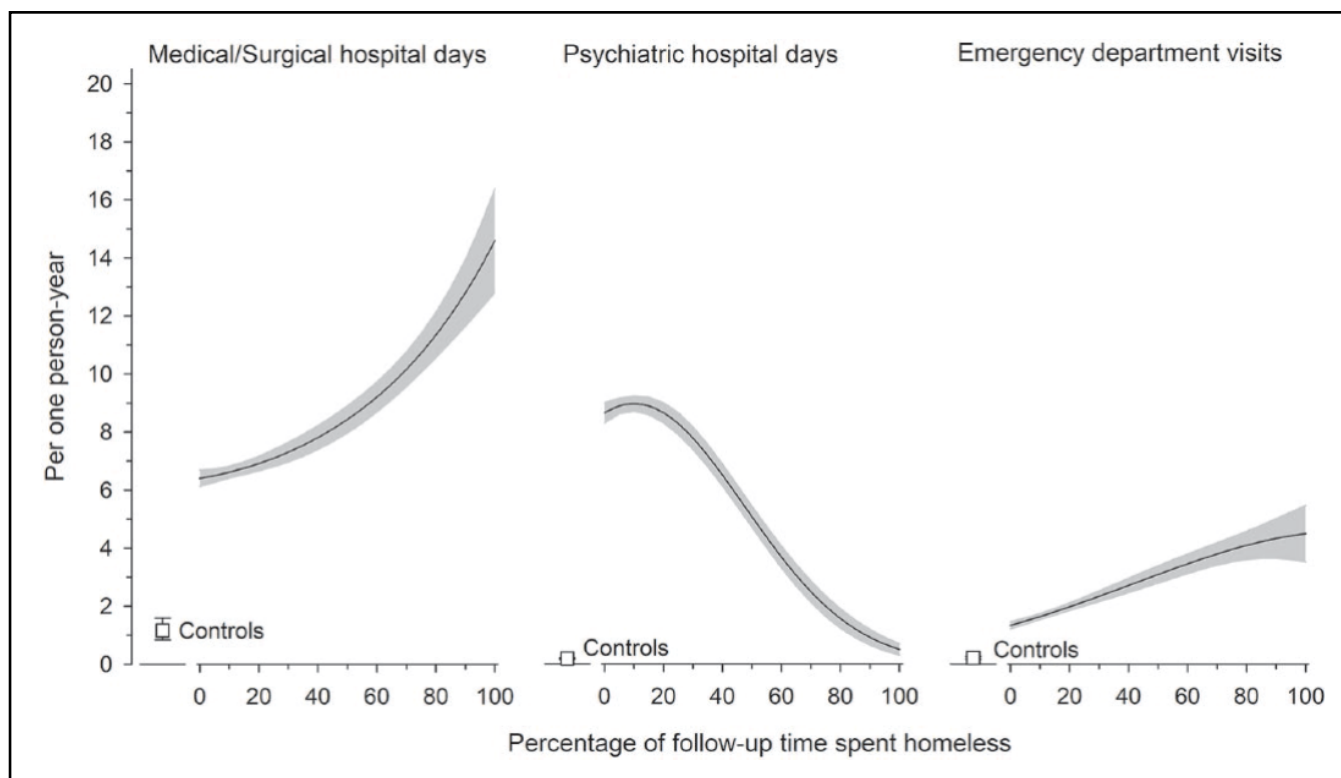Note: IRR = incidence rate ratio; CI = confidence interval; ref. = reference group.

Figure 2. Hospital days and emergency department visits among homeless persons in relation to the percentage of time spent homeless (N = 683): Helsinki, Finland 2009–2014. Data were fitted using Poisson regression models with the quadratic term of months homeless. Gray area shows 95% confidence intervals. The hospital days and emergency department visits for controls were calculated separately.

Discussion

We followed a cohort of homeless people for 4.5 years and found that very few were homeless for the whole period, but recurrent episodes of homelessness were common. Compared with the control group the homeless had high hospital and ED service utilization rates. The use of medical-surgical hospital beds and ED visits was particularly high for those who were homeless for a long duration, while the use of psychiatric hospital services was more pronounced among those homeless for a shorter duration.

This study showed, similar to previous studies from both the US and Scandinavia [20,22,26], that most persons stayed in shelters only briefly. However, we also found that many returned to the shelter later, as almost one third of the study population had periods in shelters after 2 years. This is interesting, especially considering previous findings from Finnish

studies, showing that very few shelter users enter the free housing market, but the majority end up in supported housing [26]. It seems that while for the majority the acute need for shelters ends fairly quickly, the risk of needing shelter again due to homelessness is considerable.

Comparing the health care service use of our cohort to previous findings [1–8], we see that also in the Finnish setting homeless people use a lot of hospital and ED services. This was particularly true for psychiatric hospital use, illustrating the burden of psychiatric disorders in this population. To be admitted into a psychiatric hospital in Finland, a serious mental disorder other than a substance use disorder (SUD) is usually required. Although a SUD probably often contributes to the other psychiatric conditions in this cohort, the high use of psychiatric hospital services among the homeless shows that a significant proportion of the homeless in Finland also suffers from a severe mental illness other than a SUD.

The homeless in our cohort had over 10 times the number of annual visits to EDs compared with the control group, equivalent to previous findings in Canada [3]. Our relatively low number of mean annual ED visits (<2), can be at least partially explained by the fact that in Finland the municipalities also have primary health care level emergency rooms, the registers of which we did not have access to.

Considering that the health care needs are more extensive among those chronically homeless [1,21], we hypothesized that the use of hospital and ED services would be even more increased for those homeless for longer time periods during the follow-up. We found that this was indeed the case for medical-surgical hospitalizations and for ED use, but to our surprise the pattern was reversed for psychiatric hospital use: the use decreased as the duration of homelessness prolonged. Based on the clinical experience of the first author from working in shelters, the very long-term homeless often have severe SUDs, something that probably increases the use of EDs and medical-surgical hospitalizations. This study does not provide answers to why the risk of psychiatric hospital service use was smaller among the very long-term homeless compared with those homeless for a shorter period, but several possible explanations can be considered. It is possible that the very long-term homeless people do not suffer from disorders requiring psychiatric hospitalizations, and that they are adequately treated in somatic care and in SUD treatment, data we did not have access to. Another interpretation is that the very long-term homeless are marginalized to the point where the psychiatric health care system can no longer reach them. Psychotic disorders have been shown to be associated with decreased mortality among homeless populations [27–30]. It could be that psychiatric illness other than SUD is also a predictor of being housed and as such associated with shorter durations of homelessness.

As hypothesized, we found that the temporarily homeless in Finland form a vulnerable group with a very high use of hospital and ED services compared with the control group. Stephen and Fitzpatrick have previously presented a theory that in countries with extensive welfare services fewer persons become homeless, but those who do, have higher health care needs compared with the homeless in countries with less extensive welfare policies [31]. Our findings are in line with this theory and show that the temporarily homeless in Finland have health problems in addition to housing problems.

The fact that even a brief stay in a shelter is associated with high use of hospital and ED services further raises the question of to what extent it is the homelessness that increases the morbidity and health care service use; or whether homelessness is only one symptom among many in a disadvantaged population suffering from poverty, social exclusion, unemployment and multimorbidity. Our previous study on shelter users in Helsinki also showed that a few nights in a shelter increased the mortality risk to a similar level of those who stayed longer [32]. Further studies, where housing services are also included, are needed to investigate the effect that homelessness periods and shelter stays have on health and health care service use in this marginalized population. It is likely that there are bidirectional associations between homelessness and morbidity, and interventions to stop the vicious cycle of morbidity, homelessness and use of health care services need to be developed.

The main limitation of our study is related to the method of defining homelessness. We defined periods of homelessness by using the shelter register data and determining months of homelessness as months with at least two nights in emergency shelter or at least one week in temporary accommodation. Hence, we could not capture periods of homelessness spent on the streets, residing temporarily with friends and family or in institutions (such as hospitals or prisons) without a home outside the institution. this weakness in the method could falsely produce estimates of homelessness duration that are too low, which might lead to both selection bias and a validity problem that unfortunately could not be avoided with the data at hand. It is likely that some homeless staying temporarily with acquaintances and family members or in institutions could be falsely registered as not homeless in this study. However, this potential bias does not explain why those with very long shelter use did not use psychiatric hospital services.

Using months with shelter stays as the definition of homelessness periods can be defended in the Finnish context where, due to the harsh climate, very few sleep outside, and most persons sleeping rough would stay at least a few nights in a shelter during each month and thus be registered as homeless applying this method. However, when interpreting the findings it is important to keep in mind that the duration of homelessness in this study does not include all types of homelessness described in the ETHOS definition, only homelessness periods where one has to resort to emergency shelter services.

By linking local and national register data we were able to follow a representative cohort of homeless shelter users for a long period of time, without the restrictions involved with tracing study participants that interview-based studies deal with. This enabled us to, for the first time, describe the relationship between length of homelessness and health care service use. The results offer valuable new data on the chronicity of homelessness, the health care service use of the homeless and the associations between service use and duration of homelessness.

Conclusions

Examining the duration of homelessness among shelter users in Helsinki, Finland, we found that most persons stayed in shelters for the homeless only briefly, and then moved on. However, many also returned to the shelter later. The homeless in Helsinki are heavy users of hospitals and EDs, and health care providers on all levels should recognize them as a high-risk group. Better, tailored and integrated social and health care solutions for the homeless are called for in order to reduce the need of high cost emergency and hospital care. Both temporarily and long-term homeless persons in Helsinki have increased service use, showing that not only the long-term homeless need targeted services, but those who have experienced homelessness in the recent past but are not currently homeless should also be viewed as a vulnerable group with high needs.

Contributors
ASA, JGE, PH and MG planned and designed the study. HK and ASA analyzed and interpreted the data. ASA drafted the original version of the article and all authors revised and approved the final version of the article.

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