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2021

Aro , T & Kantele , A 2021 , ' Hospital admissions of refugees, asylum seekers and undocumented migrants : Ten-year retrospective study ' , Travel medicine and infectious disease , vol. 44 , 102186 . <https://doi.org/10.1016/j.tmaid.2021.102186>

<http://hdl.handle.net/10138/354032>

<https://doi.org/10.1016/j.tmaid.2021.102186>

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Hospital admissions of refugees, asylum seekers and undocumented migrants: Ten-year retrospective study

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ARTICLE INFO

Keywords:

Migrant
Migration
Asylum seeker
Refugee
Immigration
Immigrant
Undocumented migrant
Irregular migrant
Hospital
Infectious diseases

ABSTRACT

Introduction: The worldwide population of forcibly displaced people has increased over the past decade, approaching 80 million and encompassing more than 30 million refugees and asylum seekers. Research into refugee and migrant health has remained scarce, however.

Methods: To investigate the reasons for hospital admissions of refugees, asylum seekers and undocumented migrants, we collected medical data from Helsinki University Hospital (HUH) records 2010–20.

Results: The study population consisted of 647 patients originally from 54 different countries, mainly Iraq, Syria, and Afghanistan. Among adults, 40.9% of the admissions were related to pregnancy. For minors, the group comprising congenital malformations, deformations, and chromosomal abnormalities accounted for most hospitalizations, followed by diseases of the digestive or nervous system.

Every fifth patient (19.3%) was admitted because of an infection: adults mostly for urinary tract infection (16.3%), pneumonia (14.1%), and tuberculosis (9.8%), and minors for acute gastroenteritis (15.2%). Infectious reason was more frequent within two months after immigration than later.

Conclusions: Our data reveal a unique admission profile for forced migrants: in addition to infectious diseases, a particularly high rate of obstetric diagnoses was recorded, the two ranking as the most common reasons for hospitalization.

1. Introduction

The number of forcibly displaced people has reached its all-time peak, 79.5 million worldwide [1]. It includes 26 million refugees and 4.2 million asylum seekers who have all had to flee their homes because of violence, conflict, and other disasters. With these patients a multitude of challenges are faced by healthcare systems worldwide [2,3]. Indeed, besides being among the first points of contact with society, the service also remains essential at later stages of resettlement [4]. In addition to linguistic and cultural challenges, the staff seeing the patients may have difficulties in recognizing the vast range of diseases to consider for refugees and asylum seekers. The spectrum may comprise both the various diseases common amongst local residents and infectious agents which are contracted in these patients' countries of origin and therefore much less familiar [5]. The migration process itself tends to involve exposure to various infectious and other health threats pertinent to unsafe travel [5,6]. Most studies thus far focus on infectious diseases, not providing a broader picture of the disease burden [7,8].

In Finland, adult asylum seekers are entitled to urgent and necessary healthcare services, and minor asylum seekers are entitled to the same healthcare services as locals. Undocumented migrants in Finland have limited rights to health services. However, urgent care is provided to everyone by the public health care system. Some municipalities, including Helsinki, grant undocumented migrants broader access to health services [9–11].

When devising healthcare for this group, it is essential to understand how their admission profile differs from that of the locals. In Finland, the most common reasons for admission to specialized medical wards in 2019 were diseases of the circulatory system (14.4%), injury, poisoning and certain other external reasons (10.9%), and pregnancy, childbirth, and the puerperium (9.0%); the rate of infectious diseases cannot be extracted from the public data [12]. Realizing that data remain elusive on reasons for the vulnerable – and globally increasing – population of refugees and migrants requiring medical care, we set out to scrutinize the diagnoses recorded in our hospital district.

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Abbreviations

AMR	Antimicrobial resistance
CCI	Charlson comorbidity index
CPE	Carbapenemase-producing <i>Enterobacterales</i>
ESBL-PE	Extended-spectrum beta-lactamase-producing <i>Enterobacterales</i>
HUH	Helsinki University Hospital
MDR	Multidrug-resistant
MRAB	Multiresistant <i>Acinetobacter baumannii</i>
MRGN	Multiresistant Gram-negative
MRPA	Multiresistant <i>Pseudomonas aeruginosa</i>
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
TB	Tuberculosis
VRE	Vancomycin-resistant <i>Enterococcus</i>

2. Methods

2.1. Study design, local screening practices for multidrug-resistant bacteria, and selection of patients

In order to obtain data on the health problems of refugees, asylum seekers and undocumented migrants, we collected information from the medical records of patients treated at Helsinki University Hospital (HUH) 2010–20.

HUH provides secondary and tertiary healthcare for nearly 1.7 million residents of 24 municipalities in Southern Finland. Over the study period, the infection control guidelines advised that at admission to hospital all refugees, asylum seekers, patients treated at foreign hospitals, and those having lived in an orphanage outside Finland should be screened for multidrug-resistant (MDR) bacteria; undocumented migrants were not included in the recommendation. MDR bacteria screening covered methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), extended-spectrum beta-lactamase-producing *Enterobacterales* (ESBL-PE), carbapenemase-producing *Enterobacterales* (CPE), multiresistant *Acinetobacter baumannii* (MRAB) and multiresistant *Pseudomonas aeruginosa* (MRPA).

To identify the patients, we searched the HUH infectious diseases database (SAI) for all patients screened for multiresistant Gram-negative (MRGN) bacteria. Among them, as a first step, we selected those with a non-Finnish/Swedish name and screened their patient records to find asylum seekers, refugees and undocumented migrants.

We have previously published data on the carriage rates of MDR bacteria among the same group over 2010–17 [13]. According to the Finnish Medical Research Act a review by an ethics committee is only required for research involving an intervention. The study protocol was approved by the research board of the Inflammation Center, Helsinki University Hospital, Finland.

2.2. Collection of patient data

We amassed background particulars (age, gender, country of origin, date of arrival in Finland, prior hospitalizations) from the patient records and determined the Charlson comorbidity index (CCI) [14]. In addition, we gathered data on surgery, intensive care unit admissions, deaths, and admission diagnosis and grouped them following the International Classification of Diseases and Related Health Problems, 10th revision (ICD-10) [15]. The patients were grouped by country of origin under the various geographic regions categorized by the United Nations [16].

2.3. Statistics

Statistical analyses were conducted using SPSS 25.0 software (IBM Corp. Armonk, NY). In univariate analyses for categorical variables, the chi-squared test, the Fisher's exact test or binary logistic regression analysis was applied. For continuous variables, we used binary logistic regression. Chi-squared test and Fisher's exact test were two-sided.

3. Results

3.1. Subject characteristics

The SAI database showed that 7763 patients had been screened for MRGN bacteria between 1 January 2010 and 5 June 2020. Among them we identified a total of 647 with status of refugee/asylum seeker (n = 623; 96.3%) or undocumented migrant (n = 24; 3.7%) (Fig. 1). The study population came from 54 countries in all, Iraq (40.8%), Syria (11.9%), Afghanistan (9.6%), and Somalia (6.8%) ranking as those most common. The vast majority were originally from Asia (69.2%), 21.0% from Africa, and 7.9% from Europe (Table 1). Their median age was 26, 54.9% were female, and 22.6% minors (<18 years). Nine out of ten (90.1%) had no major comorbidities with a CCI-score of 0; the median time from arrival in Finland was 95 days.

3.2. Reasons for hospitalization

Among the adults, 40.9% were admitted to hospital because of pregnancy or childbirth (Table 2). Other common reasons for hospitalization were diseases of the genitourinary (9.0%) or digestive system (7.6%), and injury, poisoning and certain other external reasons (8.6%). Diseases of the circulatory system only accounted for 2.6% of the admissions. Over one fifth (22.0%) of the patients had surgery and 2.8% were treated at an intensive care unit (ICU).

As regards the minors, the most common reasons for hospitalization were congenital malformations, deformations, and chromosomal abnormalities (17.8%), and diseases of the digestive (11.6%) or nervous system (8.9%) (Table 2). Surgery was needed for 18.5%, and 4.8% required ICU treatment.

Among undocumented migrants nearly two thirds (15/24; 62.5%) were admitted for obstetric reasons.

3.3. Infections

Infections accounted for 18.4% of hospital admissions among the adults, with urinary tract infections (16.3%), pneumonia (14.1%), tuberculosis (TB) (9.8%), and dermatologic infections (7.6%) as the most common reasons (Fig. 2). Among the minors 22.6% were admitted because of an infection, most frequently acute gastroenteritis (15.2%). Infectious reasons were more common among cases of hospitalization within 60 days than over two months after arrival in Finland (52/187; 27.8% versus 42/254; 16.5%, OR 1.9, 95% CI: 1.2–3.1) (Fig. 3). Human immunodeficiency virus (HIV) infection accounted for the admission of four adults; three were new diagnoses, one of them accompanied by gastric TB and central nervous system toxoplasmosis, and one by Burkitt's lymphoma. Seven patients (1.1%) were HIV-positive.

Nine adults, including two undocumented migrants, were admitted because of TB, three of them with pulmonary TB. Extrapulmonary presentations included three with central nervous system TB (one HIV-positive) and two with tuberculous lymphadenitis; one was a suspected case of pericardial tuberculosis but finally diagnosed with a latent TB without cardiac involvement.

Malaria was diagnosed in one adult (*P. falciparum*) and one paediatric patient (*P. vivax*) one and three weeks after arrival, respectively. Three were treated for schistosomiasis, one of them with concomitant hookworm and *Strongyloides* findings; the time between arrival to Finland and these diagnoses was 2–18 months. One individual case of

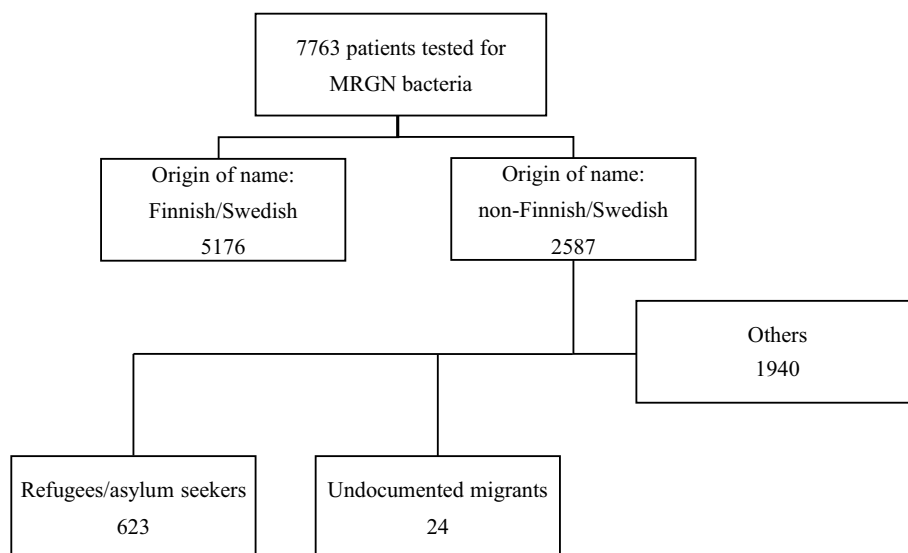


Fig. 1. Flowchart showing selection of study population (MRGN bacteria – Multiresistant Gram-negative bacteria).

cutaneous leishmaniasis was diagnosed after a year's stay, and one of echinococcosis on arrival in Finland.

A positive blood culture was recorded for four patients (*Streptococcus pyogenes*, *Candida albicans*, *Salmonella enteritidis*, extended-spectrum beta-lactamase-producing *Proteus mirabilis*).

3.4. Mortality

Twelve patients (1.9%) died at hospital: eight (1.2%) of malignancy, others of cardiomyopathy, nontraumatic intracerebral haemorrhage, hepatitis C, and urinary calculus complicated by blood culture-positive *Candida albicans* infection.

4. Discussion

The number of forcibly displaced people has reached the highest global peak ever recorded. Despite this, data on refugee and migrant health remain limited. Our decade-long study presents the characteristics of patients admitted to a secondary/tertiary hospital, looking at a data set on a cohort of refugees, asylum seekers and undocumented migrants. Our findings are expected to well reflect the healthcare needs of this patient group in a secondary/tertiary hospital setting also in other destination countries. The data can provide a tool for planning of resources and improving the healthcare of forced migrants.

4.1. Background data

The most common countries of origin reflect those applying for asylum in Finland during the same time period 2010–20: Iraq 40.8% versus 42.8%, Afghanistan 9.6% versus 11.8%, and Somalia 6.8% versus 7.6% [17,18]. The only tally standing out was for Syrians (11.9%) whose proportion amounted to three times that in the Finnish Immigration Service statistics (4.3%). This may be explained by a relatively high number of Syrians being granted asylum in Finland.

It is worth noting that, in contrast to male preponderance (74.8% in Finland and 67.3% in Europe) among asylum seekers from 2015 onwards, more than half of our patients (54.9%) were female [17,19]. This appears to be associated with pregnancy-related admissions: 58.9% of the females were hospitalized due to obstetric reasons. The proportion of minors accords with that among asylum seekers 2015–20 (25.2%) [17].

4.2. General health

It should be noted that while nine of ten patients were in good general health without major comorbidities, up to 8.3% had CCI scores of two or higher. This accords with a Danish study finding multimorbidity (one or more CCI diagnoses) more common among refugees (6.6%) than Danish-born (5.3%) [20]. In Norway, Diaz et al. report a higher frequency of multimorbidity for refugees than other immigrant groups [21].

4.3. Reasons for hospitalization

Most of the admissions of females were related to pregnancy and childbirth (58.9%), amounting to 32.3% of all patients. This rate substantially exceeds that generally recorded at Finnish hospitals: in 2019, for example, pregnancy, childbirth and the puerperium only accounted for 9.0% of admissions to specialized medical care wards [12]. The difference can be explained by our cohort's young age. However, our rate also totals almost three times the 12.3% reported by Baykan et al. for Syrian refugees in Turkish ER and outpatient clinics [22]. Our high percentage of pregnancy cases is presumably linked to the following two points: 1) all deliveries in the capital region are handled in the HUH hospitals, and thus covered by our screening, and 2) all pregnant asylum seekers and refugees are systematically screened for MDR bacteria before labour. Indeed, according with our data, Buja et al. from Italy and Cots et al. from Spain report higher rates of obstetric and gynaecology presentations (6.3–13.4% and 25.7%, respectively) at hospital emergency department for immigrants than the host population [23,24]. As such, the high numbers of pregnant asylum seekers and refugees will allow more detailed research on maternal health and obstetric outcomes in this group. Indeed, a recent Finnish study by Tasa et al. found undocumented pregnant women to receive delayed and inadequate prenatal care [25].

Fairly common among our diagnoses were diseases of the genitourinary (7.7%) and the digestive system (8.5%) which in 2019, for example, did not differ much from hospitalization rates for the general population, 5.7% and 9.0%, respectively [12].

Diseases of the circulatory system were less frequent (2.6%) than among the overall admissions to Finnish hospitals (14.4%), which is probably explained by the cohort's young age [12].

Nearly one fourth (22.6%) of our patients were minors. In a systematic review, Markkula et al. show a greater proportion of hospital admissions and visits to emergency departments among migrant

Table 1

Background characteristics of asylum seekers, refugees and undocumented migrants admitted to Helsinki University Hospital, Finland, January 2010–June 2020 (n = 647 patients); data presented by geographic region of origin^a.

Patient attributes (%)	All n = 647 (100.0)	Europe n = 51 (7.9)	Asia n = 448 (69.2)	Africa n = 136 (21.0)	Other or unknown n = 12 (1.9)
Sex n (%)					
Male	292 (45.1)	16 (31.4)	218 (48.7)	53 (39.0)	5 (41.7)
Female	355 (54.9)	35 (68.6)	230 (51.3)	83 (61.0)	7 (58.3)
Median age years	26	27	26	27	27
Age group n (%)					
0–5 years	60 (9.3)	4 (7.8)	45 (10.0)	9 (6.6)	2 (16.7)
6–15 years	68 (10.5)	4 (7.8)	58 (12.9)	6 (4.4)	0 (0.0)
16–25 years	170 (26.3)	13 (25.5)	106 (23.7)	47 (34.6)	4 (33.3)
26–35 years	220 (34.0)	17 (33.3)	148 (33.0)	50 (36.8)	5 (41.7)
36–45 years	68 (10.5)	9 (17.6)	46 (10.3)	12 (8.8)	1 (8.3)
46–55 years	23 (3.6)	0 (0.0)	16 (3.6)	7 (5.1)	0 (0.0)
56–65 years	27 (4.2)	3 (5.9)	20 (4.5)	4 (2.9)	0 (0.0)
>65 years	11 (1.7)	1 (2.0)	9 (2.0)	1 (0.7)	0 (0.0)
Charlson comorbidity index n (%)					
0 points	583 (90.1)	46 (90.2)	401 (89.5)	124 (91.2)	12 (100.0)
1 point	10 (1.5)	1 (2.0)	8 (1.8)	1 (0.7)	0 (0.0)
2–3 points	41 (6.3)	3 (5.9)	30 (6.7)	8 (5.9)	0 (0.0)
4–5 points	5 (0.8)	0 (0.0)	3 (0.7)	2 (1.5)	0 (0.0)
>5 points	8 (1.2)	1 (2.0)	6 (1.3)	1 (0.7)	0 (0.0)
Median time from arrival in Finland; days^b	95	59	106	61	96
Prior hospitalization abroad n (%)	137 (21.2)	14 (27.5)	96 (21.4)	27 (19.9)	0 (0.0)
Prior invasive procedure abroad n (%)	84 (13.0)	7 (13.7)	61 (13.6)	16 (11.8)	0 (0.0)

Europe: Albania, Bulgaria, Greece, Kosovo, Latvia, Republic of Moldova, Romania, Russian Federation, Serbia, Ukraine.

Asia: Afghanistan, Armenia, Azerbaijan, Bangladesh, China, Georgia, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Myanmar, Nepal, Pakistan, Sri Lanka, State of Palestine, Syria, Turkey, Vietnam, Yemen.

Africa: Burundi, Cameroon, Congo, Egypt, Ethiopia, Eritrea, Gambia, Ghana, Guinea, Kenya, Libya, Morocco, Nigeria, Rwanda, Somalia, South Africa, Sudan, Uganda, Zambia.

Other or unknown: Brazil, Mexico, Nicaragua, unknown.

^a Patients' countries of origin grouped by the various geographic regions.

^b Data on arrival date missing for 31.8%.

Table 2

Reasons for hospitalization (ICD-10) of asylum seekers, refugees and undocumented migrants admitted to Helsinki University Hospital, Finland, January 2010–June 2020 by age.

ICD-10 (%)	All n = 647 (100.0)	Adults n = 501 (77.4)	Minors n = 146 (22.6)
Pregnancy, childbirth, and the puerperium (O00–O99)	209 (32.3)	205 (40.9)	4 (2.7)
Diseases of the digestive system (K00–K93)	55 (8.5)	38 (7.6)	17 (11.6)
Diseases of the genitourinary system (N00–N99)	50 (7.7)	45 (9.0)	5 (3.4)
Injury, poisoning and certain other consequences of external causes (S00–T98)	51 (7.9)	43 (8.6)	8 (5.5)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00–R99)	41 (6.3)	35 (7.0)	6 (4.1)
Certain infectious and parasitic diseases (A00–B99)	34 (5.3)	22 (4.4)	12 (8.2)
Diseases of the respiratory system (J00–J99)	28 (4.3)	18 (3.6)	10 (6.8)
Diseases of the musculoskeletal system and connective tissue (M00–M99)	28 (4.3)	25 (5.0)	3 (2.1)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50–D89)	26 (4.0)	14 (2.8)	12 (8.2)
Congenital malformations, deformations and chromosomal abnormalities (Q00–Q99)	26 (4.0)	0 (0.0)	26 (17.8)
Diseases of the nervous system (G00–G99)	21 (3.2)	8 (1.6)	13 (8.9)
Diseases of the circulatory system (I00–I99)	17 (2.6)	13 (2.6)	4 (2.7)
Neoplasms (C00–D49)	15 (2.3)	9 (1.8)	6 (4.1)
Diseases of the skin and subcutaneous tissue (L00–L99)	13 (2.0)	9 (1.8)	4 (2.7)
Mental and behavioural disorders (F00–F99)	10 (1.5)	8 (1.6)	2 (1.4)
Endocrine, nutritional and metabolic diseases (E00–E90)	9 (1.4)	2 (0.4)	7 (4.8)
Factors influencing health status and contact with health services (Z00–Z99)	6 (0.9)	4 (0.8)	2 (1.4)
Diseases of the eye and adnexa (H00–H59)	5 (0.8)	3 (0.6)	2 (1.4)
Certain conditions originating in the perinatal period (P00–P96)	2 (0.3)	0 (0.0)	2 (1.4)
Diseases of the ear and mastoid process (H60–H95)	1 (0.2)	0 (0.0)	1 (0.7)

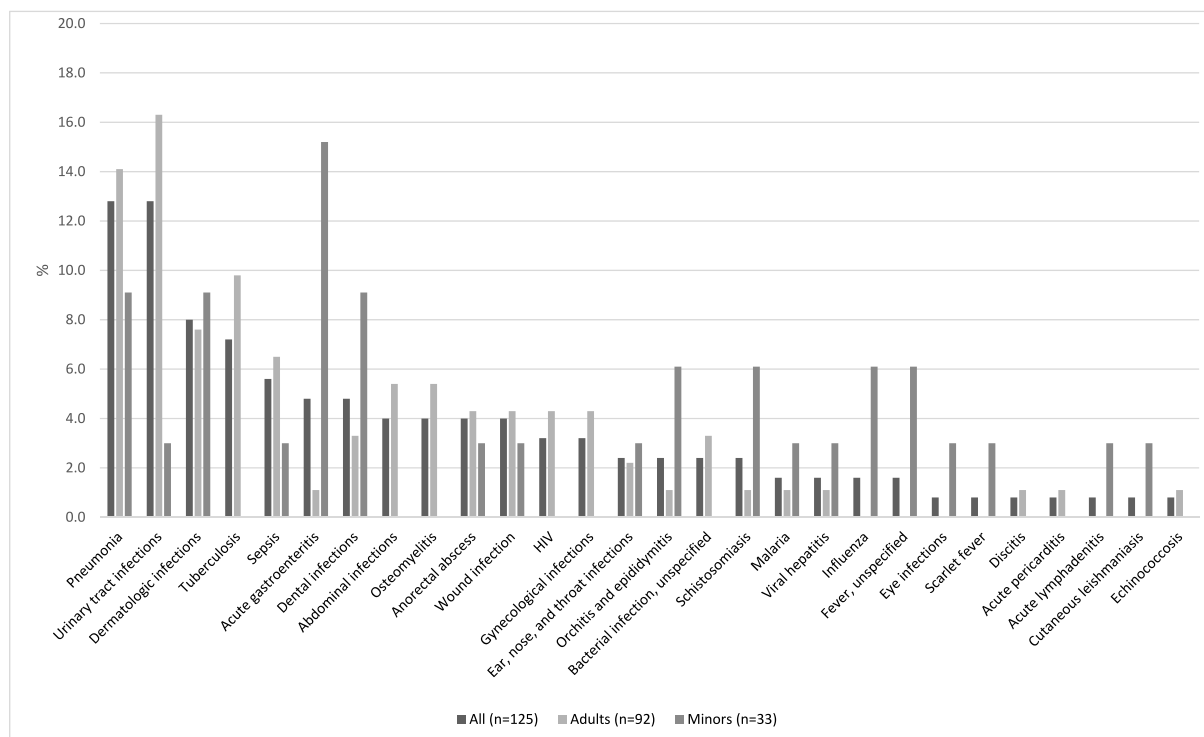


Fig. 2. Infections as reasons for hospitalization among asylum seekers, refugees and undocumented migrants admitted to Helsinki University Hospital by age.

children than the local population, suggesting delayed care or problems in accessing routine treatment [26]. In our data the most common reasons for hospitalization among minors were congenital malformations, deformations and chromosomal abnormalities, which can at least partly be attributed to our study setting, secondary/tertiary hospitals.

4.4. Infectious diseases

An infection accounted for one fifth (19.3%) of our hospital admissions. It is worth noting that infectious diseases proved more common (27.8%) within two months after the patients' arrival in Finland than later. Even at an earlier stage, the rate was lower than reported by Bloch-Infanger et al. 2014–15 for asylum seekers at a tertiary care hospital in Switzerland where more than half of the patients (55.6%) were admitted for an infectious disease [27]. Likewise, our rate did not reach that previously reported for Finns while abroad: Siikamäki et al. show that among their study population of Finnish travellers, half (48.7%) required hospital care because of infectious diseases [28]. The low rates in our study may reflect the study conduct at a secondary/tertiary hospital: the majority of infections are presumably treated in primary care with no need for hospital admission. Furthermore, as Finland is not a main entry point into Europe, many infections may already have been treated in other European countries before arrival in Finland [29].

Among minors, the three most common infections were gastroenteritis and respiratory and dermatologic infections. These data accord with an investigation carried out in Switzerland by Pohl et al. and another conducted in Sweden by Hertting et al., both reporting a similar spectrum and severity of infections among refugees and resident children [30,31].

A substantial proportion of infectious diagnoses were the same we commonly see among locals, too: urinary tract, respiratory tract, and dermatologic infections, and among minors, gastroenteritis. These data accord with reports describing a similar risk of respiratory and gastrointestinal infections for refugees and migrants as for the host population [7]. Likewise, respiratory tract infections (23%) proved the most common reason for migrants to seek primary health care at the

Greek-Turkish border [32]. Our results differ from those of Bloch-Infanger et al. reporting malaria as the most frequent infection among asylum seekers in a Swiss Hospital 2014–15 [27]. This difference may be explained by their study population including a higher rate of African patients than ours.

Time from the patients' arrival in Finland appears to have impacted on the diagnosis profiles, but the number of individual infections was too low for drawing definitive conclusions. Pneumonia and gastroenteritis accounted for a greater proportion of admissions among those immigrated within two months than those who had stayed longer. The diagnoses for infections with longer incubation periods, such as tuberculosis, were often made later. In Finland, 43% (96/224) of the new TB cases in 2019 were recorded for individuals of foreign origin [32]. This percentage accords with an increased risk of infection involving refugees and migrants from countries with high TB prevalence [7]. In our data this was not evident: only nine patients (1.4%) were admitted because of TB.

Asylum seekers in Finland are provided screening for TB, hepatitis B, HIV and syphilis based on individual risk assessment. According to the Ministry of Social Affairs and Health (STM) guidelines screening for pulmonary TB with a chest X-ray (CXR) should be offered within two weeks after arrival in Finland [33]. However, Tiittala et al. report for adults the delay of 74 days to pulmonary TB screening 74 days, and 91 days to hepatitis B, HIV and syphilis screening 91 days [34]. These data according with our results may be attributed, among other reasons, to delayed screening and late clinical manifestation of these infections. The ECDC reports for 2016 that 40% of the new HIV diagnoses in the EU/EEA were made among migrants who often sought care at a late stage of infection [7,35]. It is noteworthy that a significant proportion of migrants acquire HIV after arrival in the EU/EEA [36–38]. In Finland, 64% of the patients diagnosed with HIV in 2019 were of foreign origin [32]. Our data comprised only three new HIV diagnoses and a total of seven HIV-positive patients (1.1%). The finding accords with the overall rate of 0.3% reported by Tiittala et al. for asylum seekers screened in Finland 2015–16 [34].

The potentially long incubation periods and chronicity of some

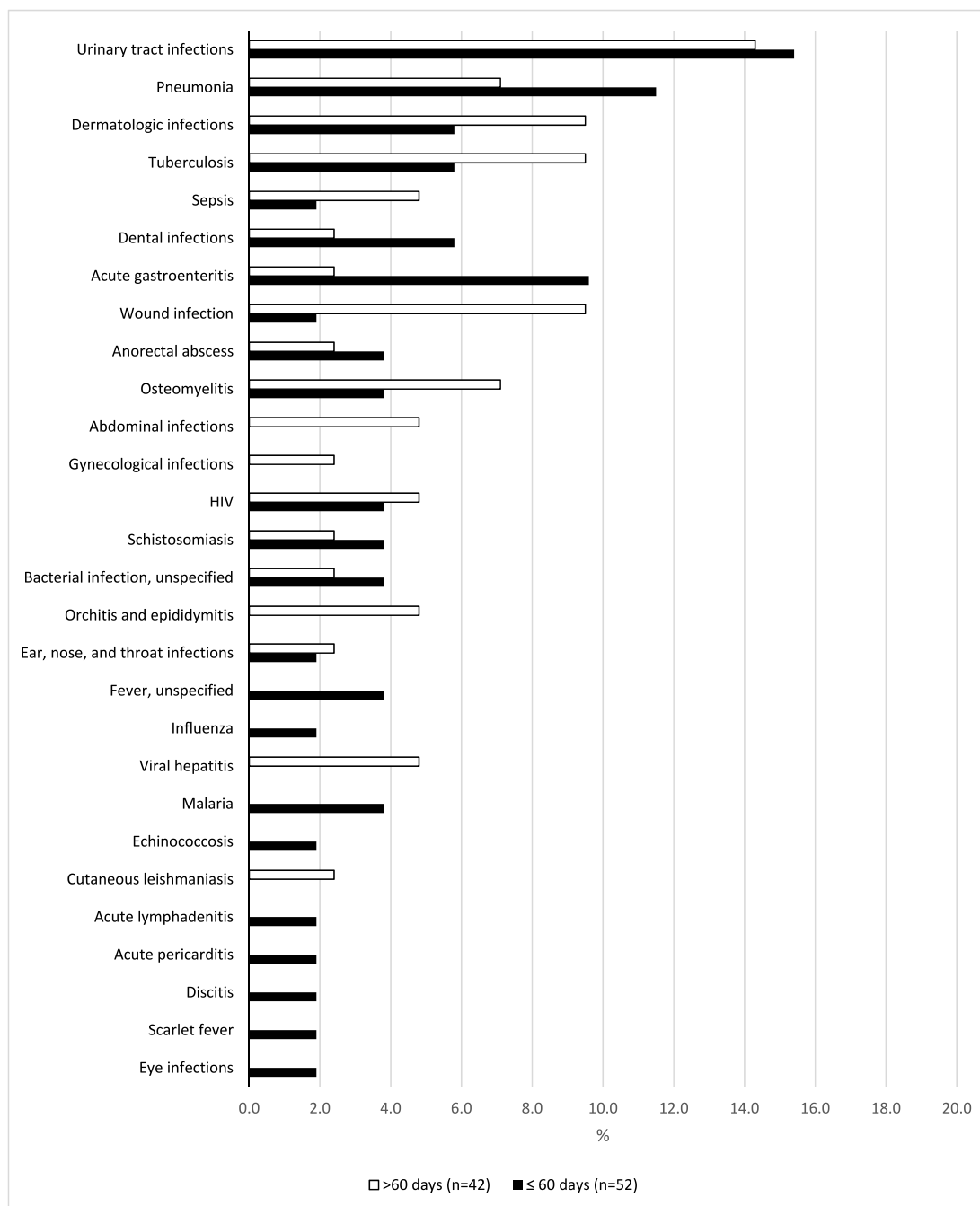


Fig. 3. Infections as reasons for hospitalization among asylum seekers, refugees and undocumented migrants admitted to Helsinki University Hospital by time after arrival in Finland. (Data on arrival date missing for 31.8%).

tropical and parasitic infections warrant special attention in healthcare of refugees and migrants [39]. Indeed, we identified two patients with malaria and three with schistosomiasis. Cutaneous leishmaniasis, hookworm disease, *Strongyloides* infection, and echinococcosis were also seen. Some of the diagnoses were made on arrival, while others remained latent for nearly two years.

4.5. Neoplasms

Eight patients died of malignancy. As reported by the WHO, even though refugees and migrants have lower risk of neoplasms (except cervical cancer), their diagnoses are more likely to be delayed than those of the host population [7].

5. Limitations

The main limitation of our study stems from its retrospective design and strict focus on data available in hospital records. The study population was restricted to patients admitted to secondary/tertiary hospitals, among whom only those screened for MDR bacteria could be included. As for the latter, however, we anticipate no significant selection effect as compared to those whose MDR screening had failed. Due to our research setting at a secondary/tertiary hospital, the study does not cover the primary care or outpatient clinics and thus does not represent the total health care needs of this patient group.

As for undocumented migrants, we may not have covered the whole group, since the hospital MDR guidelines do not instruct their screening. However, due to their foreign origin and possible previous asylum

seeker status, many doctors interpret the guidelines as if they should be screened.

6. Conclusions

Our study presents a variety of reasons for hospitalization of asylum seekers, refugees and undocumented migrants. The data highlight a substantial frequency of obstetric admissions, especially among undocumented migrants. One fifth of the patients were admitted because of an infection, a reason we found more common within two months after arrival in Finland than later.

Authors' contributions

Study concept and design AK; acquisition of data TA; analysis and interpretation of results TA, AK; drafting of manuscript TA, AK; statistical analysis TA; final approval of version published TA, AK.

CRediT authorship contribution statement

Tuomas Aro: Investigation, Formal analysis, Data curation, Writing – original draft, Visualization, Funding acquisition. **Anu Kantele:** Supervision, Conceptualization, Methodology, Writing – original draft, Funding acquisition.

Declaration of competing interest

The authors declare no conflicts of interest.

Acknowledgements

The authors thank Jukka Ollgren (Finnish Institute for Health and Welfare) for expert advice in statistical analyses and Ville Holmberg for valuable comments on the manuscript. This work was supported by the Finnish Governmental Subsidy for Health Science Research, the Sigrid Juselius Foundation, the Finnish Cultural Foundation, the Finnish Medical Foundation, Medical Society of Finland (Finska läkaresällskapet), Finnish Society of Infectious Diseases Doctors (Suomen Infektiolääkärit), and the Scandinavian Society for Antimicrobial Chemotherapy Foundation. The funding sources were not involved in study design, collection, analysis and interpretation of data, devising manuscript, and decision to submit the article for publication.

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