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Referrals to secondary care in an outpatient primary care walk-in clinic for refugees in Germany: results from a secondary data analysis based on electronic medical records

Ingmar Schäfer ![ORCID] ,[1] Jan Hendrik Oltrogge,[1] Susanne Pruskil,[1,2] Claudia Mews,[1] Dana Schlichting,[1] Martin Jahnke,[1] Hans-Otto Wagner,[1] Dagmar Lühmann,[1] Martin Scherer[1]

[1]Department of Primary Medical Care, University Medical Center Hamburg-Eppendorf, Hamburg, Germany
[2]Local Health Authority Altona, Free and Hanseatic City of Hamburg, Hamburg, Germany

Correspondence to
Dr Ingmar Schäfer;
in.schaefer@uke.de

ABSTRACT

Objectives The aims of our study were to describe the disease spectrum of refugees, to analyse to what extent their healthcare needs could be met in an outpatient primary care walk-in clinic and which cases required additional services from secondary care (ie, outpatient specialists or hospitals).

Design Retrospective longitudinal observational study.

Setting The study was based on routine data from a walk-in clinic in the largest central first reception centre in Hamburg, Germany between 4 November 2015 and 21 July 2016.

Participants 1467 asylum seekers with 4006 episodes of care (ie, distinctive health problems) resulting in 5545 consultations. The patients were 60% men and had a mean age of 23.2 years. About 90% of the patients were from Central Asia or from the Middle East and North Africa.

Primary and secondary outcome measures The endpoint of our analyses was referral to secondary care. Time to event was defined as days under treatment until the first referral. Predictor variables were the patients' diagnoses grouped in 46 categories. The data set was analysed by Cox regression allowing for multiple failure times per patient. This analysis was adjusted for age, sex and country of origin.

Results Referrals to secondary care occurred in 15.5% of the episodes. The diagnosis groups with the highest referral rates were 'eye' (HR 4.9; 95% CI 3.12 to 7.8; p≤0.001), 'teeth/gum symptom/complaint or disease' (3.51; 2.52 to 4.9; p≤0.001) and 'urological system/female or male genital' (2.50; 1.66 to 3.77; p≤0.001). Age, sex and country of origin had no significant effect on time until referral.

Conclusions In most cases, the walk-in clinic physicians could provide first-line medical care for the health problems of patients not integrated in the German healthcare system. Additional resources were needed particularly not only for visual impairment and dental problems but also for psychological disorders, antenatal care and certain infections and injuries.

Strengths and limitations of this study

► Multivariable analyses adjusted for confounders and allowing for cluster effects in the data set.
► There is no selection bias, because we did not need to obtain patient consent, and there is no recall bias concerning diagnosis and treatment data.
► In some cases, our retrospective coding may be imprecise or incomplete, because it is based on electronic medical records and could not be verified by clinical examination of the patients.
► The reasons for discontinued episodes of care are unknown, for example, the health problem may have been resolved, the patient may have chosen to use emergency care or to refrain from further treatment despite persistent symptoms.
► The data set only includes one first reception centre, which may weaken the representativeness of the study.

INTRODUCTION

In the years 2015 and 2016, almost 2.5 million refugees entered the European Union. Syria, Afghanistan and Iraq were the most frequent main citizenships in this period and the preferred destination of most asylum seekers was Germany. Subsequently, during 2017–2018, the number of asylum seekers almost halved, roughly matching the number before 2015.[1] However, the root causes for migration such as war, displacement and poverty remain unchanged today and there is still a gap between evidence regarding how migration should be addressed and the often interest-driven and inconsistent European responses.[2]

The influx of refugees in 2015–2016 posed major challenges to the host countries, regarding not only housing and equipment with basic necessities but also the provision of

medical care. On the one hand, severe health problems of the asylum seekers had to be addressed, for example, acute mental health problems, physical problems and disabilities, malnutrition and a wide range of non-communicable and infectious diseases.[3–5] On the other hand, politicians and health professionals intended to protect the resident population from infectious diseases, which might be introduced by newly arrived refugees.[6]

There are different approaches to first-line medical care for refugees ranging from emergency care supplemented by screening and immunisation services to full access to primary healthcare.[4 7] Access to available healthcare for refugees is often impeded by various barriers including insufficient information about services, missing interpreters and lack of continuity and comprehensive care.[8 9] Excluding refugees from healthcare is related to adverse health outcomes and may—in the long term—result in higher health expenditures than regular access to care.[4 10 11]

In 2015—2016, the Federal State of Hamburg received approximately 57 000 first-time asylum applicants. Due to a lack of suitable accommodations, the federal government approved the temporary conversion of non-residential facilities (eg, large hardware stores) into housing facilities accommodating up to 1500 refugees each.[12] To ensure low-threshold medical care, the health authority of Hamburg commissioned first-line medical care services for all residents of the largest central first reception centre in an attempt to compensate for the lack of access to regular healthcare services. As a result, a local walk-in clinic was established and operated from 4 November 2015 to 21 July 2016. The clinic was run by primary care physicians and included interpreting services.

The aims of our study were (1) to characterise (a) the patients and (b) the spectrum of health problems treated in the walk-in clinic, (2) to describe to what extent our approach was able to meet refugees' healthcare needs– as indicated by the proportion of health problems that could be solved without referral and (3) to analyse for which specific health problems additional services were regularly needed—as indicated by early referral to secondary care (ie, outpatient specialists or hospitals).

METHODS
Setting
In Germany, newly arrived asylum seekers have limited access to healthcare as regulated by the Asylum Seekers Benefits Act ('*Asylbewerberleistungsgesetz*'). They can receive treatment for acute illnesses and severe pain, but many other conditions are excluded, for example, chronic illnesses. Vulnerable groups, such as pregnant women, can receive additional services. If the asylum seekers stay in Germany for 15 months or longer, they will be insured by a statutory health insurance and can receive the same services as the resident population. Some federal states, such as Hamburg, issue temporary health insurance registrations after the refugees apply for asylum. The

temporary registration facilitates direct access to healthcare providers but it does not affect the spectrum of services the asylum seekers can use.[13 14] However, due to the large number of applications during the years 2015–2016, the temporary health insurance registration was often delayed for a longer period of time.

Our study is based on routine data from the outpatient primary care walk-in clinic in the largest first reception centre in Hamburg ('*Zentrale Erstaufnahme—Am Rugenbarg*'), which had been set up in a cooperation between the local health authority of Hamburg-Altona and the Department and Policlinic of Primary Care at the University Medical Center Hamburg-Eppendorf (UKE). Initially, in November 2015, up to 1600 refugees were housed in the first reception centre. From December 2015 to April 2016, the number of residents ranged between 1006 and 1354 until continuously decreasing to 584 in July 2016. From the beginning, the number of clinic visits of approximately 430–518 patients per month was relatively stable, before starting to significantly decrease to 272 and 158 in June and July 2016, respectively. On 21 July 2016, the first reception centre and the affiliated clinic were closed due to the reduced number of newly registered refugees. Until decommissioning, the clinic was open 8 hours a day from Monday to Friday.

The Department and Policlinic of Primary Care at the UKE was involved in the development of a so-called container solution, which won the German Federal Government award 'Deutschland, Land der Ideen'. The container served as walk-in clinic and consisted of a waiting area, a preparation room and a medical treatment room containing a medication cabinet with necessary medical equipment for first-line medical care. Communication was ensured by video remote interpreting services.[15]

Without health insurance registration, patients could be examined and treated with regards to general medical treatment and basic wound treatment. Additionally, special consultations were offered on a voluntary basis by medical specialists in paediatrics (2 hours per week), gynaecology and dentistry (both without regular consultation hours) as well as psychological and psychiatric trauma counselling (in severe cases on demand). The physicians were assisted by an emergency medical technician who coordinated the consultations and was able to provide first aid in emergencies. For imaging and laboratory testing, patients had to be sent to the UKE. Letters of referral from the walk-in clinic facilitated treatment and accounting in secondary care even if the patients had no health insurance registration.

Data source
Electronic medical records included non-standardised information about medical history and examinations, performed procedures, diagnostic findings, diagnoses, treatments and medications and—in 32.2% of the consultations—standardised 'International Statistical Classification of Diseases and Related Health Problems, 10th revision' (ICD-10) diagnoses. Our data set encompassed

the complete project period from 4 November 2015 to 21 July 2016 and included all patients with sociodemographic data and all consultations with complete medical records.

Before data analysis, the medical records were deidentified by the staff at the UKE. Patient consent did not have to be obtained as anonymised process data were analysed (as regulated by German law in §75 Sozialgesetzbuch (SGB) X). The local ethics committee of the Hamburg Medical Association appraised the study (Reference Number. WF-053/18; 30 October 2018) and concluded that there was no need for counselling because the analysed database was completely deidentified.

For the extraction of diagnoses and medical treatment procedures, the study investigators (JHO, DS and MJ) manually assigned the corresponding 'International Classification of Primary Care, second Revision' (ICPC-2) codes.[16] Every investigator analysed between 1725 and 1936 medical records. All documented health problems and healthcare responses were considered including chronic conditions and recurring procedures. The investigators were trained in ICPC coding and blinded to the objectives of our study. Ambiguous and complicated cases were discussed in regular team meetings and solved with consensus. The investigators were instructed to follow the wording of the free text entries as closely as possible and to code only one diagnosis on the highest level of information for each health problem, for example, patients with a common cold were diagnosed with 'upper respiratory infection acute' but not with diagnoses for symptoms, such as coughing, if they could be explained by the leading diagnosis. If ICD-10 codes were provided, we used the official mapping tables translating them into ICPC-2 codes.[17]

In order to facilitate a longitudinal analysis, health problems were coded according to the concept of 'episodes of care' describing distinctive health problems possibly resulting in multiple consultations.[18] All consultations of each patient were assigned to one or more episodes of care depending on the number of medical problems documented at the same time. If a medical problem was addressed at more than one encounter, all related consultations were marked as part of the same episode. Online supplemental figure S1 exemplifies the grouping of consultations and episodes of care in a hypothetic patient.

The data in our study are thus available on three levels. (1) The patient level describes features of the individuals, for example, the distribution of sociodemographic data and the incidence of health problems in the walk-in clinic population. The patient level neglects multiple occurrences of similar health problem in the same individual and multiple consultations resulting from the same health problem, (2) the episodes of care level describes features of the health problems, for example, how long the patients have to be treated for the same health problem and how frequently distinctive health problems can be found in the data set. The episodes of care level do not consider if health problems occur in different individuals and it also

does not respect the number of resulting consultations and (3) the consultation levels describe features of the healthcare utilisations, for example, how frequently the physicians had to treat certain health problems, considering that the same health problem can result in multiple consultations and that patients can suffer multiple times from the same distinctive health problems.

Patient and public involvement
There were no patient and public involvement in the design, conduct and reporting of our research.

Endpoint, sociodemographic data and predictor variables
The endpoint of our analyses was referral to secondary care. The duration of the episodes of care was defined as days undergoing treatment by a primary care physician in our walk-in clinic, that is, episodes including only one encounter counted as 1 day. Time to event was defined accordingly as days undergoing treatment in our walk-in clinic until the first referral.

The sociodemographic data of the patients included information about age, sex and their country of origin. Regarding analyses of sociodemographic data, the frequency of health problems and the healthcare utilisation, six age groups, were calculated including at least 10% and not more than 20% of the patients (ie, 0–5; 6–17; 18–23; 24–29; 30–39 and 40–73 years old). As many different nations were represented in the data set, the refugees' countries of origin were grouped according to their geographical region (ie, 'Central Asia'; 'East-Central and South-East Europe'; 'East, West and Central Africa'; 'Middle East and North Africa' and 'Post-Soviet Eurasia').

The main predictor variables were the patients' diagnoses. As many different health problems were treated in the walk-in clinic and we did not want to lose available information by excluding infrequent diagnoses, diagnosis groups with a frequency ≥1.0% on the episode-of-care level were generated on the basis of the ICPC-2 diagnoses. The diagnosis groups should preserve the highest level of available information and facilitate the statistical analyses. As a first step, single diagnoses (eg, 'upper respiratory infection acute') were used as diagnosis group if they fulfilled the frequency criterion. In the second step, diagnosis groups were composed from a combination of a single ICPC-2 organ system and a single ICPC-2 diagnosis type (eg, 'injuries of the musculoskeletal system'). In a third step, we built diagnosis groups comprising a complete organ system or—in the cases of 'injuries' and 'infections'—a complete diagnosis type. In the fourth step, we generated diagnosis groups from combinations of organ systems (eg, 'urological system, female and male genital').

Teeth problems (symptoms/complaints and diseases) were grouped in a separate diagnosis group because they are not usually treated by primary care in Germany. As there were only very few congenital anomalies and neoplasms in the data set, these diagnosis types were included in the category 'other diagnoses'. The diagnosis

groups were not allowed to overlap, that is, diagnoses already included into a higher level diagnosis group were excluded from groups of lower levels (eg, 'infections of the skin' do not include 'scabies/other acariasis' and 'pediculosis/skin infestation other', which are already represented as single diagnoses). The diagnosis groups and the assigned single diagnosis are found in the online supplemental tables S1 to 9.

Data analysis
Patient characteristics
Descriptive data regarding sociodemography, healthcare utilisation and the health problems with the highest incidence in the patient population of the walk-in clinic were presented as means and SD and as percentages, respectively. We compared sociodemographic data of patients who received at least one referral with patients who never received a referral to secondary care by t-tests in cases of continuous variables and χ^2 tests in cases of categorical variables. As three statistical tests had to be conducted, these analyses were Bonferroni-adjusted and an α-level of 1.7% (p≤0.017) was therefore defined as statistically significant. All of these analyses were conducted on the patient level.

Spectrum of health problems treated in the walk-in clinic
In order to analyse how often the physicians of the walk-in clinic were confronted with specific health problems, the frequencies of ICPC diagnosis types (eg, infections, injuries or neoplasms) within ICPC-2-organ systems (eg, respiratory system) were described on the consultations level. As the treatment of children is sometimes connected to different requirements than the treatment of adults, this analysis was stratified by age groups. Single diagnoses were shown if they occurred in ≥1.0% of the consultations of the respective age group.

Episodes of care and referrals to secondary care
The duration of the episodes of care and the resulting number of consultations were described by means and SD and the total referral rate was shown as percentage. For each diagnosis group, we also presented the proportion of episodes of care resulting in a referral. For each health problem, curves visualised the growth over time of (1) the fraction of patients who received a referral to secondary care and (2) the fraction of patients whose medical care got discontinued (eg, because the health problem had resolved). These analyses were performed on the episodes of care level.

Association between the specific health problems and time until referral
Time until referral was analysed by Cox regression analyses adjusted for the clustering of health problems in patients and allowing for multiple failure times (ie, one individual failure time for each episode of care). Relative risks for early referral connected with having versus not having the respective diagnoses were expressed as HRs with 95% CIs. This analysis shows whether the specific diagnosis

groups were significantly associated with early referrals to secondary care as indicated by HRs>1 or significantly related to late referrals as indicated by HRs<1. If no referrals occurred during the observation time, the respective diagnosis group had to be excluded prior to analysis.

For the Cox regression analysis, we defined a multivariable model representing all diagnosis groups and each diagnosis was thus adjusted for the influence of all other diagnoses. Additionally, the analysis was also controlled for age, sex and patients' country of origin. Two of the 46 diagnosis groups (namely 'pediculosis/skin infestation other' and 'back syndrome without radiating pain') had to be excluded from the analysis, because no events had occurred in these diagnosis groups during the observation time. We defined an α-level of 5% (p≤0.05) as statistically significant. All statistical analyses were performed using Stata version 15.1.

RESULTS
Participants
During the 220 working days of the observation period, there were 6219 consultations of 1516 patients at the walk-in clinic. Due to missing entries in the medical records, 49 patients (3.2%) had to be excluded and 674 consultations (10.8%) of patients included in the data set could not be analysed. The final data set included 1467 patients with 5545 consultations, with 95.7% performed by primary care physicians, 2.5% by paediatricians, 1.2% by gynaecologists, 0.3% by dentists and 0.3% by psychiatrists or psychologists. For our longitudinal analyses, the consultations were assigned to 4006 episodes of care.

Patient characteristics
Sociodemographic data of the patients are shown in table 1. The mean age of the patients was 23.2 years. When assigned to the predefined age groups, 14.4% of the patients were between 0 and 5 years, 19.3% between 6 and 17 years, 19.2% between 18 and 23 years, 17.6% between 24 and 29 years, 16.5% between 30 and 39 years and 13.0% between 40 and 73 years of age. More than 60% of the patients were men.

About 90% of the patients were from Central Asia, mainly Afghanistan or from the Middle East and North Africa, mainly Syria, Iraq and Iran. The subgroup of patients who received at least one referral was older and more often women than the subgroup of patients who were never referred to secondary care. Sociodemographic data stratified by age and sex are shown in online supplemental tables S10 and 11.

The health problems with the highest incidence among the patients treated in the walk-in clinic are shown in online supplemental table S12 . Differences between male and female patients and the age dependency of the health problems are analysed in online supplemental tables S13 and 14. The patients had between 1 and 30 consultations at the walk-in clinic (mean±SD: 3.8±3.6) and between 1 and 15 episodes of care (2.8±2.1). Online supplemental table S15 shows the mean number of consultations by age and sex.

Spectrum of health problems treated in the walk-in clinic
The frequency in which specific health problems were presented during the consultations in the walk-in clinic is

Table 1 Sociodemographic data by referral to secondary care (patient level)

	Total	Without any referrals to secondary care	With at least one referral to secondary care	P value
Age at first consultation:				
Mean±SD	23.2±14.8 years;	22.5±15.0 years	24.7±14.4 years	0.009
	(n=1434)	(n=973)	(n=461)	
Sex: n %				
Female	529; 37.3%	322; 33.5%	207; 45.4%	<0.001
Male	889; 62.7%	640; 66.5%	249; 54.6%	
Country of origin: n; %				0.022
Central Asia, thereof:	653; 46.9%	427; 45.3%	226; 50.1%	
Afghanistan	651; 46.7%	426; 45.2%	225; 49.9%	
Bangladesh	1; 0.1%	1; 0.1%	–	
Pakistan	1; 0.1%	–	1; 0.2%	
Middle East and North Africa, thereof:	599; 43.0%	430; 45.7%	169; 37.5%	
Syria	311; 22.3%	227; 24.1%	84; 18.6%	
Iraq	183; 13.1%	134; 14.2%	49; 10.9%	
Iran	95; 6.8%	63; 6.7%	32; 7.1%	
Palestine	4; 0.3%	2; 0.2%	2; 0.4%	
Morocco	2; 0.1%	1; 0.1%	1; 0.2%	
Turkey	2; 0.1%	2; 0.2%	–	
Tunisia	1; 0.1%	–	1; 0.2%	
Yemen	1; 0.1%	1; 0.1%	–	
East, West and Central Africa, thereof:	62; 4.5%	36; 3.8%	26; 5.8%	
Eritrea	38; 2.7%	23; 2.4%	15; 3.3%	
Somalia	15; 1.1%	6; 0.6%	9; 2.0%	
Ghana	3; 0.2%	2; 0.2%	1; 0.2%	
Mali	2; 0.1%	2; 0.2%	–	
Gambia	1; 0.1%	–	1; 0.2%	
Guinea-Bissau	1; 0.1%	1; 0.1%	–	
Niger	1; 0.1%	1; 0.1%	–	
Nigeria	1; 0.1%	1; 0.1%	–	
East-Central and South-East Europe, thereof:	41; 2.9%	28; 3.0%	13; 2.9%	
Macedonia	14; 1.0%	11; 1.2%	3; 0.7%	
Albania	9; 0.6%	5; 0.5%	4; 0.9%	
Bosnia-Herzegovina	6; 0.4%	5; 0.5%	1; 0.2%	
Montenegro	4; 0.3%	4; 0.4%	–	
Serbia	4; 0.2%	1; 0.1%	3; 0.7%	
Kosovo	3; 0.1%	2; 0.2%	1; 0.2%	
Poland	1; 0.1%	–	1; 0.2%	
Post-Soviet Eurasia, thereof:	38; 2.7%	21; 2.2%	17; 3.8%	
Russia	32; 2.3%	17; 1.8%	15; 3.3%	
Armenia	6; 0.4%	4; 0.4%	2; 0.4%	

shown in figure 1. The consultations most often included diagnoses of the respiratory system. Other recurrent organ systems were the digestive system and the skin. The least recurrent categories were 'blood, blood-forming and immune mechanism', 'male genital' (0.6%; not shown) and 'social problems' (0.3%; not shown). The frequency of the
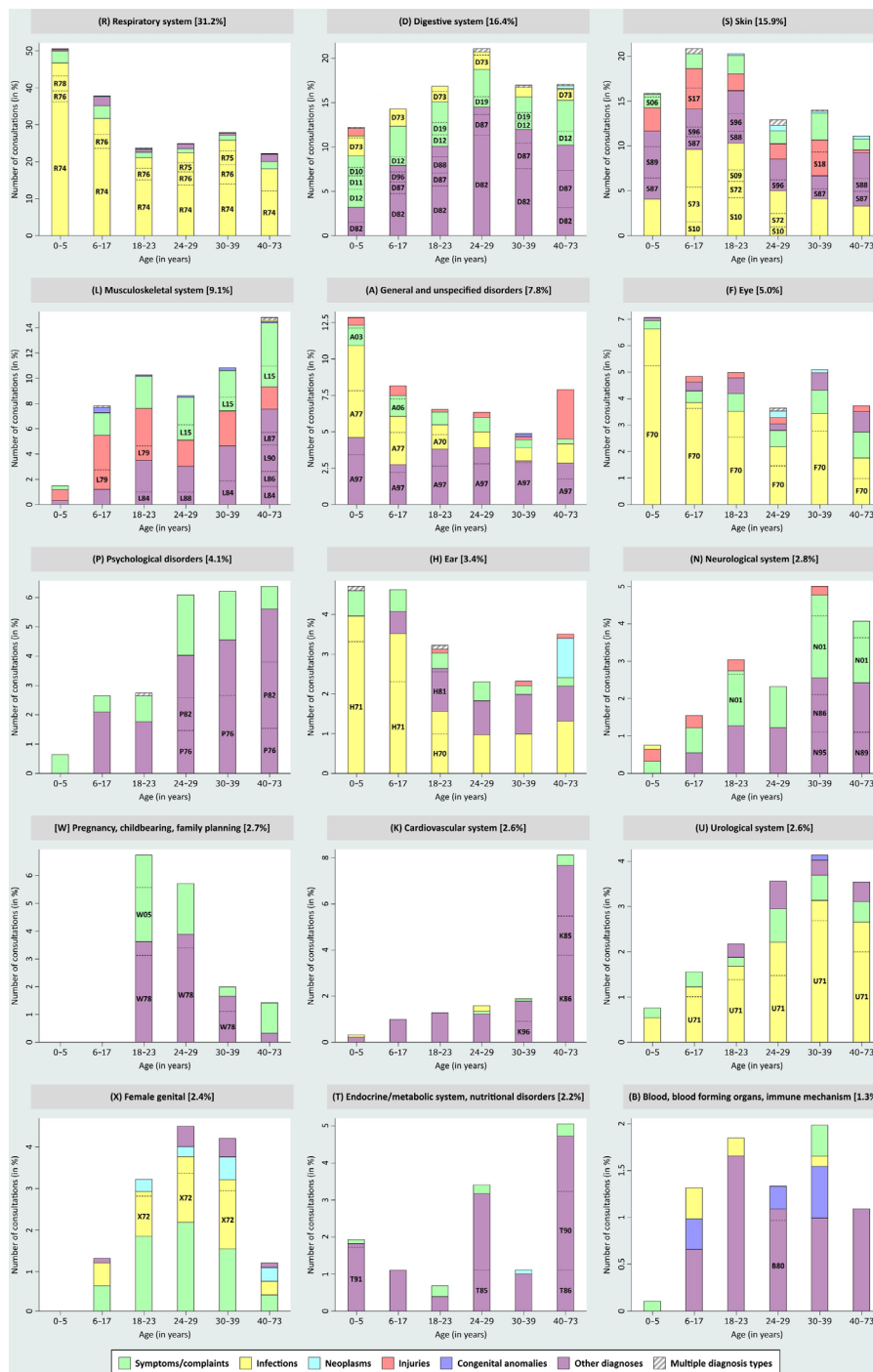
Figure 1 Frequencies of ICPC-2 diagnoses by age groups* (consultations level). *Diagnoses <2.5% in the respiratory system and diagnoses <1.0% in other systems are not individually shown. A03, fever; A06, fainting/syncope; A77, viral disease other/NOS; A97, no disease; B80, iron deficiency anaemia; D10, vomiting; D11, diarrhoea, D12, constipation; D19, teeth/gum symptom/complaint; D73, gastroenteritis presumed infection; D82, teeth/gum disease; D87, stomach function disorder; D88, appendicitis; D96, worms/other parasites; F70, conjunctivitis infectious; H70, otitis externa; H71, acute otitis media/myringitis; H81, excessive ear wax; K85, elevated blood pressure; K86, hypertension uncomplicated; K96, haemorrhoids; L15, knee symptom/complaint; L79, sprain/strain of joint NOS; L84, back syndrome without radiating pain; L86, back syndrome with radiating pain; L88, rheumatoid/seropositive arthritis; L90, osteoarthrosis of knee; N01, headache; N86, multiple sclerosis; N89, migraine; N95, tension headache; P76, depressive disorder; P82, post-traumatic stress disorder; R74, upper respiratory infection acute; R75, sinusitis acute/chronic; R76, tonsillitis acute; R78, acute bronchitis/bronchiolitis; S06, rash localised; S09, infected finger/toe; S10, boil/carbuncle; S17, abrasion/scratch/blister; S18, laceration/cut; S72, scabies/other acariasis; S73, pediculosis/skin infestation other; S87, dermatitis/atopic eczema; S88, dermatitis contact/allergic; S89, diaper rash; S96, acne; T85, hyperthyroidism/thyrotoxicosis; T86, hypothyroidism/myxoedema; T90, diabetes non-insulin dependent; T91, vitamin/nutritional deficiency; U71, cystitis/urinary infection other; W05, pregnancy vomiting/nausea; W78, pregnancy; X72, genital candidiasis female. ICPC,International Classification of Primary Care; NOS, not otherwise specified.

specific health problems depended on the age group, for example, some diagnoses were most common in the 0-year to 5-year olds (eg, respiratory system, eye) and others in 24-year to 29-year olds (eg, digestive system) or in 40-year to 73-year olds (eg, musculoskeletal or cardiovascular system).

Episodes of care and referrals to secondary care

Episodes of care had a mean duration of 9.8±26.8 days. Most of the episodes (72.2%) were one-time visits. In contrast, 9.5% of the episodes comprised multiple visits and had a duration of 1 week or less, 4.6% were between 1 and 2 weeks, 4.6% were between 2 and 4 weeks, 6.0% were between 4 and 12 weeks and 3.2% were between 12 and 36 weeks (maximum 251 days). As expected, the mean number of consultations was higher if episodes had a longer duration, for example, a mean of 2.1±0.4 visits in episodes with a duration of 1 week or less and 5.0±3.6 visits in episodes with a duration of 12–36 weeks.

Referrals to secondary care occurred in 735 consultations (13.3%) corresponding to 620 episodes (15.5%) and 464 patients (31.6%). The frequency of the specific health problems and their referral rates are shown in online supplemental tables S16 and 17. For each diagnosis group, the figures 2 and 3 show the growth over time of the fraction of patients who received a referral to secondary care as compared with the growth over time of the fraction of patients whose medical care got discontinued. In these figures, the upper blue area shows the number of discontinued episodes of care, the middle green area shows the number of patients under treatment and the lower red area shows the number of episodes with referrals to secondary care. The beginning of white areas indicates that no additional discontinued episodes and no additional episodes with referrals have occurred as of that time. The proportion of referrals varied between 0% and 55.9% in the different diagnosis groups. There were no referrals in the diagnosis groups 'pediculosis/skin infestation other' and 'back syndrome without radiating pain'. The diagnosis groups with the highest proportion of referrals were 'pregnancy', 'eye' and 'teeth/gum symptom/complaint or disease'.

Association between the specific health problems and time until referral

Time until referral was analysed in one multivariable model including sociodemographic data and 44 diagnosis groups. This analysis showed no statistical significant effect of age (HR 0.97; 95% CI 0.91 to 1.03; p=0.317 for a 10-year difference), sex (0.95; 0.79 to 1.15; p=0.605 for women compared with men) and country of origin (1.44; 0.83 to 2.52; p=0.198 for 'East-Central and South-East Europe'/0.97; 0.62 to 1.53; p=0.897 for 'East, West and Central Africa'/1.20; 0.98 to 1.46; p=0.072 for 'Middle East and North Africa'/0.99; 0.52 to 1.90; p=0.981 for 'Post-Soviet Eurasia'/each compared with the reference category 'Central Asia').

Figure 4 shows the association between the diagnosis groups and time until referral. Diagnosis groups associated with late referrals included 'stomach function disorder', 'conjunctivitis infectious' and 'upper respiratory infection acute'. The diagnosis groups with the highest association with early referrals to secondary care were 'eye', 'teeth/gum symptom/complaint or disease' and 'urological system/female or male genital'.

DISCUSSION
Statement of principal findings

A large part of the treated disease spectrum consisted of acute and chronic diseases, which are usually also frequently found in the domestic population. For example, respiratory infections and conjunctivitis were highly prevalent particularly among young children, and they could also be found in all other age groups. In younger adults, urinary tract and vaginal yeast infections had a higher incidence, while hypertension and diabetes mellitus played a greater role in middle-aged and older adults. Approximately 15% of the 15-year-old to 49-year-old women consulting the walk-in clinic were seeking gynaecological care due to being pregnant. Only a relatively small proportion of the consultations took place due to infectious diseases, such as malaria or tuberculosis, which are rare in industrialised countries.

Some illnesses were probably attributable to the nutritional situation of the population. In all age groups, gastroenteritis, constipation and worms were frequently discussed in consultations. In addition, vitamin deficiencies indicated malnutrition in several of the treated children below 6 years of age. Specific diseases, such as lice and scabies, which mainly affected older minors and younger adults, most likely originated in the housing conditions and hygiene behaviour. Likewise, and in all age groups, but particularly in young adults, many consultations addressed teeth and gum problems.

Another disease cluster might be related to experiences in the country of origin and during the flight. Psychological disorders and traumata mainly affected the adult population over 24 years of age, particularly depression and post-traumatic stress disorder. In addition, somatisations, for example, headache, were frequently mentioned during consultations. But psychological and psychosomatic reasons for consultation were prevalent even among children and younger adults.

Furthermore, physical traumata were frequently detected. In addition to fractures and sprains of the musculoskeletal system, found in all age groups, skin injuries were also often treated, particularly in children and younger adults.

Referrals to outpatient specialists or inpatient treatments were comparatively rare in the walk-in clinic. In our analyses, time until referral seemed to be independent of patients' age, sex and country of origin although there was a strong link to some of the diagnosis groups. Both, the highest rate of referrals and the strongest association with time until referral were found in dental problems—for which our walk-in clinic could only provide symptomatic treatment—as well as in non-infectious non-traumatic ophthalmologic disorders, particularly
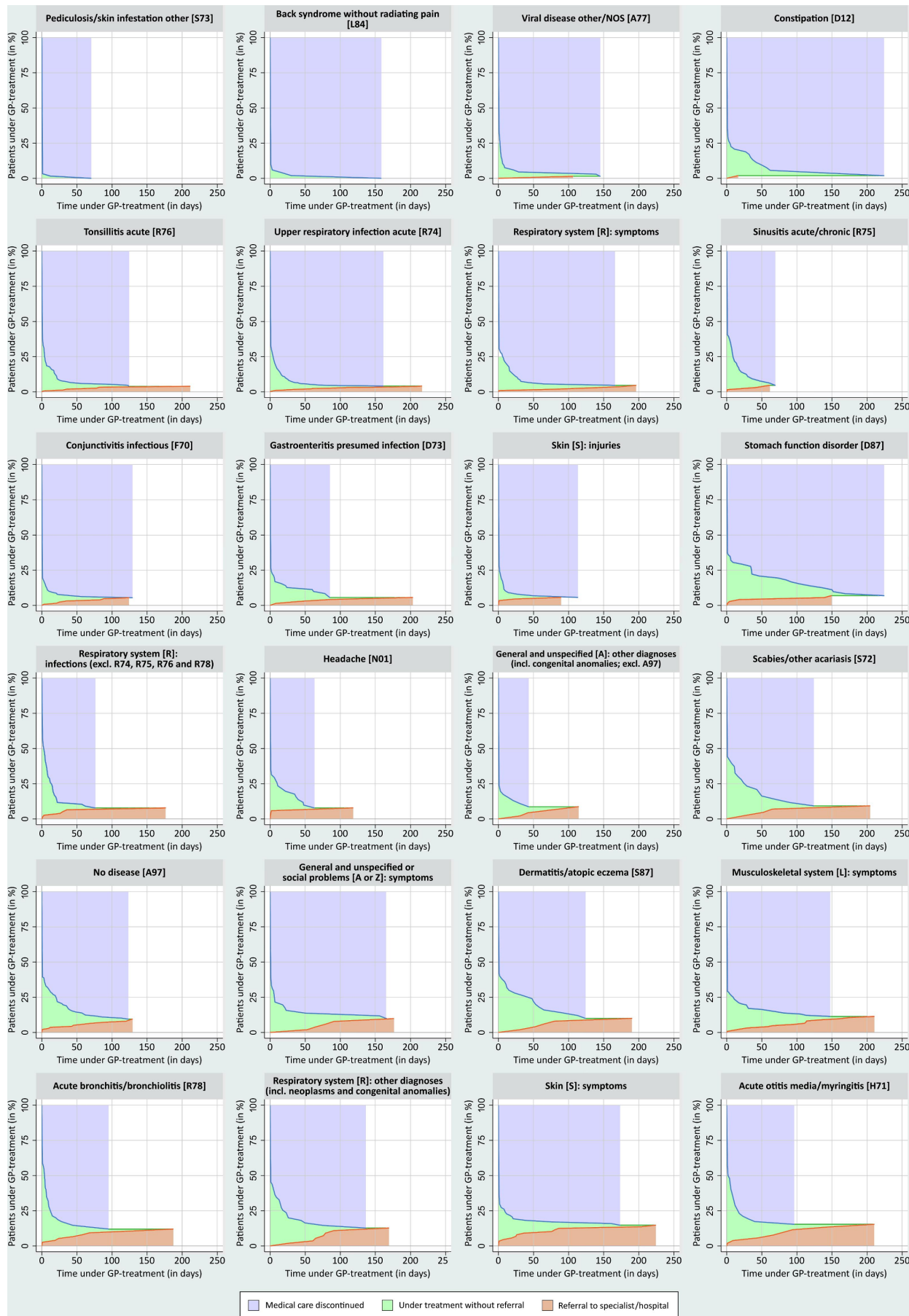
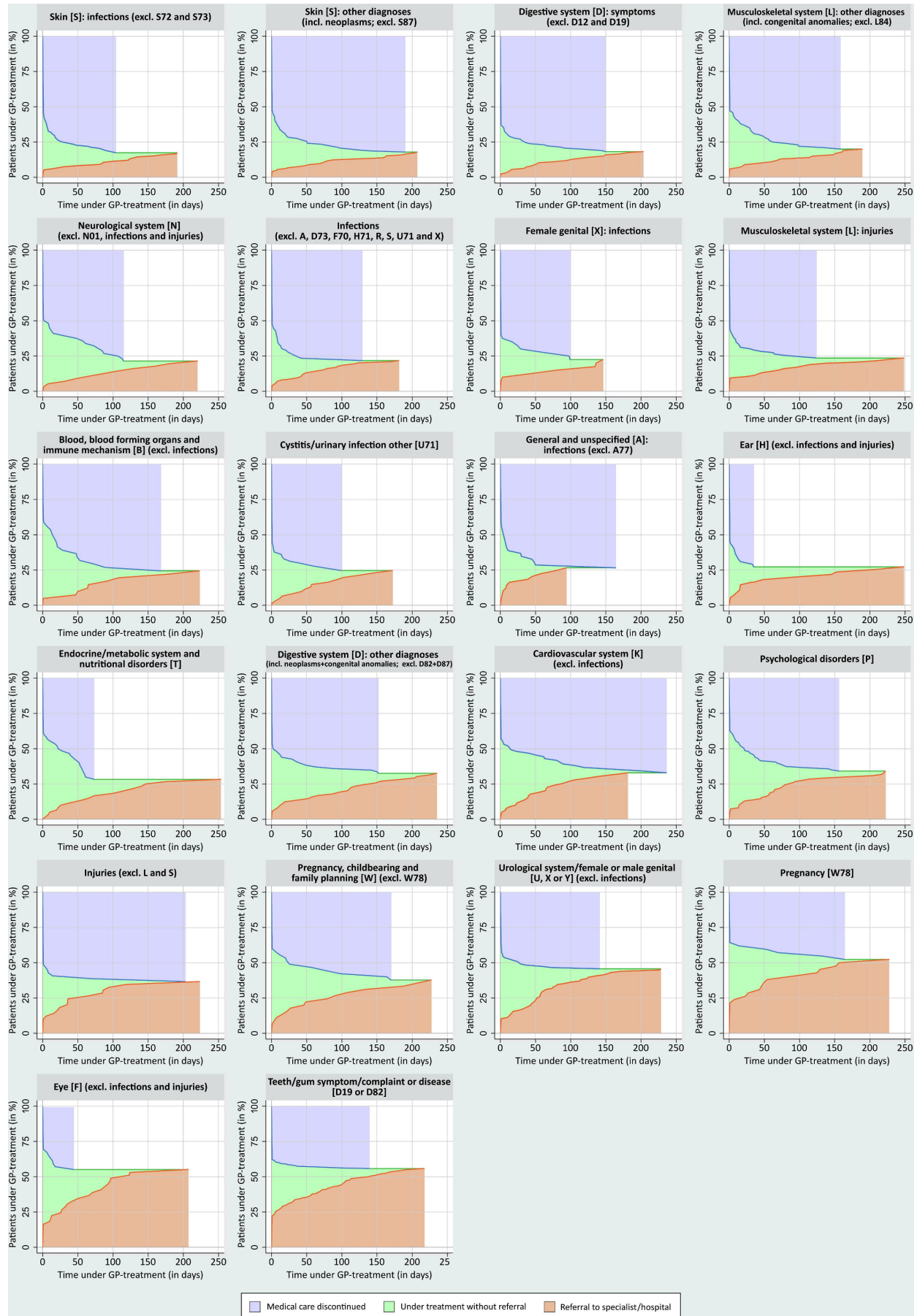**Figure 2** Referrals to secondary care and discontinuation of medical treatment over time.

Figure 3 Referrals to secondary care and discontinuation of medical treatment over time, continued.

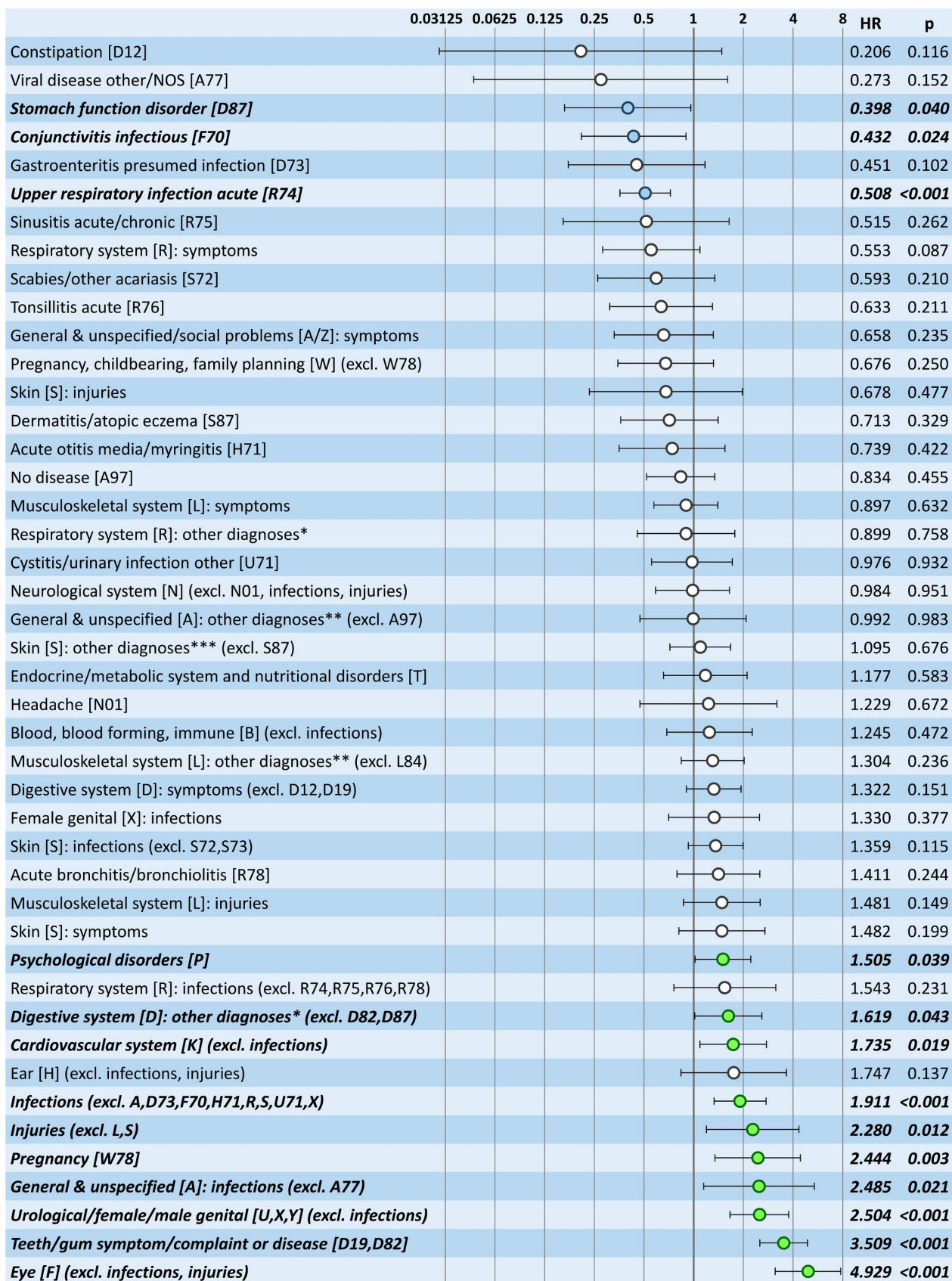|	0.03125	0.0625	0.125	0.25	0.5	1	2	4	8	HR	p
Constipation [D12]										0.206	0.116
Viral disease other/NOS [A77]										0.273	0.152
Stomach function disorder [D87]										*0.398*	*0.040*
Conjunctivitis infectious [F70]										*0.432*	*0.024*
Gastroenteritis presumed infection [D73]										0.451	0.102
Upper respiratory infection acute [R74]										*0.508*	*<0.001*
Sinusitis acute/chronic [R75]										0.515	0.262
Respiratory system [R]: symptoms										0.553	0.087
Scabies/other acariasis [S72]										0.593	0.210
Tonsillitis acute [R76]										0.633	0.211
General & unspecified/social problems [A/Z]: symptoms										0.658	0.235
Pregnancy, childbearing, family planning [W] (excl. W78)										0.676	0.250
Skin [S]: injuries										0.678	0.477
Dermatitis/atopic eczema [S87]										0.713	0.329
Acute otitis media/myringitis [H71]										0.739	0.422
No disease [A97]										0.834	0.455
Musculoskeletal system [L]: symptoms										0.897	0.632
Respiratory system [R]: other diagnoses*										0.899	0.758
Cystitis/urinary infection other [U71]										0.976	0.932
Neurological system [N] (excl. N01, infections, injuries)										0.984	0.951
General & unspecified [A]: other diagnoses** (excl. A97)										0.992	0.983
Skin [S]: other diagnoses*** (excl. S87)										1.095	0.676
Endocrine/metabolic system and nutritional disorders [T]										1.177	0.583
Headache [N01]										1.229	0.672
Blood, blood forming, immune [B] (excl. infections)										1.245	0.472
Musculoskeletal system [L]: other diagnoses** (excl. L84)										1.304	0.236
Digestive system [D]: symptoms (excl. D12,D19)										1.322	0.151
Female genital [X]: infections										1.330	0.377
Skin [S]: infections (excl. S72,S73)										1.359	0.115
Acute bronchitis/bronchiolitis [R78]										1.411	0.244
Musculoskeletal system [L]: injuries										1.481	0.149
Skin [S]: symptoms										1.482	0.199
Psychological disorders [P]										*1.505*	*0.039*
Respiratory system [R]: infections (excl. R74,R75,R76,R78)										1.543	0.231
Digestive system [D]: other diagnoses (excl. D82,D87)*										*1.619*	*0.043*
Cardiovascular system [K] (excl. infections)										*1.735*	*0.019*
Ear [H] (excl. infections, injuries)										1.747	0.137
Infections (excl. A,D73,F70,H71,R,S,U71,X)										*1.911*	*<0.001*
Injuries (excl. L,S)										*2.280*	*0.012*
Pregnancy [W78]										*2.444*	*0.003*
General & unspecified [A]: infections (excl. A77)										*2.485*	*0.021*
Urological/female/male genital [U,X,Y] (excl. infections)										*2.504*	*<0.001*
Teeth/gum symptom/complaint or disease [D19,D82]										*3.509*	*<0.001*
Eye [F] (excl. infections, injuries)										*4.929*	*<0.001*

Figure 4 Diagnosis groups associated with late referral (blue dots) or early referral (green dots) to secondary care: results from Cox regression analysis allowing for multiple episodes of care per patient and adjusted for age, sex and country of origin. The diagnosis groups 'pediculosis/skin infestation other [S73]' and 'back syndrome without radiating pain [L84]' have been excluded from the statistical model due to no events occurring during observation time. *Including congenital anomalies and neoplasms; **including congenital anomalies; *** including neoplasms. NOS, not otherwise specified.

symptoms/complaints related to glasses, refractive errors and impaired vision.

Other diagnoses associated with a high rate of referrals were pregnancy—where some of the required equipment, such as sonography devices, could not be provided—and psychiatric disorders indicating the need for psycho-therapy, particularly depression and post-traumatic stress disorder. Other organ systems, such as the urological system (including male and female genitals) as well as the cardiovascular and digestive system, were also related to a higher rate of referrals to secondary care.

Additional outpatient specialists or inpatient care were also sometimes required in the treatment of injuries—particularly if they were localised in organ systems other than the skin or musculoskeletal system—and certain infections, most notably in cases of pyelonephritis/pyelitis, eye inflammations, chronic otitis media and tuberculosis.

Strengths and limitations

The data set analysed in our study mainly consisted of retrospectively coded diagnoses and procedures. In some cases, the coding might have been imprecise or incomplete because it was solely based on free-text entries in the patients' electronic medical records and the codes therefore could not be verified by clinical examination of the patients. Unfortunately, due to the design of the study, it was not possible to compare the study participants to a non-refugee population, for example, in a matched-pair analysis. We therefore were not able to determine the difference in healthcare needs between asylum seekers and the resident population.

The primary care physicians in our walk-in clinic documented all health problems presented by the patients and/or dealt with during the consultations, but they did not conduct systematic screenings for certain conditions. For this reason, we probably missed some health problems in the refugee population. Furthermore, the observation time of our study encompassed 4 November 2015 until 21 July 2016. We therefore have no information about seasonal diseases usually occurring in the 3-month period between August and October, and we do not know if these diseases show similar or different referral patterns than those diseases included in our analyses.

Furthermore, the analyses presented here were based on a comparison of episodes of care including referrals to secondary care with episodes being discontinued without referral. However, the reasons for discontinued episodes are unknown, for example, the health problem might have been resolved, the patient might have chosen to use a hospital's emergency care or to refrain from further treatment despite persistent symptoms. Unfortunately, we were also not able to determine whether non-referral was adequate. Furthermore, we do not know what happened after referral, for example, if the referral leads to a new significant diagnosis.

Our patients had no regular health insurance registration and therefore no possibility to consult a dentist.

For this reason, dental problems had to be treated in our walk-in clinic. Also, self-medication was impeded by language and financial barriers, which might have increased the proportion of avoidable consultations. Some patients might have received a temporary health insurance registration during the treatment in the walk-in clinic, which facilitated self-referral to other healthcare providers and did not affect the restrictions for services provided for asylum seekers. It should also be noted that the analysed population was in a constant change due to newly arriving asylum seekers and others being relocated to other facilities.

The data set included only one first reception centre, which might weaken the representativeness of the study. Our population varied from the general refugee population in Germany, whereas the majority of registered asylum applicants in Germany was from Syria (2015: 35.9%; 2016: 36.9%) followed by Afghanistan (2015: 7.1%; 2016: 17.6%) and Iraq (2015: 6.7%; 2016: 13.3%)[19 20] the majority of our population was from Afghanistan (46.9%) followed by Syria (22.4%) and Iraq (13.0%).

A strength of our study was that we were able to include a large population into our study representing real-world conditions and that there was no selection bias—because there was no need to obtain patient consent—and no recall bias concerning diagnosis and treatment data. Our statistical analyses included multivariable analyses and were allowing for cluster effects in the data set. We adjusted our analyses for age, sex and country of origin, but this adjustment might be incomplete as the duration and locations of the flight could not be considered.

Comparison with the literature

The patients in our study presented many conditions being prevalent in the resident population. Infectious diseases, such as tuberculosis and hepatitis B, which are regularly found far more often in refugees than in residents,[21] were also present and did not dominate the daily routine of the primary care physicians in the walk-in clinic. Some studies were in line with these results and also reported that the disease spectrum of residents and refugees was similar to the resident population.[22–25] Other studies, however, stressed the high prevalence of infectious diseases[26] and emphasised the importance of the mandatory screening of tuberculosis among all newly arrived refugees.[27 28] Further screening measures for infectious diseases have turned out to be rather costly, difficult to execute and of doubtful benefit from an individual as well as from a public health perspective.[6] Instead, researchers suggested to deal with the problem of infectious diseases in refugee populations with low-threshold access to primary medical care[6] and a special focus on vaccine preventable diseases.[26]

In our study, only a relatively small proportion of the patients presented psychological disorders or possible somatisations. This was in contrast to other publications. An outpatient clinic at an emergency accommodation in Cologne, for example, reported a higher rate of headache, back/neck problems and abdominal pain than

found in our study.[23] The difference between our study and many other studies might be explained by the fact that the consultations at our walk-in clinic were guided by the patients' self-reported reasons for consultation and that there was no general screening for psychological disorders. Studies including general screenings reported that almost half of the recently arrived refugees in Germany screened positive for post-traumatic stress disorder, depression or somatisation.[29 30] Compared with the resident population, higher rates of other psychological problems in refugees were also reported, such as non-affective psychosis.[31]

Approximately 15% of the women of reproductive age seeking medical care in our walk-in clinic were pregnant. Other studies stated a lower ratio. For example, a different study, also located in northern Germany, reported only 9% of the refugee women in this age group.[32] The higher rates in our study might be explained by the fact that our ratio is based on women using healthcare and not on the general female refugee population of reproductive age. Other studies based on the general refugee population and/or including screening measures reported comparable differences to our study. For example, a study screening for oral health problems in refugees located in Berlin reported that almost four out of five participants had untreated caries and overall oral hygiene was poor.[33] A systematic review in refugee populations worldwide also found a high prevalence of visual impairment and refractive error.[34]

In our walk-in clinic, we generally found that the refugees' healthcare utilisation depended on age and sex. Healthcare utilisation in the resident population differed also according to age, sex and other factors, such as socioeconomic status.[35] It was impossible to compare the amount of healthcare utilisation of the refugees to the resident population due to the fact that we monitored a constantly changing population and we did not know the patients' average duration of stay in the first reception centre. Another study analysing administrative data showed that asylum seekers had more hospital and emergency department admissions than the regularly insured, including more admissions that could be avoided through outpatient care or prevention.[36]

In our study, referral rates were independent of age, sex and country of origin if statistical analyses were adjusted for the leading diagnoses of the episodes. A systematic review was in line with our study and found only very little variation in referrals due to patients' age and sex.[37] In contrast, the referral rate in a Swiss study was influenced by these factors.[38]

Implications for clinical practice
In most cases, the physicians in our walk-in clinic could provide a first-line medical care for the health problems of our patients without involving hospitals, other practices or other medical specialties. Healthcare needs could be met independently of the patients age, sex and country of origin. The provided medical care exceeded the often criticised mere emergency care for refugees[39] and included help for severe problems regularly excluded from this patient group, for example, chronic conditions, such as diabetes. However, our physicians sometimes had to refer to specialists, use additional diagnostic devices or arrange hospital admissions in order to provide the medical care needed by their patients.

Despite the fact that the Asylum Seekers Benefits Act did not allow asylum seekers to get dental prostheses or visual aids before they received a regular health insurance registration,[14] a comparably high number of patients consulted our physicians because of dental or visual problems, which in many cases had already persisted for years. Usually, these health problems are not treated by primary care in Germany and there were no ophthalmologists and only little opportunity to consult the dentists working in our walk-in clinic. Nevertheless, about 45% of these health problems could be treated without referral.

Patients of all age groups frequently presented psychological problems during consultations. Although researchers maintained that many psychological disorders in the refugee population indicated immediate psychotherapy and medical treatment,[40] these treatment options usually were not available for the population of asylum seekers without regular health insurance registration. Despite limited access to psychological counselling at our walk-in clinic, two-thirds of these consultations had to be treated by our physicians without referral.

Pregnancy was prevalent among female refugees of reproductive age. Pregnant refugees are a vulnerable patient group with increased healthcare utilisation.[32] Despite the fact that they were allowed to use gynaecologists, midwives and nursing care,[14] it was de facto hardly possible to get this kind of support during the specific situation of 2015–2016. In order to prevent adverse health outcomes,[41] care for pregnant women was included in the primary care for refugees in our walk-in clinic. However, half of the pregnant women had to be referred to gynaecologists outside of our walk-in clinic.

Based on the results of our study, we can conclude that—with little modification—our approach of low-threshold primary care provided in an outpatient walk-in clinic is able to address the majority of health problems presented by patients who have no access to the regular healthcare system.

ORCID iD
Ingmar Schäfer http://orcid.org/0000-0002-1038-7478

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