Asylum-seeking children at a Swiss tertiary hospital

Julia Regina Brandenberger

Thesis for the degree of Doctor Philosophiae (dr. philos.)
University of Bergen, Norway
2020

UNIVERSITY OF BERGEN

Asylum-seeking children at a Swiss tertiary hospital

Julia Regina Brandenberger

Thesis for the degree of Doctor Philosophiae (dr. philos.)
at the University of Bergen

Date of defense: 11.11.2020

Year: 2020

Title: Asylum-seeking children at a Swiss tertiary hospital

Name: Julia Regina Brandenberger

Print: Skipnes Kommunikasjon / University of Bergen

To my husband
Daniel Brandenberger
and the pediatric team of Nduta refugee camp.

Research environment

The thesis is the result of a collaboration between the University Children's Hospital Basel and the Centre for International Health, University of Bergen, Norway.

The thesis is part of the project "care for pediatric asylum-seeking patients," conducted at the University Children's Hospital Basel from 2017-2020.

The studies in this thesis were funded by the "Botnar Foundation", the "Freiwillige Akademische Gesellschaft Basel", and the "proUKBB foundation.

Table of contents

Abstract

Introduction: As reflected in the Sustainable Development Goal number 3, it is essential that all people have have timely access to health care to ensure healthy lives for everyone at all ages. Although the number of studies investigating the health of migrants is increasing, the field of pediatric migrant health remains underexplored. The general aim of this thesis was therefore to understand the health needs of asylum-seeking children at a Swiss tertiary hospital compared to the local non-asylum-seeking population.

Methods: The three studies presented here are the quantitative part of the project "care for pediatric asylum-seeking children." They were designed as hospital based retrospective chart reviews, comparing the visits of asylum-seeking pediatric patients with those of non-asylum-seeking pediatric patients. All visits at the hospital from 2016 and 2017 were included. The primary outcome parameters were: the proportion of total visits by the group of asylum-seeking patients compared to the proportion of total visits by non-asylum seeking patients, the main disease that led to admission as defined by the International Classification of Diseases- 10 code, and the proportion of admissions due to ambulatory care sensitive conditions (conditions for which hospital admission can be prevented by early interventions in primary care). Statistical analysis and the generation of graphs were done using Stata.

Results: In total, 1674 visits by 439 asylum-seeking patients and 200,642 visits by 55,350 non-asylum-seeking patients were included. The number of visits by asylum-seeking patients was low 1%) compared to the number of non-asylum-seeking patients (99%). Most visits by asylum-seeking children were by Syrian patients (26%; 442/1674), followed by visits from Eritrean (13%, 210/1674), Afghan (11%, 192/1674), Algerian and Armenian patients (both 11%, 182/1674). The spectrum of disease of asylum-seeking inpatients was comparable to the one of non-asylum-seeking patients with diseases of the respiratory system being the most frequent reason for admission in both groups. They accounted for 17-19% of admissions in both groups. The proportion of total visits created by frequently visiting patients was higher in the asylum-seeking group with 48% (807/1674) of the total visits in the asylum-seeking group versus 25% (49,886/200,642) of the total visits in the non-asylum-seeking group. The amount of potentially preventable hospital admissions was similar in the asylum-seeking (12.1%) and in the non-asylum-seeking (10.9%) patients' group. Although presenting less frequently to the emergency department than non-asylum-seeking patients, the percentage of non-urgent visits at the emergency department by asylum-seeking patients was high with 82.2% (244/297).

Conclusions: In the research context, asylum-seeking patients represent a small and diverse part of the pediatric patient population in the studycontext. The health needs of currently asylum-seeking patients in the local context are comparable to other children in terms of communicable diseases. The population of asylum-seeking children with very frequent visits in need of complex care has been neglected so far. Health programs should be tailored to the needs of this particularly vulnerable group. Data of this thesis suggest a relatively strong primary care system for asylum-seeking patients in the research context, which could serve as good practice example for other regions. Strategies to prevent non-urgent visits at emergency departments are needed to ensure an efficient use of the health care system.

Abbreviations and definitions

3C model	Model on main challenges in migrant health care delivery including Communication, Continuity of Care and Confidence
Australasian triage scale	Scale, used to assess the urgency of a medical condition. The score ranges from 1 (resuscitation) to 5 (non-urgent condition)
ACS	Ambulatory care sensitive conditions; conditions for which hospital admission can be prevented by early interventions in primary care
CI	Confidence interval
Child with medical complexity	Child with complex chronic conditions in need of frequent health care visits
ED	Emergency department
EKNZ	Ethics Committee of North-West Switzerland
FAC	Federal Asylum Centre
ICD 10	International Classification of Diseases 10
IOM	International Organization for Migration
IQR	Interquartile Range
ISSOP	International Society for Social Pediatrics and Child Health
MIPEX	Migrant integration policy index
MSF	Médecins Sans Frontières (Doctors without Boarders)
Non-urgent visits	Visits at the emergency department, not requiring urgent medical care. Non-urgent visits were defined as score of 4 and 5 on the Australasian triage scale
REDCap	Research Electronic Data Capture, a data management software
REK nord	Regional Committees for Medical and Health Research Ethics of Norway, Northern Region
SDG	Sustainable Development Goal
UCL	University College London
UKBB	Universitäts- Kinderspital beider Basel (University Children's Hospital Basel)
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
WHO	World Health Organization

Original papers

The thesis is based on the following papers:

I. Brandenberger J, Pohl C, Vogt F, Tylleskär T and Ritz N. Health care provided to asylum-seeking and non-asylum-seeking pediatric patients at a Swiss tertiary hospital. (Manuscript under review)

II. Gmünder M* and Brandenberger J*, Buser S, Pohl C, Ritz N. Reasons for admission in asylum-seeking and non-asylum-seeking patients in a paediatric tertiary care centre. Swiss Med Wkly. 2020;150:w20252. Published 2020 May 27. doi:10.4414/smw.2020.20252 *shared first authorship; open access (1)

III. Brandenberger J, Bozorgmehr K, Vogt F, Tylleskär T, Ritz N. Preventable admissions and emergency-department-visits in pediatric asylum-seeking and non-asylum-seeking patients. Int J Equity Health. 2020 May 1;19(1):58. doi: 10.1186/s12939-020-01172-w. Open access (2)

All original papers were open access publications. Therefore, permission of the respective publisher was not required.

Acknowledgements

It was honestly not my plan to do a PhD. That this project became reality is therefore to a large part thanks to the guidance and support of the following persons:

Urs Frey. Your passion for research is contagious and your ability to lead with kindness and understanding is an inspiration. Thank you for having sometimes better visions for my future than myself.

Thorkild Tylleskär. You picked me up right after my first mission with MSF, gave me some extra lessions in strategic, academic thinking and paved the way to realize this thesis. Thank you very much for giving me this opportunity and guiding me through.

Nicole Ritz. You invested hours, days and years in assisting a humanitarian pediatrician to become a researcher. Thank you for being my supervisor, "mama simba", appreciated colleague and friend.

Myriam Gmünder and Sina Buser. You are a true enrichment to our migrant research team.

Robert Kopf, the team of HEKS interpreter services, the powerful female team of the Federal Asylum Centre and the Clinical Trial Unit Basel. Thank you for offering your generous support to realize the studies of this thesis.

Katrin Sontag. You introduced me to the fascinating perspective of anthropology and showed so much patience with the square-headed mind of a medical researcher. Thanks to you, I understood that hospitals are indeed a "captivating habitat".

Ante Wind. You are the best American English tutoress on this planet and a true friend.

Isabelle Steiner, Julia Höffe and Kristina Keitel. Thank you for helping me to combine the work at the pediatric emergency department with my interest in pediatric migrant research. Clinician-scientists can only exist with heads of departments like you.

My colleagues and friends at MSF and particularly the team of Nduta refugee camp. You taught me so much – in particular to disregard the feeling that things are impossible.

The little patients, in particular those of Nduta and Niger. You motivated me to do research by opening my eyes to all the urgent questions, which have yet to be answered.

My friends and in particular Kristine Onarheim. You motivated me to do a PhD at Bergen University. Thank you for the inspiring exchange in migrant health.

My parents and Daniel. You are my number one support. No matter what.

Introduction

With one billion people on the move worldwide, migrant health has become an essential part of public health (3). Of these, about 70.8 million individuals and 36 million children were forcibly displaced in 2018 (4). This number has reached a historical record high, with child refugees having increased by 21% in the past decade (5).

As reflected in the Sustainable Development Goal number 3 (SDG 3), it is essential that everyone has timely access to health care to ensure healthy lives for all at all ages (6). The considerable increase of asylum-seeking children and adults arriving in many European countries challenge the local health care systems, which are responsible for the delivery of their health care. According to many authors and the World Health Organization (WHO), many health systems in Europe still lack adequate adaptations to the needs of asylum-seeking patients (7, 8).

To enable stakeholders to base adaptations of health systems to the needs of migrants on evidence, many organizations like the WHO, the University College of London (UCL) Lancet Commission on Migrant and Health, and the International Society for Social Pediatrics and Child Health (ISSOP) have called for more high-quality data on characteristics of asylum-seeking patients (9, 10).

The following introduction provides a review of the current literature in the field of migrant health. First, the term migrant, refugee, and asylum-seeker are discussed. Second, evidence on recent migration patterns is provided from a global, European and Swiss perspective. Third, literature on current health needs of migrants is presented with a particular focus on migrant children. Finally, challenges and potential solutions in migrant health care on the global, European and Swiss level are discussed.

Terminology in migrant health

As area of intensive public interest and politicized debate, the terms used in the field of migration are sometimes lacking consistent definitions. To ensure a common understanding, this paragraph provides the definitions used in this thesis, moving from the broader to the more specific terms. It is based on the definitions commonly used by the Office of the United Nations High Commissioner for Refugees (UNHCR), WHO and the International Organization for Migration (IOM) (7, 11).

People on the move

"People on the move" is a descriptive term used for any persons who are moving away from their home, regardless their nationality, motivation for the movement, or their legal status. This term is preferably used by non-governmental organizations as it is considered non-judgmental.

Migrant

There is no universally, precise definition of the term "migrant." In this thesis, the definition by IOM is used, which defines a migrant as "any person who is moving or has moved across an international border or within a state away from his/her habitual place of residence, regardless of the person's legal status; whether the movement is voluntary or involuntary; what the causes for the movement are; or what the length of the stay is." It includes a heterogeneous group of people including internally displaced persons, asylum-seekers, refugees, sans-papiers but also persons migrating for work or after retirement.

Asylum-seeker

An asylum-seeking person is defined as a person who made the legal application to become a refugee. By doing so, the person seeks safety from persecution or serious harm in a host country. The corresponding permit issued by the Swiss authorities at that stage is "N" (asylum-seeking (12)). The asylum-seeking person waits for a decision from the national institutions responsible for the application. In case of a negative decision, the person must leave the country and may be expelled, unless permission to stay is temporarily provided for humanitarian reasons (11). The corresponding legal status in Switzerland for those with a negative decision, who are temporarily accepted for humanitarian reasons is "F" (Provisionally admitted foreign nationals (12)). Their asylum request will be reevaluated after 12 months. As asylum-seekers are in a legal transition status starting immediately after their arrival in host countries, they are a vulnerable group with potentially important health needs, largely neglected during escape.

Refugee

The term refugee is clearly defined as a legal status by UNHCR since 1951. A refugee is defined as "a person who, owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinions, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country." Member countries of the United Nations (UN) have the obligation to permit persons defined as refugees to stay in a safe place outside their country of nationality (13). Every refugee granted asylum in Switzerland receives a residence permit "B" (12).

Sans-Papiers or undocumented migrants

In Switzerland, the term "Sans-Papiers" (from French "without (official) papers") describes foreigners who travel to Switzerland without legal permission or remain in the country although the legal duration of their stay has expired. It therefore describes people who are not authorized to stay in the country by legal institutions. An accepted synonym for Sans-Papiers is undocumented migrants. The term illegal migrant is considered discriminative and therefore not used in this thesis or any publication of the author team (14).

Current migration patterns

Global migration

With nearly one-seventh of people worldwide living in locations away from their place of birth, migration is a global normality (15). According to the recently published report on migration and health, the vast majority of migrants are labor migrants within low-income and middle-income countries, followed by international labor migrants (3). However, the number of forcibly displaced people worldwide is continuously rising. In 2018, about 70.8 million people were forcibly displaced compared to 43.3 million in 2009. A total of 41.3 million persons were internally displaced and 20.4 million officially declared as refugees. About 3.5 million people worldwide applied for asylum (4). As in the years before, in 2018 most asylum applications originated from Syria and most of them were issued in Turkey. A second important flow of new asylum-applications derived from people from Venezuela

applying for asylum in Peru, followed by South Sudanese applications made in Sudan. Germany was the European country where most asylum requests were made with applicants coming mainly from Syria and Iraq, **Figure 1.**

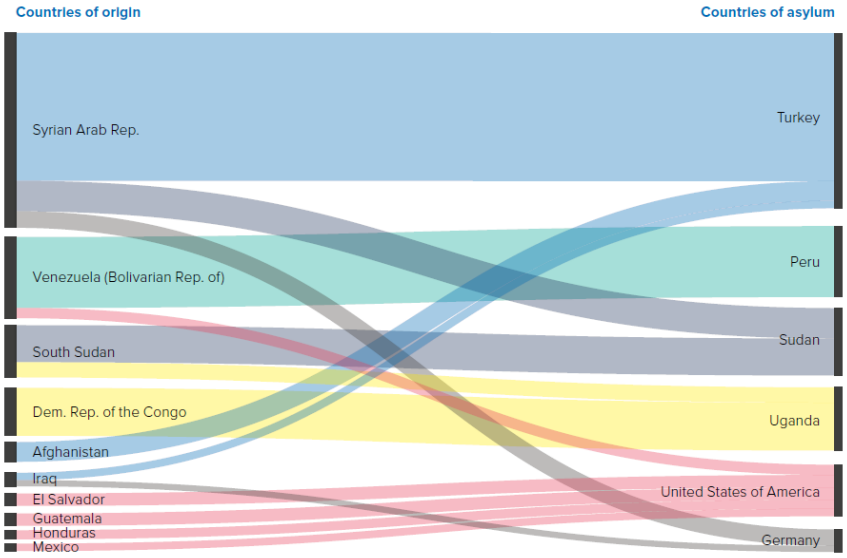


Figure 1: Global trends in Migration 2018 (16)

Europe

In contrast to the global increase of forcibly displaced people, with a total of 644,480 asylum-applications issued in 2018, asylum-applications in European countries decreased for the third consecutive year (17). This is mainly due to a more restrictive migration policy adopted by the majority of European countries. One important example is the EU-Turkey statement made in 2016, which reduced arrivals from Turkey to Greek islands according to official documents by 97%. Consequently, more asylum-seekers are registered in Turkey and other non-European countries (17). Despite the reduction of total asylum-requests in Europe, there has been a tenfold increase in the number of asylum applications by children in Europe within the last decade (18) including a continuous increase in 2018 and 2019 (19). The main European countries where asylum applications were registered in 2018 were Germany, France, Greece and Spain. Applicants in Germany mainly originated from Syria, Iraq, Afghanistan, Iran, Nigeria and Turkey. Applicants in Greece were mainly of Syrian

and Afghan origin. Applicants in Spain came predominantly from Venezuela, and those applying for asylum in France mainly originated from Afghanistan, **Figure 2**.

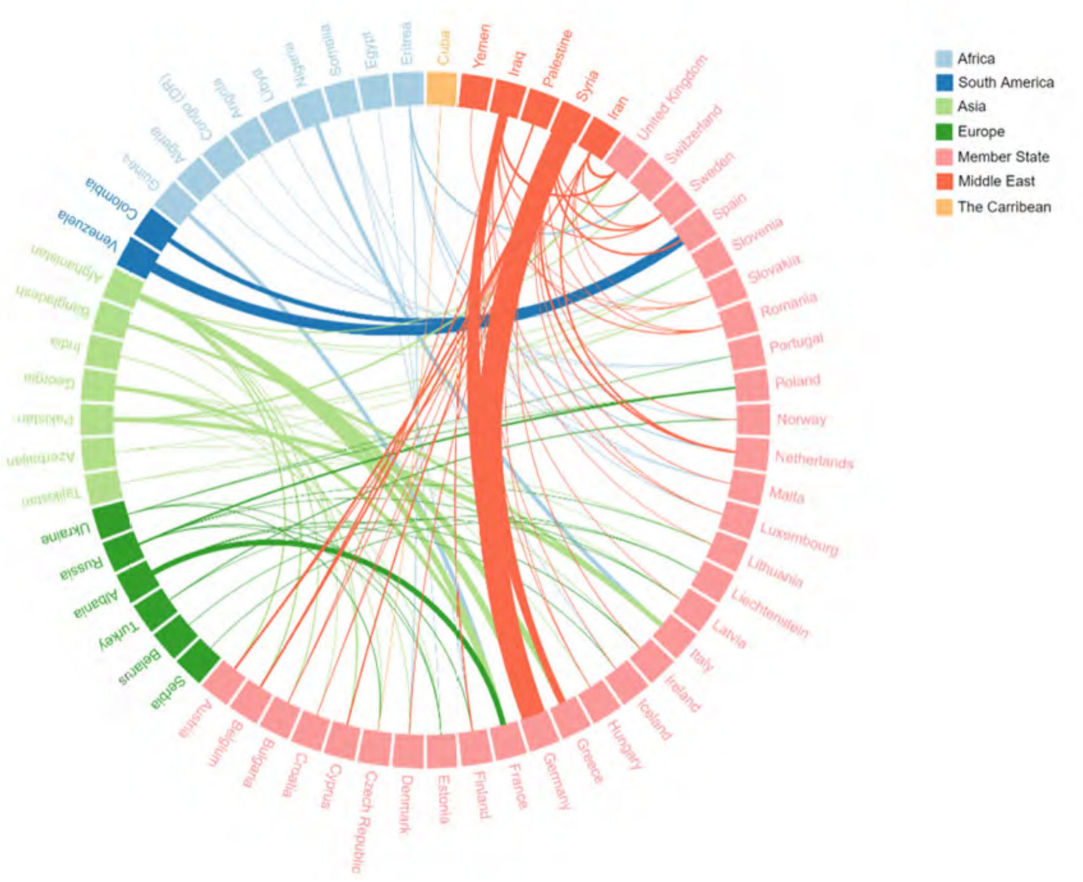


Figure 2: Top applications for international protection in 2018, by EU+ country and citizenships of origin (17)

Switzerland

With every 6th person coming from another country than Switzerland since the 1970s, migrants have been a considerable part of the Swiss society for decades. Of 8,544,527 inhabitants registered by the end of 2018, 25% (2,148,275) have a nationality other than Swiss (20). About 15% of them come from Italy, followed by Germany with 14.3%, and

Portugal with 12.3% (21). About 17% of migrants in Switzerland come from non-European countries. There have been two peaks of asylum applications in the last decades: one in 2015 following conflicts in Syria and Afghanistan and one in the 1990s as consequence of the Balkan wars, **Table 1**. At that time, the proportion of child refugees was only around 10% (22). As in the whole European region, asylum applications decreased in Switzerland in 2018 and also, according to the most recent data, in 2019 (23). Its share of the number of European applications remained 2.4%, stable compared to the previous years (24). Both years, applicants were most frequently of Afghan, Eritrean, Syrian and Turkish origin.

Particular to the migration patterns of asylum-seekers in Switzerland is a strong representation of Eritreans. Due to the border conflict with Ethiopia and persecution by the totalitarian government, the number of Eritrean asylum-applications in Switzerland started to increase in 2006 and remained strong over the following years (23). As a consequence of the already existing strong Eritrean community, 51 % of the Eritrean applications in Switzerland in 2018 came from new-borns of asylum-seeking Eritrean parents, and 28% from family reunifications (24).

Figure 3: Art, welcoming migrants on the walls of an official building in Basel, Switzerland

Table 1: Asylum requests from 1986 to 2019 in Switzerland (23)

country	1986	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019
Afghanistan	40	172	109	444	243	670	7'831	3'229	1'217	1'186	1'296
Albania	2	259	98	350	52	16	451	157	137	95	123
Algeria	6	82	373	470	210	417	326	557	553	747	754
Angola	130	1'120	517	407	175	90	38	62	81	81	59
Armenia	1	0	22	405	199	105	52	54	72	45	36
Ethiopia	142	140	144	293	125	182	599	1'036	349	247	160
Bangladesh	74	682	238	218	58	30	74	28	11	19	12
Bosnia	0	6	3'641	1'380	347	189	116	80	59	54	44
Bulgaria	13	671	33	60	476	24	4	2	8	2	3
Chile	250	13	0	1	1	1	0	0	0	0	2
China	24	62	53	68	94	358	586	350	267	287	245
Côte d'Ivoire	0	5	39	83	159	102	94	347	348	84	36
Eritrea	9	166	33	88	181	1'799	9'966	5'178	3'375	2'825	2'715
Gambia	0	7	93	66	21	208	968	1'054	387	189	110
Georgia	0	0	5	177	441	642	404	465	670	873	575
Ghana	108	470	22	10	4	157	94	87	64	38	32
Guinea	1	17	79	498	238	281	274	900	797	217	123
Guinea-Bissau	3	23	8	109	21	124	107	96	60	28	19
India	206	1'787	161	135	48	19	16	42	38	37	19
Iraq	18	71	285	896	474	659	2'388	1'312	653	611	498
Iran	941	431	117	731	293	324	623	561	318	504	501
Yemen	0	0	27	106	28	74	50	48	38	29	17
Kamerun	0	9	33	121	162	60	58	254	216	65	47
Congo DR	232	785	380	599	339	192	159	176	147	102	82
Kosovo	0	0	0	0	0	602	566	249	137	112	103
Libanon	139	5'528	168	165	50	19	25	45	20	21	17
Liberia	1	63	103	26	21	67	23	36	30	4	8
Libyia	7	13	61	103	56	36	140	210	148	161	103
Mali	0	5	29	59	29	52	151	195	122	43	22
Marocco	5	39	16	49	33	125	419	823	459	475	323
Macedonia form. Yugosl. Rep.	1	55	131	84	144	417	177	143	89	65	27
Mongolia	0	0	8	185	72	113	132	73	27	47	25
Nigeria	2	307	185	261	382	1'969	970	1'106	700	511	329
Pakistan	394	1'268	454	243	85	101	262	167	145	132	87
Poland	188	561	4	115	5	6	5	6	3	4	4
Romania	85	1'908	82	53	104	55	20	6	10	13	10
Russia	2	16	107	253	353	348	205	185	155	173	137
Senegal	3	10	28	42	35	80	402	299	131	63	32
Serbia	122	5'434	5'715	4'662	1'600	910	200	280	171	112	149
Sierra Leone	0	5	108	219	28	61	60	148	113	23	11
Somalia	17	183	593	611	553	337	1'253	1'581	843	561	399
Sri Lanka	602	4'816	1'262	1'415	277	939	1'878	1'373	840	652	654
Sudan	0	13	52	39	71	85	277	225	87	34	37
Syria	138	269	64	162	131	469	4'745	2'144	1'951	1'393	997
Togo	2	12	45	70	198	136	60	63	68	43	25
Czech slovakia	101	24	1	0	0	0	0	0	0	0	0
Tunesia	10	67	72	196	117	358	326	252	206	281	140
Turkey	3'989	7'611	1'364	1'486	753	530	424	526	852	1'005	1'176
Ukrania	0	4	24	112	48	17	243	96	76	61	52
Vietnam	86	84	157	61	50	10	6	9	3	0	4
Without nationality	0	3	7	20	57	97	380	144	77	116	80
Nationality unknown	24	228	109	510	427	229	238	150	104	148	79
Total	**8'118**	**35'504**	**17'459**	**18'916**	**10'068**	**14'891**	**38'865**	**26'609**	**17'432**	**14'618**	**12'538**

Migrant health

The movement of a person from one place of residence to another is a life-changing and therefore also a health-changing event. The effects of migration on health are complex and difficult to generalize (7). It is important to know characteristics like the home, transition and host country (25), the social determinants of health of the migrant (26) and the reason for migration (27). Depending on the specific characteristics of the movement, the health of the migrant can improve or decrease. In a systematic review on mortality data of international migrants as a group, migrants had a mortality advantage compared to the local population, a phenomenon commonly known as the "healthy-migrant-effect", generally attributable to the younger age and better health condition of the migrants compared to the local population. It is applicable to international migrants in high-income countries who are working, studying or living with their families. However, a conclusive sub-analysis of potentially vulnerable groups was not possible due to insufficient data, highlighting an important research gap (28). A similar effect was described in a study in Spain, comparing the health of migrants to their local peers in relation to primary care (29).

The literature review of the UCL-Lancet Commission on Migration and Health also described the difficulty to assess the full range of global migrants' health needs in 2018 due to the heterogeneity of the group and poor quality data, particularly for the further analysis of subgroups (3).

On the other hand, there are particular health risks of migrants (30). One common concept described in the current literature is the concept of allostatic load (31). When life-conditions change, the organism needs additional resources to maintain stable and therefore healthy. If the additional stress continues over a long period of time, health decreases. Particularly migrants exposed to continuous stress may therefore have a health disadvantage compared to local peers leading to for example an impaired immune-system (32).

In a review including 51 studies on the health profile of recent asylum-seekers and refugees in Europe, a disproportionally high burden in certain infectious diseases like hepatitis B was found (33). To a large extent, this could be ascribed to the high prevalence of hepatitis B and hepatitis C in the country of origin or to the extended stay in intermediate host countries with high prevalence (34, 35).

Among different European countries, the prevalence of diseases in migrants showed a strong variation and also depended on the time after resettlement. A literature review investigating the health of newly arrived migrants in Europe found a significant burden of communicable diseases but also non-communicable diseases like chronic conditions and mental and social health problems (36). A systematic literature review showed that most migrant women face poorer maternal health outcomes than non-migrant women throughout the WHO European Region (37). The insufficient treatment of non-communicable diseases in asylum-seekers in Jordan, Lebanon, and Turkey was described in a recent literature review (38).

Complementary to studies investigating morbidity, other authors focus on factors contributing to the promotion and maintenance of migrant health also called salutogenesis. A study from China described that a higher socioeconomic status as being married had positive effects on the reported well-being (39). Resilience describes the "capacity of a dynamic system to adapt successfully to disturbances that threaten system function, viability, or development"(40). There is a recent increase in the literature investigating resilience in children and adolescent migrants. One study conducted in six countries was part of an international collaborative research project on youth resilience in the context of migration. The results showed that resilience mediated integration into the new cultural context, which lead to an improvement of the adolescents' mental health status.

Migrant health and identifiable populations

It is important to identify similarities and differences in morbidity and mortality between different groups of migrants, to ensure important health needs specific to a subgroup of migrants are identified and addressed. In migrant health, different concepts to differentiate between subgroups have been used. A concept commonly used by biologists is the concept of race. However, studies investigating the genetical differences between human subggroups classified as different races showed that these differences were small. In the past, ethically highly questionable studies investigating differences between persons put in different racial categories have been conducted (41).

Ethnicity is defined as the group to which people belong. Ethnicity is perceived as part of a persons' identity and includes culture, religion, customs, traditions and values (42).

Research using both concepts has been misused to discriminate certain groups of people, particularly in public debates (43). The serious negative impact of discrimination on health is largely known. Particularly chronic discrimination can lead to conditions like hypertension, obesity or mental health problems (44, 45). The effects of discrimination on children are particularly harmful (46). To avoid a potential discrimination of studypopulations, the term "identifiable population" is discussed as potential alternative (43), as everyone considers her or himself as "part of one or many identifiable populations" (47). However, the term has not been widely accepted yet.

Health of migrant children

In addition to the generally complex positive and negative effects of migration on persons, the health of migrant children additionally depends on their caregivers and families. The current evidence on health of migrant children originates dominantly from North America and Australia and is therefore not necessarily directly applicable in the European context. A publication by the World Bank showed that migrants from low-resource countries moving to high-income countries experienced a 16-fold reduction in child mortality after resettlement (48).

However, migrant children face major health risks (49). They include mental health disorders due to trauma, social isolation, and separation from family members. In addition, they might have insufficient access to preventive health care like immunisations. If caregivers are not familiar with local health care systems, asylum-seeking children might have limited access to potentially available health care (8, 15).

The only recent literature review on health needs of migrant children conducted in Europe was published by Swedish researchers. The authors describe heterogeneous health needs including communicable diseases but highlight the major risk of mental health problems (50).

A systematic literature review on the health needs of migrant children in Switzerland included studies published until 2011 and concluded that migrant children have important differences in health needs compared to their native peers including higher rates of hospital admissions and admissions at intensive care units, dental care needs, and mental health consultations (51).

In high-income countries, research on children with special health care needs has gained attention. One important subgroup are children with medical complexity, recently defined as children with complex chronic conditions in need of frequent health care visits. This subgroup includes all children with serious chronic health conditions, important functional limitations, increased health care costs and increased health or other service needs (52). Although research on mulitmorbidity and migration in adults is emerging (53), research on asylum-seeking children with medical complexity is lacking.

Challenges & potential solutions in migrant health care

Global level

In the Sustainable Development Goal number 3 (SDG 3), the United Nations aim to ensure access to health care for all at all ages (6). As a particularly vulnerable group of migrants, asylum-seekers worldwide not only face particular health risks but are also likely to lack access to timely and appropriate health care (54). Many challenges to providing quality care to asylum seekers have been identified. On the health care provision level, these challenges include communication, continuity of care and confidence between the health care providers and the asylum-seekers as important examples.

Communication has been globally identified by multiple studies as a key challenge to deliver health care to patients, who do not speak the same language as the health care providers (55-59). Clear communication allowed for an enhanced level of trust between health care professionals and migrant patients. Confidence, mainly created by a trustful patient – health care provider relationship, is central for the patients` satisfaction with the health care received (60-63). It helps to promote adherence to the treatment and therefore improves continuity of care. Continuity of care is a challenge due to frequent relocations of migrants and relocations in remote areas, implying the risk of health information loss (63, 64). These challenges are embedded into the specific context in which the health care delivery to migrants takes place. A literature review on health care delivery highlights the importance of the health system level as the governmental level for the provision of migrant health care (65). In a recent systematic review, the results showed a clear link between restrictive entry and integration policies and poor migrant health outcomes in high-income

settings (66).

To address the global health needs of migrants, the New York Declaration for Refugees and Migrants was formulated in September 2016, outlining commitments for refugees and migrants on a global level (67). It set out the key elements of a Comprehensive Refugee Response Framework, which was created to ease pressures on countries hosting larger numbers of refugees (68). The New York Declaration also set the floor for the "Global Compact on Refugees", as comprehensive refugee response framework which was officially affirmed by the UN General Assembly on December 17th, 2018. It includes a comprehensive program of action to respond to large movements of refugees and defines the follow-up and review of the refugees' situation (69).
In a framework of priorities, steps to promote migrant health were articulated (70) and helped to set up a draft Global Action Plan on the health of refugees for 2019 to 2023 (71). It entails 12 priorities to improve migrant health, namely to advocate for for mainstreaming migrant health in global, regional and country agendas, and to promote migrant-sensitive health policies in order to reduce mortality and morbidity among migrants through health interventions (71). The particular protection of migrant children is defined as priority number 7.

The first world congress on migration, ethnicity, race and health took place in 2018 in Scotland. One result of the conference was the Edinburgh Declaration. The declaration calls for the elimination of barriers to access to healthcare for migrants, their participation in policy development and evaluation of migration related policies, as for the strengthening of collaborations between different stakeholders in migrant health (72).

European level

On a European level, migrant health has been discussed at several regional conferences. Many experts in the field call for a shift from a problem-oriented discussion partially driven by populism (73), to a discussion focused on practical solutions and improvements (74).

As one strategy to improve migrant health care delivery, the European Union has already started an initiative called the "migrant-friendly hospital project" in 2002 (75). The approach focused on improving interpreting services, providing migrant-friendly information and training staff in cultural competence (75). Based on the experience of this

project the Amsterdam Declaration was endorsed in December 2004. It identified the need for a comprehensive training of health care providers to understand the specific requirements of migrants and refugees (76).

In order to respond to the globally formulated need for mainstreaming migrant health in regional agendas, practical recommendations for the first and follow-up appointments of migrant children in Europe were created. Representatives of pediatric societies in Europe, including the study team of this thesis collected and systematically selected existing recommendations. These included a screening of growth and development, mental health, vision and hearing. Depending on the country of origin, screening for hepatitis B and C, human immunodeficiency virus, syphilis or tuberculosis was recommended (77). It also includes the "HEALTH – Acronym", summarizing key questions for practitioners providing health care to asylum-seeking patients, **Table 2.**

Figure 4: University Childrens Hospital Basel, Switzerland.

Table 2: Summary of key-questions in migrant health history taking for practitioners. Source: Medical care of asylum-seeking children in Europe; Schrier L. et al (77)

Category	Questions
H ome	Is the home country a permanent or temporary country of origin of refugees? Health care delivery before crisis? Did the patient fall sick? Did (s)he receive health care (incl. screening/prevention)?
E scape	Escape route? Total duration of escape?
A rrival date	Date of arrival in host country?
L anguage	Languages the patient speaks? Preferred language including dialect? Need for an interpreter? Preference for male/ female interpreter?
T ransition countries	Did the patient stop for a longer time in other countries? Did (s)he fall sick? Did (s)he receive health care (incl. screening/prevention)?
H ost country	Did the patient fall sick in the host country / receive health care (incl. screening/prevention)? Does (s)he have a personal pediatrician? Check health literacy of parents in the host country and improve it if needed

The migrant integration policy index (MIPEX) is an evaluation tool of migrant integration policies within 38 countries. It was created in 2004 to compare and improve migration policies in various European countries and has included several non-European countries over time. The health care delivery to migrants remains very heterogeneous among the different European countries despite many promising first results (78). Efforts have to be made to promote European cooperations of academic scientists, policy-makers health health care providers to scale successful projects up and develop a coherent good quality health care for migrants in the entire region (79).

Swiss level

Despite having a low migrant integration policy index in the areas access to nationality and anti-discrimination, Switzerland scored second highest after New Zealand compared to 38

other countries in the promotion of migrant health (3, 80). One important reason for that is that health was put as priority within the country's integration policy. After the completion of the European migrant-friendly hospital initiative in 2004, the Swiss ministry of health decided to create a national network, initially under the same name, based on the experiences of the initiative (81). Financed by the ministry, the initiative was renamed into the network "Swiss hospitals for equity" in 2014 to be more inclusive to other vulnerable groups.

Children hospitals were a central part of the network from its very beginning. To date, 13 hospitals in 9 out of 26 Swiss regions are part of the program. All three exclusively pediatric hospitals of Switzerland participate, and 4 of the other 10 hospitals also treat pediatric patients (81). The main areas of the program are the promotion of the availability of interpreter services at hospitals (82), the empowerment of migrant patients to participate in the migrant health policy decision-making, as well as the training of intercultural competence of medical staff. With regular meetings of the network, hospitals exchange their experiences and adopt successful strategies from each other.

Despite the overall improvements in migrant health care in Switzerland, there is still a strong discrepancy between urban and rural regions. All hospitals that are part of the "Swiss Hospitals for Equity" are located in urban areas. 8 of the 13 hospitals are university hospitals. On the primary care level, although every asylum-seeking child has access to a primary care pediatrician, practically no support is available for these physicians to provide good migrant health care. Lack of access to interpreter services is one example. As a country with a federal tradition, regions have a pronounced freedom of action. Therefore access to health care for asylum-seeking persons depends on multiple factors including the migrant-health policy on the regional level and the personal commitment of the specific officials in charge (83).

Analytical framework

Migration as social determinant of health

Global patterns of morbidity and mortality are strongly determined by social, political and economic inequities. At the same time, moving from one place of residence to another provokes fundamental changes in the life of a person, no matter under which conditions the movement takes place. Therefore, migration is not only a socially determined phenomen affecting health but also a social determinant of health itself (26).

The effect of social determinants on migrant health also depends on their combination. Certain combinations can have a stronger impact on the health of the migrant than just the addition of their single effects, a phenomen known as intersectiontality (84).

The ability to become healthy and to maintain health depends on many dynamic social determinants (85) including the available personal resources. Based on the theory of capital of Pierre Bourdieu, all human beings have economic and non-economic resources, which he calls capital. He differentiates between personal networks and social contacts (social capital), education often reflected by degrees and diplomas (cultural capital) and monetary resouces (economic capital) (86). If a person migrates, these resources, and therefore the personal resources to maintain health, change.

In the case of labor migrants, diplomas obtained prior to migration may be accepted by the host country. The resultant ability to work may provide an opportunity for the migrants to increase their cultural and economic capital and thereby increase the resources of a migrant and the family to care for their health. However, in case of asylum-seeking persons, not only monetary, but also social and cultural capital are likely to decrease as they cross various borders. Even if the asylum-seekers were highly skilled in the home country, their diplomas may not be accepted by the transit and host countries and therefore they lose their value in the new context (87).

The escape of asylum-seeking families often takes years, reduces the families' capital, and negatively influences their ability to cope with potential critical health events, **Figure 5**.

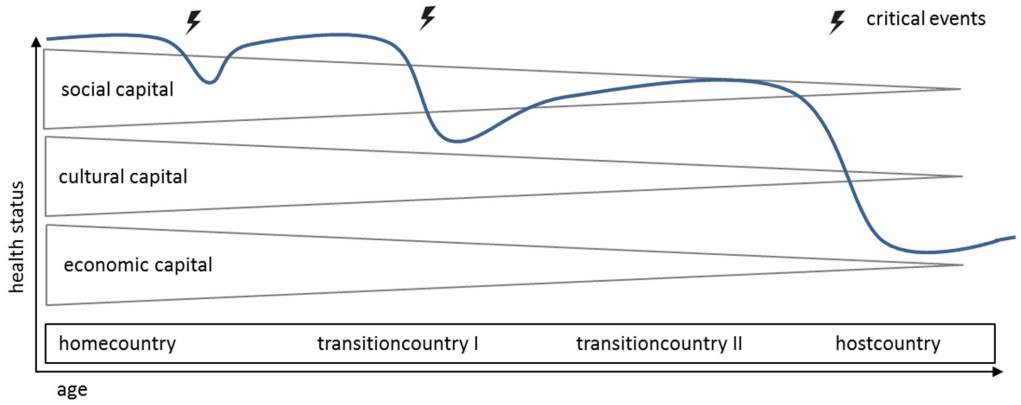


Figure 5: Model of the potentally negative influence of the duration of escape on the asylum-seeking families´ capital and therefore their ability to cope with critical health events. Figure inspired by (53).

A life-course perspective on pediatric migrant health

It is key to understand the patients' health during all stages of their life. Like obesity, many health conditions can be related to health events during childhood or pregnancy (88). The concept of studying health influencing exposures of a person from gestation until later adult life is called life-course epidemiology (89). One concept is the critical period model. During certain periods of life, critical health events have an impact on the overall health, which can not be modified at later stages. Many of these critical periods occur during gestation, pregnancy, childhood and adolescence, periods in which the human organism grows and develops (90). One additional concept proposes that the risk to develop a disease increases with the duration of the exposure to critical health events. For example, the occurrence of severe bed-wetting is associated with the duration of stressful events in a childs' life (91).

Particularly forced migration is likely to take years. It is common that some children of asylum-seeking families are born and raised in transition countries and exposed to many stressful events. When assessing the health of a pediatric migrant, it is therefore important to assess both: the timing and the duration of critical health events during the whole life of the child.

Rationale

Although the number of studies in the field of migrant health is increasing (92), basic knowledge, particularly in the field of the health of asylum-seeking children, is missing (7). Important questions are:

- Who are the currently arriving asylum-seeking children?
- What are their health needs compared to those of non-asylum-seeking children?
- What could be done better to ensure their health needs are adequately addressed?

To answer these questions for the context of North-West Switzerland, the project "care for pediatric asylum-seeking patients" was initiated.

The project "care for pediatric asylum-seeking patients"

The papers I - III are part of the project "care for pediatric asylum-seeking patients", which was started in 2017 at the University Children's Hospital Basel. The aim is to understand and improve the health care provided to asylum-seeking, pediatric patients. The research project includes two parts. One part consists of a literature review and a qualitative study. The second part consists of 4 quantitative studies.

The qualitative part

Before conducting the studies included in this thesis, a literature review (Annex 1) was done to understand what is already known in the area of challenges in migrant health. In a qualitative study (Annex 2), we investigated the perspective of the asylum-seeking caregivers on the health care provided at the tertiary hospital, as their perspective was of central importance to develop further, relevant research questions.

The quantitative part

Complementary to the qualitative study, the quantitative part aims to understand the quantitative aspects of health care provided to asylum-seeking children as their current demographics and epidemiology. It includes the three studies presented in this thesis.

The objective of paper I was to answer the question: who are the current asylum-seeking pediatric patients and what health care is provided to them? It aims to understand the basic demographics of the study population and provides an overview about the health care delivered to asylum-seeking patients compared to non-asylum-seeking patients.
The results of paper I led to the research questions of paper II and III and to the research question of Annex 3.

Paper II aims to describe similarities and differences in the spectrum of disease and management of asylum-seeking compared to non-asylum seeking pediatric inpatients.
Paper III focuses on the question: what could be done better? It aims to understand whether the health care provided to asylum-seeking children could be improved by preventing certain diseases that require hospital admission. It also focuses on potentially preventable, non-urgent presentations of asylum-seeking children at emergency departments.

In paper I, a large proportion of visits by asylum-seeking children were by very few patients, who presented to the hospital multiple times. To better understand this subpopulation, the authors conducted an in-depth analysis of the health visits by asylum-seeking children in need of complex medical care. These findings are summarized in Annex 3.

Table 3: Summary of the project: care for pediatric asylum-seeking patients

Quantitative part		Qualitative and review part	
Paper I	hospital based retrospective chart review of all visits	Annex 1	systematic literature review
Paper II	hospital based retrospective chart review of inpatient visits	Annex 2	qualitative study
Paper III	hospital based retrospective chart review of ambulatory care sensitive conditions and emergency department visits		
Annex 3	retrospective chart review of asylum-seeking children with medical complexity		

Aim and objectives

General aim

The general aim of this thesis is to understand the health needs of asylum-seeking children at a Swiss tertiary hospital compared to the local population.

Objectives

1. To compare the demographics and the full spectrum of health care provided to asylum-seeking and non-asylum-seeking children. (Paper I)

2. To systematically compare the spectrum of disease and management of asylum-seeking and non-asylum-seeking children requiring hospital admission. (Paper II)

3. To assess the amount of preventable hospital admissions and non-urgent emergency department visits in asylum-seeking and non-asylum-seeking pediatric patients. (Paper III)

Study population and methods

Study area

All three studies were conducted at the University Children's Hospital in Basel (Universitäts- Kinderspital beider Basel, UKBB). Located in Switzerland on the border of France and Germany, the University Children's Hospital Basel delivers health care to a multicultural population. The hospital is part of the "Swiss Hospitals for Equity" program (81) and the only tertiary pediatric health care provider for two regions in North-West Switzerland. Since March 2019, Switzerland is divided into six asylum regions. Basel has the only federal asylum centre (FAC) with processing facilities within the asylum region, **Figure 6**, which is run by the Swiss State Secretary of Migration. Asylum-seekers stay for a maximum of three months after arrival at the federal asylum centre. Nurses are present there, providing basic primary care. All children lodging at the federal asylum centre in need of urgent medical care are referred by the nurses to the University Children's Hospital. In addition, asylum-seeking families relocated to apartments within the region can spontaneously present themselves at the hospital.

Figure 6: Map of the federal asylum centres (FAC) in the six asylum regions (93)

The hospital also has a migrant health service, consisting of a social worker, a consultant specialized in infectiology and a resident. The doctors in charge of the hospital wards call the team, if admitted migrants are in need of particular support. The migrant health service also offers outpatient consultations for migrants, who exceed the capacities of primary care pediatricians. A first evaluation takes one hour. With a professional in-person interpreter, a detailed medical history from birth until the present complaint is taken and the child examined. Based on the findings, laboratory samples are taken and the patient is referred to additional specialists. If this is not necessary, the primary care pediatrician receives a comprehensive summary of the medical findings and detailed recommendations regarding catch-up vaccinations or further diagnostic steps. In a migrant health expert group, the team meets with the representatives of the hospital management every three months. Challenges in migrant health are discussed and the expert group decides on the steps needed to adapt the hospital service accordingly.

Figure 7: Two patients waiting for their consultation at the migrant outpatient clinic, UKBB, Basel, Switzerland

Study design

The quantitative part was designed as hospital based retrospective chart reviews. Paper I provided an overview of all health visits at the hospital and paper II and III focused in depth on specific important aspects of these visits.

Table 4: Summary of the methods used in the different papers

Paper	Design	Sample size	Data analysis	Primary outcome parameter
Paper I	Hospital based retrospective chart review of all visits	202,316 visits	Descriptive and inferential statistics	Proportion of total visits by asylum-seeking patients versus non-asylum-seeking patients
Paper II	Hospital based retrospective chart review of inpatient visits	11,794 inpatient visits	Descriptive and inferential statistics	Spectrum of diseases in asylum-seeking patients compared to non-asylum-seeking patients
Paper III	Hospital based retrospective chart review of ambulatory care sensitive conditions and emergency department visits	75,199 inpatient visits and emergency department visits	Descriptive and inferential statistics	Inpatient visits due to ambulatory-care-sensitive conditions in asylum-seeking versus non-asylum-seeking children.

The timeline

Since paper I to III were part of the project "care for pediatric asylum-seeking patients", the timeline for the conduction of the studies was defined in the project's plan of action. The project started in autumn 2016 with the development of a study proposal and funding application, which was granted by the "Botnar foundation" in 2017. In a first step, a literature review (Annex 1) was conducted to gain an overview about challenges in migrant health.

For the quantitative part of the project, the team and the infrastructure needed for the quantitative studies were created. In a second step, the team was trained to use the REDCap data management tool (Vanderbilt university/IC 6.9.4) and the statistics program (Stata/IC 13.1.2013). Third, the research questions and the variables needed were defined and the database generated. Fourth, the data was extracted, cleaned, and analyzed. The publication was written in 2019.

The qualitative part was done in parallel to the quantitative part. The different steps included the creation of the interview guideline and research network, the pilot phase, recruitment, conduction of the interviews, and data analysis by an interdisciplinary team.

Table 5: Plan of action project: care for pediatric asylum-seeking patients

	Project: care for pediatric asylum-seeking patients	
year	**Quantitative part**	**Qualitative and review part**
2016	Funding application for human resources and project grant	
2017	Setting up the research infrastructure (hiring of two master students, office, software)	Literature review (Annex 1) on challenges in migrant health
	Approval by the ethics committees 2017 and 2018	
	Decision on variables paper I	Based on Annex 1: design qualitative study (Annex 2)
	Creation of database paper I	
	Data extraction and preliminary analysis of data paper I	Setting up the research infrastructure
2018	Based on preliminary analysis data paper I: final decision on variables paper II, paper III and Annex 3	Conduction of interviews
	Creation Databases for paper II, III and Annex 3	Transcription
	Data extraction	Analysis
	Data cleaning	Writing of the publication
	Analysis	
2019	Writing of the publications	Submission
2020	Submissions	Publication
	Publications	

Study population

All health visits by patients, visiting the University Children's' Hospital Basel between January 1, 2016 and December 31, 2017 were identified, using administrative and medical electronic records. The asylum-seeking status of all patients was systematically assessed and recorded. Patients were registered as asylum-seeking if any of the following conditions were met: (a) referred from one of the reception and processing centers run by the State Secretary for Migration; (b) referral sheet stating that the patient is asylum-seeking; (c) asylum-seeking identity card, which is routinely issued to all individuals lodging an asylum request in Switzerland. To ensure that only recently arrived asylum-seeking patients were included, children who had visits recorded more than one year before the study period (i.e. before 1st January 2015) were excluded.

For Paper I, all health visits were included in the final study population. The study population of paper II focused only on hospital admissions during the study period. One admission was defined as the period between admission to the hospital and discharge. If during the admission the ward was changed, this was recorded but not counted as a separate admission. Paper III also included all admissions as defined in paper II plus emergency department visits. In all papers, the study population was divided into two groups: visits by asylum-seeking patients and visits by non-asylum-seeking patients.

Variables and definitions

In an interdisciplinary team, all variables including those used as primary and secondary outcome parameters were defined. A codebook was created, entailing the definitions of the variables.

The primary outcome parameter for paper I was defined as the proportion of total visits by the group of asylum-seeking patients compared to the proportion of total visits by non-asylum-seeking patients.

In paper II, the primary outcome parameter was the main disease that led to admission as defined by the International Classification of Diseases 10 (ICD10) codes (94). An admission was defined as a documented presentation at our institution from admission to discharge. If the ward was changed during one stay, this was documented but not counted as separate admission to prevent an overestimation of admissions.

In paper III, the primary outcome parameter was the proportion of admissions due to ambulatory care sensitive conditions. Ambulatory care sensitive conditions are conditions for which hospital admission can be prevented by early interventions in primary care. They are a commonly used indicator to measure the effectiveness of the primary health care system (95). An important secondary outcome parameter was the amount of non-urgent emergency department visits by asylum-seeking patients. Non-urgent visits were defined by the Australasian triage scale (96). The scale ranges from 1 (resuscitation) to 5 (non-urgent condition) and is routinely assessed by trained nurses in all patients presenting at the hospitals' emergency department. Non-urgent visits are commonly defined as score of 4 and 5 (97).

Data collection, management and analysis

The variables defined as primary outcome parameters as those, defined as secondary outcome parameters like age, sex, and nationality were extracted from the administrative and medical health records and transferred to a previously created REDCap-database (Vanderbilt university/IC 6.9.4). For all inpatient and emergency department visits by asylum-seeking patients, important additional secondary variables like registered personal primary care physician or family structure were manually extracted and added to the database. After the automatic and manual data extraction, data cleaning, and automatic and manual quality control tests were performed. For the included variables, missing data was not excluded from analysis but reported as such. Stata (Stata/IC 13.12013) was used for the statistical analysis and for the generation of graphs. The statistical analysis was mainly descriptive. Inferential statistics were used to describe the primary outcome parameters of the different studies. The two sample Chi-square test was used to compare proportions of the primary outcome parameters. Confidence intervals were provided to describe the precision around the summary statistic using a confidence level of 95%.

Ethics

The studies were approved by the Ethics Committee of North-West Switzerland (EKNZ 2017-01585) and exempted from approval by the Regional Committees for Medical and Health Research Ethics of Norway (2018/1351/REK nord).

Summary of results

Here, a summary of the main results from papers I-III is included.

The first part provides an overview about the demographic and epidemiological characteristics of asylum-seeking pediatric patients compared to non-asylum-seeking patients presenting at the hospital during the study period. It mainly refers to paper I.

The second part describes the health care provided with a special focus on pediatric inpatients, summarizing mainly the findings of paper II. The third part focuses on what could be done better. It analyzes the timeliness of health visits by asylum-seeking patients, summarizing findings of paper III.

Who are they: baseline characteristics of asylum-seeking pediatric patients

In total, 202,316 visits by 55,789 patients were recorded at the hospital during the two-year study period. After application of the inclusion and exclusion criteria, 1674 (1%) visits by 439 (1%) asylum-seeking patients were included in the final analysis. A total of 200,642 (99%) visits by 55,350 (99%) non-asylum-seeking patients were included, **Figure 8**.

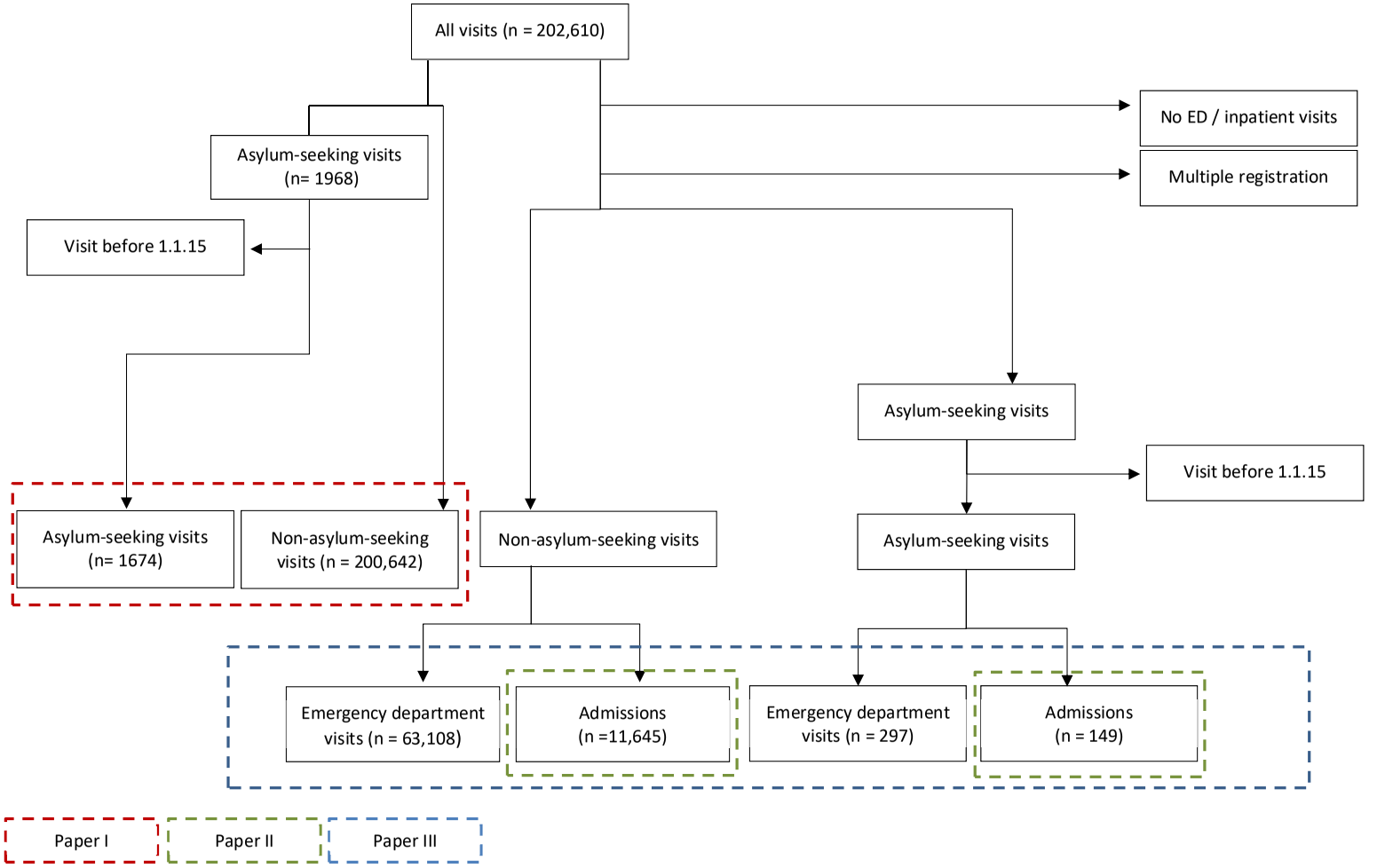


Figure 8: Flow chart summarizing the different study populations of paper I – III

Nationality

Asylum-seeking patients originated from 38 countries. The most frequent nationalities were Eritrea (14%), Afghanistan (13%), and Syria (9%). Most visits were created by Syrian patients (26%; 442/1674), followed by visits from Eritrean (13%, 210/1674), Afghan (11%, 192/1674), Algerian (11%, 182/1674) and Armenian patients (9%, 157/1674), as visualized in **Figure 9.**

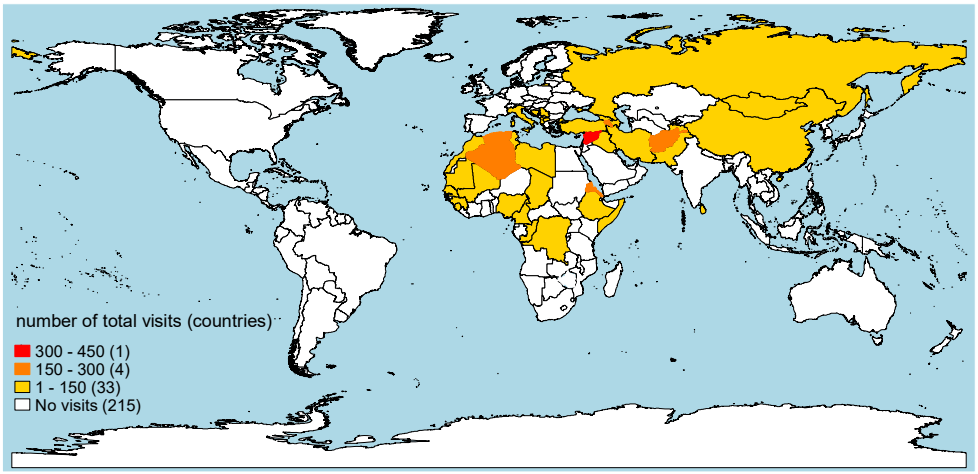


Figure 9: Number of visits by asylum-seeking patients per country

Of the non-asylum-seeking patients, 64 % were Swiss (124,714/200,642). The other 36% originated from 141 different countries with those from Germany (6%, 12,961/200,642), Turkey (5% 9310/200,642), and Italy (4% 7292/200,642) being most frequent.

Age

The age distribution of visits by asylum-seeking patients showed two peaks. Most of the visits (39%; 646/1674) were by patients younger than 3 years of age. This peak was smaller but also present in the non-asylum-seeking children (23%; 45,478/200,642).

The second peak of visits in the asylum-seeking group was adolescents aged 15 to 17 years (25%; 421/1674). In the non-asylum-seeking group, no second peak of visits was detected as adolescents accounted for only 13% (25,736 / 200,642) of the visits. This was not more than the other 3-year intervals between the ages of 3 and 14.

Sex

There was a predominance of male patients among the asylum-seeking compared to the non-asylum-seeking patients with 70% versus 55% of visits. This difference was highest in the adolescent group with 87% (366/421) of visits by males in the asylum-seeking and 50% (12,922/25,736) in the non-asylum-seeking group, respectively. The sex distribution in children < 3 years was similar in both groups.

Frequency of health care visits

The median number of visits per patient was 1 (IQR 1-2; range 1-179) in the asylum-seeking and 2 (IQR 1-4; range 1-221) in the non-asylum-seeking children. When analysing patients with frequent visits (> 15 visits per patient), these occurred in 4% (16/439) of the asylum-seeking and in 3% (1482/55 350) of the non-asylum-seeking patients. The proportion of the total visits contributed by frequently visiting patients was much higher in the asylum-seeking group: visits by frequently-visiting patients accounted for 48% (807/1674) of the total visits in the asylum-seeking group versus 25% (49,886/200,642) of the total visits in the non-asylum-seeking group, **Figure 10**.

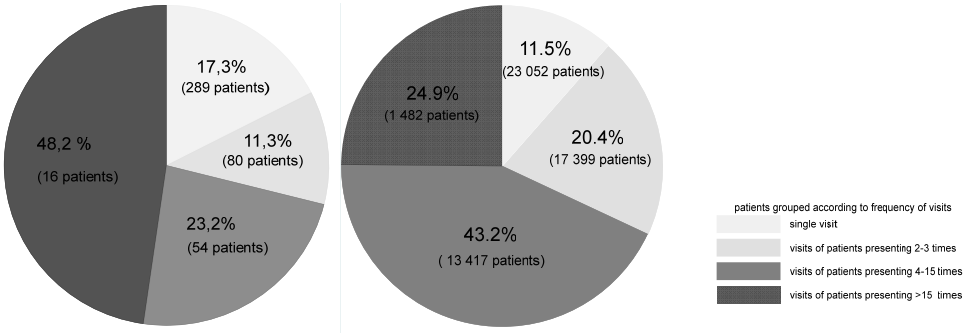


Figure 10: Pie charts depicting frequency of visits and proportions of total visits by (left) asylum-seeking (n = 439 with 1674 visits) and (right) non-asylum-seeking children (n = 55,350 with 200,642 visits)

Health care needs

Overall, outpatient visits were most frequent in both groups with 89% (1490/1674) in the asylum-seeking and 93% (185,950/200,642) in the non-asylum-seeking patients. The

proportion of hospital admissions was higher in asylum-seeking patients with 11% (184/1674) compared to 7% (14,692/200,642) in the non-asylum-seeking children.

Outpatient care

The emergency department was most frequently visited in both groups with a significantly lower proportion in the asylum-seeking patients with 19% (317/1674, CI: 0.15-0.23) compared to 32% (64,315/200,642, CI: 0.32-0.32) in the non-asylum-seeking patients ($p < 0.01$ CI of difference in proportion: -0.17- -0.09). The second most frequently visited department in asylum-seeking children was the department of exercise therapy (12%, 200/1674 visits) and the surgical outpatient department in the non-asylum-seeking patients (9%, 18,507/200,642).

Inpatient care

After applying the definition of admission used for paper II, a total of 11,794 inpatient visits of 9,407 patients were detected. Of these, 1% of visits (149/11,794) and 1% of patients (117/9,407) were asylum-seeking children.

Infants were the largest age group (30%) of inpatients in both groups. Similar to the age distribution seen in the total of hospital visits, the asylum-seeking group showed a second peak in the age distribution in adolescence with 11% (17/149) being aged ≥ 15 compared to 5% (565/11,645) in the non-asylum-seeking group.

Diseases of the respiratory system accounted for 17-19% of admissions in both groups (difference in proportions 95% CI: -0.08-0.04, $p = 0.73$). Infectious/parasitic diseases were more frequent in asylum-seeking children (15% versus 7%, difference in proportions 95% CI: 0.02-0.14, $p < 0.001$). In the asylum-seeking children, 3% of the admissions were caused by malaria (5/149), intestinal infections (4/149), and active tuberculosis (4/149). In the non-asylum-seeking children malaria and active tuberculosis were very rare with < 0.1% of admissions (2/11,645 and 4/11,645, respectively).

Injuries were more frequent in non-asylum-seeking children (22% (2,517/11,645) versus 13% (19/149), difference in proportions 95% CI: 0.04-0.14, $p < 0.01$). Admission for mental diseases were infrequent but more common in asylum-seeking children (6% (9/149)

versus 2.6% (304/11,645), difference in proportions 95% CI: -0.04-0.07, p < 0.01), **Figure 11**.

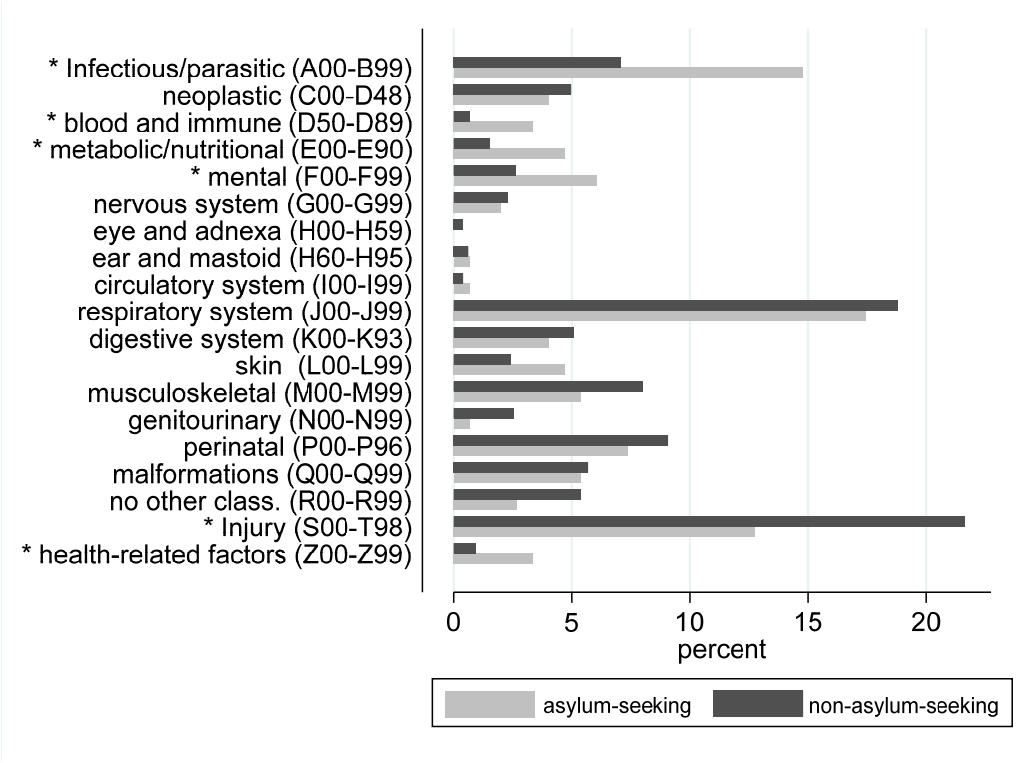


Figure 11: The proportion of main diagnoses in ICD10 categories in asylum-seeking and non-asylum-seeking inpatients. *p-value < 0.05

Asylum-seeking inpatients received analgesics less often than non-asylum-seeking inpatients. A total of 75,722 accounting-units of the most common analgesics including paracetamol, non-steroidal anti-inflammatory drugs, and opioids were prescribed. With 3.4 (506/149) accounting-units per admission in asylum-seeking children, analgesic prescription was lower compared to non-asylum-seeking children with 6.5 (75,216/11,645) accounting-units per admission. Opioids were rarely used in any of the groups, in total 0.67 (7,916/11,794) accounting-units per admission, with 0.37 (55/149) accounting-units per admission in the asylum-seeking and 0.69 (7,861/11,645) accounting-units per admission in the non-asylum-seeking children, respectively.

Amoxicillin-clavulanic acid and cephalosporins were the most commonly prescribed antibiotics overall with 0.9 (10,608/11,794) accounting-units per admission. Prescription of amoxicillin-clavulanic acid was comparable in both groups with 0.7 accounting-units per admission in the asylum-seeking children (109/149) and in non-asylum-seeking children (8,139/11,645). Cephalosporins were less frequently prescribed with 0.1 (15/149) and 0.2 (2,345/11,645) accounting-units per admission in asylum-seeking and non-asylum-seeking children.

What could be done better?

Presenting too late: ambulatory-care sensitive conditions

In study III, a total of 75,199 hospital visits were included, of which 63,405 were emergency department visits and 11,794 were admissions. A similar amount of admissions due to ambulatory-care-sensitive conditions was found in the two groups with 12.1% (18/149, 95%CI: 0.07-0.18) in the asylum-seeking and 11% (1270/11,645, 95%CI: 0.1-0.11) in the non-asylum seeking patients' group ($p = 0.65$; difference in proportions 95% CI: -0.04-0.06), **Figure 12**.

The distribution within the different categories of ambulatory-care-sensitive conditions varied between the groups. The most frequent category in both groups was "severe infections of ear, nose, throat or upper respiratory tract". This ambulatory-care-sensitive condition category was more frequent in visits by asylum-seeking compared to non-asylum-seeking patients, 12/18 (67%) and 475/1270 (37%), respectively. Skin infections were the second most common category in admissions for ambulatory-care-sensitive conditions by asylum-seeking patients with 3/18 (17%), compared to 124/1270 (10%) in non-asylum-seeking patients. In the non-asylum-seeking patients, admissions for "gastroenteritis and dehydration" was also common with 175/1270 (14%), compared to no admission for these reasons in the asylum-seeking patients. Nutritional deficiency was more common in asylum-seeking patients 1/18 (6%) compared to non-asylum-seeking patients 2/1270 (0%).

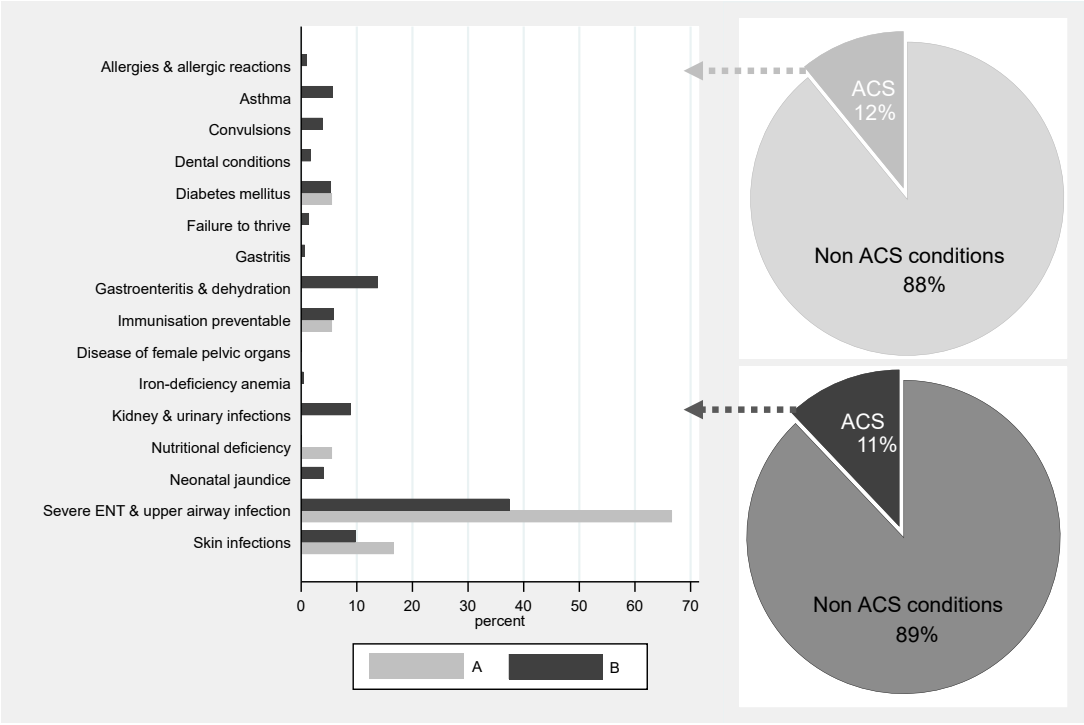


Figure 12: The proportion of ambulatory care sensitive (ACS) conditions in the asylum-seeking (A, light grey) and in the non-asylum-seeking group (B, dark grey).

A primary care physician was documented in 66/149 (44%) of the admissions of asylum-seeking patients. There was no difference in the proportion of admissions for ambulatory-care-sensitive conditions in visits with and without a documented primary care physician: 8/66 (12%) and 10/83 (12%), respectively.

Presenting in time: Non-ACS admissions through the emergency department

In total, 70,515 presentations at the emergency department were recorded of which 63,405 were emergency department visits and 7,110 were admissions initiated by the emergency department. In total, 394/70,515 (0.5%) were by asylum-seeking and 70,121/70,515 (99.5%) by non-asylum-seeking patients. The proportion of emergency department contacts leading to admission was higher in asylum-seeking compared to non-asylum-seeking patients (97/394 (25%) and 7013/70,121 (10%)). Of those admissions initiated by the emergency department, a comparable amount in both groups was due to ambulatory care

sensitive conditions (16.5% (16/97) in the asylum-seeking and 15.7% (1101/7013) in the non-asylum-seeking group).

Presenting too early: non-urgent emergency department visits

Among the outpatient emergency department visits by asylum-seeking patients, non-urgent conditions accounted for 82.2% (244/297). A primary care physician was documented in 122/297 (47%) of the asylum-seeking outpatient visits. The median (IQR) triages score for those with and without a documented primary care physician was similar: 5 (3-5) and 5 (4-5), respectively. The proportion of office-hours visits was similar in visits of patients with a primary care physician documented compared to visits of those without: 57% (70/122) versus 59% (99/168).

Figure 13: Asylum-seeking patient at the University Childrens' Hospital Basel, Switzerland. With the kind permission of the caregiver.

Discussion

This thesis shows that the number of visits by asylum-seeking patients presenting at a tertiary hospital in Switzerland was low compared to the number of non-asylum-seeking patients. The most common nationalities were Eritrean, Syrian, and Afghan. Compared to the age distribution of non-asylum-seeking patients, there were proportionally more adolescents and more males in the asylum-seeking group. The spectrum of disease of asylum-seeking inpatients was comparable to that of non-asylum-seeking patients. The proportion of total visits created by frequently visiting patients was higher in the asylum-seeking group and consisted of young patients with genetic diseases as well as of adolescents with mainly orthopaedic and mental health problems.

The amount of potentially preventable hospital admissions was similar in asylum-seeking and non-asylum-seeking patients. Although presenting less frequently to the emergency department than non-asylum-seeking patients, the percentage of non-urgent visits at the emergency department by asylum-seeking patients was high.

In the following sections, the most important strengths and weaknesses of the methods used will be discussed. The meaning of the results will be reflected and put into the broader context of the whole project as into the context of current evidence. Finally, research questions prompted by the study results will be described and potential recommendations for politicians and researchers will be discussed.

Discussion of methods

Study design

This thesis work has several limitations. One major limitation was the retrospective nature of the study. This resulted in missing data for example for the variable nationality. Important variables could not be included in the analysis as the percentage of missing data was too high. Retrospectively contacting patients to gather additional information was not deemed feasible. This limited an in-depth analysis of many important aspects like analyzing the family-structure of asylum-seeking patients, describing key social determinants of health like the socio-economic and educational background of the study population, or calculating the proportion of non-urgent emergency visits in the non-asylum-seeking group. For the same reason, ethnicity could not be assessed and nationality was used as a proxy.

The design as comparative studies with a large control group of non-asylum-seeking patients is a strength of the thesis. It allowed a direct comparison of similarities and differences to the non-asylum-seeking population living in the same context and receiving health care from the same facility. This reduced the likelihood of confounding due to different health care contexts and therefore wrongly attributing a difference to the exposure "asylum-seeking". However, this study does not include a comparison of the asylum-seeking group with their corresponding source populations. Differences to their own health status before migration as between migrants and those remaining in the home country could not be analyzed. Therefore, it was not possible to exclude or identify a potential "healthy migrant effect" bias (98). On the other hand, the healthy migrant effect has not been shown in purely pediatric populations yet. Families with children in need of medical complexity are more likely to be chosen by the UNHCR resettlement programme, which could result in the opposite selection bias with overrepresentation of very sick children in the study population (99).

In summary, with the chosen design it is not possible to differentiate whether the differences and similarities in health needs measured can be attributed solely to different national backgrounds or to migration itself. Additionally, a selection bias and overrepresentation of healthy or sick patients is possible.

An important strength of this thesis work is its integration into a broader research project. The previously conducted systematic review of the literature helped to improve the study design by knowing the strengths and weaknesses of the studies already published in the research area. It helped to formulate relevant research questions.

Annex 2 allowed an understanding of the perspective of the study-population on their health needs. It helped the researchers to understand the studypopulation in a more holistic way, get an impression of their daily reality and deepened the knowledge provided by the quantitative studies.

Annex 3 helped to gain evidence about the important sub-group of children with medical complexity. In this study, a deeper analysis of the social determinants of health of the families was possible which was an important addition to the knowledge gained in the studies of this thesis.

Alternative study designs

Many authors in migrant health consider the design as cohort study with measurements before and after migration and comparisons to the home and host populations as potential gold standard. They also acknowledge that such a design is difficult to implement, as it is usually not known whether a person will migrate or not (74). In addition, the cohort in the host country is difficult to follow. During the Swiss asylum-process, asylum-seekers are relocated multiple times, crossing regional borders. By crossing regional borders, the primary care providers and hospitals in charge of their health care are changing and health information is difficult or impossible to collect.

One potential solution could be a countrywide, prospective cohort with all newly arriving asylum-seeking persons receiving an electronic health record. First, this could reduce loss of information during relocations and improve the quality of health care asylum-seeking patients receive. Second, not only health visits at specific hospitals but also visits at primary care facilities or community facilities could be included if the electronic health record is consequently used by all levels of care. Third, it could provide important, longitudinal research data allowing to observe health profiles over time. On a voluntary base, these asylum-seeking persons could name a family member of a similar age, sex and socioeconomic background who did not migrate who could volunteer as control in the home

country. If well established, the electronic health record project could be scaled up to different European countries, accompanying the asylum-seeking person along the European part of their escape route. Particularly in pediatric health, European health records of asylum-seeking children could ensure better implementation of the European health guidelines for migrant children (77) and would make key health prevention interventions like timely, continous vaccination of children easier.

Canada provides one first example of improving countrywide electronic health care for migrants and refugees. The country established a Canadian Collaboration for Immigrant and Refugee Health, providing nation wide online resources relevant to migrant health workers (100). Scotland was one of the first countries which linked the national census data with health-related data (101) which made nation-wide overview about important aspects of migrant health possible in a relatively feasible way.

Representativity

Consisting of in total over 200,000 visits, this thesis has a large study-population ensuring precise results and solid representability of the population and the control group. As the only tertiary health care provider of the region, asylum-seeking children in need of tertiary care are well represented. However, migrant children without official documents are not separately identified in the studies of the thesis. As in the study context undocumented children can receive a health insurance card like the asylum-seeking children if presenting at the facility for undocumented migrants (102), it is possible that some children classified as asylum-seeking are in reality undocumented migrants.

The studies of the thesis only compared asylum-seeking children to non-asylum-seeking children. However, the percentage of migrants in the comparison group who did not have a Swiss passport was high (36%). Potential similarities and differences between Swiss nationals and non-asylum-seekers without Swiss nationality were missed.

The studies of this thesis excluded asylum-seeking children who had visited the hospital before January 1, 2015. It sometimes happens that persons remain asylum-seeking for decades, although they are well integrated in the host country and have had access the country's health care for years. Consequently, the health profiles of migrating persons assimilate to those of the host population over time in aspects like infectious diseases or risk

behaviour (103). The exclusion of these visits might, however, limit the representability of the results for long-term asylum-seekers and potential important differences like for example in the field of mental health might have been missed.

As the distribution between the study groups was unequal, certain aspects of the asylum-seeking group could not be precisely measured. For example, the number of admissions due to ambulatory-care-sensitive conditions was small in the asylum-seeking group, not allowing further stratification for sex and age, which makes it difficult to draw conclusions with certainity.

Generalisability

A weakness of the study is its limited generalisability to other contexts. The study was conducted at a single tertiary hospital with a long-standing interest and experience in pediatric migrant health. With nurses as gate-keepers at the local federal asylum centre, the support of the "Swiss Hospitals for Equity" network, full time availability of interpreter services, and systematic intercultural training of the health care providers at the facility, the hospital might not represent a standard tertiary facility and therefore the results might not be directly applicable to other institutions. However, studies investigating current demographics, epidemiology, and health needs of asylum-seeking persons are by necessity very context and time specific (3). It is therefore at the same time strength of a study to focus on data from one context to detect important similarities and differences between specific subgroups of the study population like inpatients, adolescents, or children with medical complexity. It is also important to describe the study context in a detailed way to understand which structural, social and managerial factors are beneficial to the study population and which are not. This is most easily done in a single center study or in studies including few health facilities. The results of this thesis and of Annex 2 show that the hospital could be used as a model for similar contexts who had no particular interest in pediatric migrant health so far.

Misclassification bias

One of the strengths of this study is the systematic registration of patients as "asylum-seeking" at the hospital, which is rarely done in Switzerland. It allowed for the precise identification of the asylum-seeking patients without relying on indirect identification-methods as a proxy like the State Secretary as billing-address for the health expenditures as it was used in other studies (104). This direct registration is described as urgently needed in more settings (105). However, some asylum-seeking patients might have been missed by the administrative staff and the number of asylum-seeking patients might have been potentially underestimated. As mentioned above, undocumented pediatric migrants who received a health insurance card might also have been wrongly classified as asylum-seeking.

Discussion of results

Who are they: a small, diverse and dynamic population

The findings of this thesis show that the proportion of visits by asylum-seeking patients with 1% is low. This finding echoes a recent publication of the University College London Lancet Commission on Migration which shows that public statements in current discussions about asylum-seekers disproportionately burdening the health care systems of host countries are not true for all contexts (3). A similar finding was described by a second study, investigating the amount of visits by asylum-seeking pediatric patients at an emergency department in London downtown (106).

The main nationalities of asylum-seeking patients were Afghan, Syrian, and Eritrean. This is in line with the current migration patterns since 2015 (24). In studies conducted at the research context some years ago, asylum-seeking patients dominantly came from former Yugoslavia and the Balkan states, and thus had different health needs and health perceptions (107-111). Therefore, continuous monitoring of the demographics of asylum-seeking patients in host countries is key to identify new migration patterns and adapt the health care provision accordingly.

Health care needs

Our results show important similarities and differences in health care needs of asylum-seeking and non-asylum-seeking pediatric patients.

Communicable diseases

The spectrum of diseases in pediatric inpatients showed that respiratory diseases was the most frequent reason for admissions in asylum-seeking and non-asylum-seeking patients alike. This is in line with other studies (112-114). Admissions for certain infectious and parasitic diseases were more frequent in asylum-seeking than non-asylum-seeking patients but only the second most frequent category for admission in the asylum-seeking population. There are large differences regarding the prevalence of certain infectious diseases in asylum-seekers and migrants across European countries (36) which might also be due to the geographic location of Switzerland. Acute infections may present in transit countries such as Italy, Greece or Turkey, where patients spend their first months after crossing into Europe. By the time they travelled through the bordering countries to Switzerland, incubation periods for microorganisms such as Plasmodium falciparum have already passed. In contrast, asylum-seeking patients are prone to the local microorganisms that do not occur in their home countries. In older but also current public debates, asylum-seeking patients are commonly discussed as main carriers for new infectious diseases (115). Based on the results of this study, this is not true for the Swiss context. As also shown by previous authors, in regions like Switzerland the probability for asylum-seeking children to get infected with microorganisms new to their immune-system is much higher than the risk for the local children to acquire new infections from them (116).

Non-communicable diseases

In contrast to the relatively similar health needs in the field of communicable diseases, health needs in the area of non-communicable diseases showed important differences. Despite a considerable amount of asylum-seeking male adolescents, our study showed a relatively small amount of health visits due to mental health problems. A current literature review highlights that the mental health needs of asylum-seeking children and adolescents

has not yet been adequately addressed (117). In the recent Australian longitudinal study on mental health of refugee children, the importance of early detection and intervention was pointed out (118). To date, no systematic mental health screening of asylum-seeking adolescents is done in Switzerland. This may result in an under-diagnosis of these diseases, also in our context.

Use of pain medication

The use of pain medication was lower in the asylum-seeking group compared to the non-asylum-seeking group. Possible explications for this finding are differences in the reasons for admissions with fewer painful injuries in the asylum-seeking group or the language barrier between asylum-seeking families and the medical team. However, nurses are trained to ask all children frequently about their need for pain medication, using validated face-charts. Aa alternative explication is that asylum-seeking families asked for pain medication less often. The use of medication of migrant children was also assessed in a nation-wide Norwegian study. The results showed that migrant children used less of all assessed prescribed medications compared to the majority population. The use of prescribed medications for the children of migrants was slightly higher but still less if compared to the local peers (119).

Children with medical complexity

In this thesis we found that the proportion of total visits created by frequently visiting patients was considerably higher in the asylum-seeking group than in the non-asylum-seeking group.

This is an important sub-population of pediatric patients. The term “children with medical complexity” has only recently been defined and is an emerging research area in high-income settings (52). To our knowledge, this sub-group has not yet been studied in asylum-seeking children. Current publications focus on certain disease groups like pulmonary diseases (120) or describe single rare cases like complex lice infection (121) or neurobrucellosis (122) but the public health importance of asylum-seeking patients in need of complex care as a group has been overlooked in research so far.

In Annex 3, the health records of 19 patients most frequently visiting the hospital were analyzed in depth. All together, these patients had 811 visits during the study period. Like the study population of Paper I and II, two main age groups within the frequently visiting patients were identified: young children < 2 years old and adolescents > 12 years of age. In infants, genetic diseases and nutritional problems were most common; in adolescents, orthopedic diseases and mental health problems were more prevalent (123). Targeted programs like family planning and genetic counselling for consanguine couples with young children suffering from genetic diseases are more common in countries with a higher prevalence and awareness of consanguinity. Host countries could learn from programs like the sickle cell family counselling and treatment program in rural Niger (124) and adapt accordingly.

What could be done better?

Presenting too late

This thesis shows comparable amounts of admissions due to ambulatory care sensitive conditions in asylum-seeking and non-asylum-seeking children. In one German study that used the same ICD-10 codes to define ambulatory-sensitive conditions, asylum-seeking children were much more likely to be admitted due to ambulatory-care sensitive conditions compared to non-asylum-seeking patients (104). One explanation for the difference between the studies is availability of primary care. Nurses at the federal asylum center triage asylum-seeking children and refer them to primary care pediatricians if needed. However, after the publication of the first study, the German research team published a follow-up study after the implementation of a walk-in clinic for asylum-seeking patients. This showed no positive effect on the admissions due ambulatory-care sensitive conditions after time adjustment. However, the authors did not focus on pediatric patients and had no direct parallel control group, which might have influenced the results (125). Another potential explication for the different outcomes could be accessability. The nurses at the federal asylum centres actively organize the referral including transportation of asylum-seeking children and the caregiver. In contrast to the German context, the asylum-seeking caregivers around Basel do not need to know how to access health care services by themselves.

Presenting too early

The results of this thesis show that asylum-seeking patients presented proportionally less frequently to the emergency department compared to non-asylum-seeking patients. This is in line with a systematic review of studies investigating the use of health structures by migrants, including emergency departments. The authors concluded that migrants used the health structures less often than the local population (126). Similarly, in a nation-wide Norwegian study, migrants in general used the emergency department less than the majority population, exept for those originating from Somalia and Irak (127). However, despite the relatively infrequent use of the emergency room by asylum-seeking children, 82% of their visits were non-urgent. This might be due to over-referral to the emergency department by primary care providers, frightened to miss a serious health condition when history taking is impaired. One study described such a fear among general practitioners when dealing with migrant patients and impaired communication. The fear of "missing something" led to additional potentially unnecessary diagnostic tests (127).. In our study, however, there was no difference in the number of non-urgent emergency department presentations between asylum-seeking children who had a registered personal pediatrician and those who did not have one. Therefore, it is likely that there were many non-urgent self-presentations of asylum-seeking patients. The findings of the qualitative study (Annex 2) showed that being able to communicate with the health care provider was of central importance for the asylum-seeking caregivers when evaluating the quality of care (61). This finding is also supported by other studies (57, 60, 128, 129) and by Annex 1 (130). Good communication also contributed to build trust towards the medical staff treating the child, which was of utmost importance to asylum-seeking families. As primary care providers lack access to interpreter services, asylum-seeking caregivers might prefer to present to tertiary level facilities, where they know that interpreter services are provided. In addition, it is known that limited health literacy of asylum-seeking patients can lead to non-urgent emergency department presentations (131). In this study, it was not possible to assess whether the asylum-seeking family presented only to the emergency department or in addition to a consultation at the primary care facility.

Adapting primary care for migrants

The importance of adapting primary care systems to the needs of asylum-seeking patients has been acknowledged by 7 European countries, who created the EUR-HUMAN project to improve primary health care for refugees (132). For the development of improved models in migrant health, the 3C Model developed in Annex 1 could be used. It describes the 3 major challenges in migrant health care delivery on the health provision level: Communication, Continuity of Care and Confidence, **Figure 14** (130).

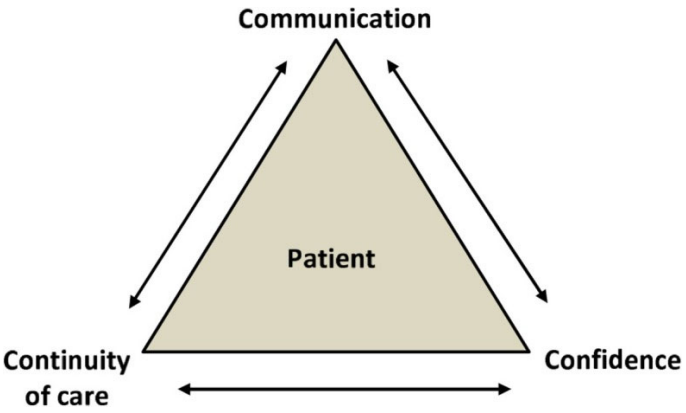


Figure 14: Depicting the 3C Model on challenges in migrant health care (130)

Making interpreter services easily available for primary care providers might be one first important step to ensure good quality care for asylum-seeking children and their families. The finding of Annex 2, that a holistic approach to health care delivery was welcomed by the parents, has also beenmentioned by other authors (133-136). Services where parents and children alike got health counselling and advice on legal and social issues were described as highly efficient by health care providers (137) and appreciated by asylum-seeking families (61). Patient navigators as individual assistants of families helping to navigate through the health care system could ensure that the right health care structure is visited at the right time (138). Finally, migrant families could become community health educators, trained to involve community members in the planning and delivery of self-chosen health promotion activities to their communities (139).

Integration of results into the analytical framework

The comparable amounts of ambulatory care sensitive conditions in the asylum-seeking and non asylum-seeking group show that the research context seems to provide sufficient support to asylum-seeking families to compensate for the lost capital during their escape. This includes the provision of economic support by including asylum-seeking children to the national health insurance system, cultural support by providing interpreters present at welcome centers and the hospital and social support by the social service of the hospital and the nurses at the federal centres, triaging and taking care of referrals to health facilities if needed, **Figure 15.**

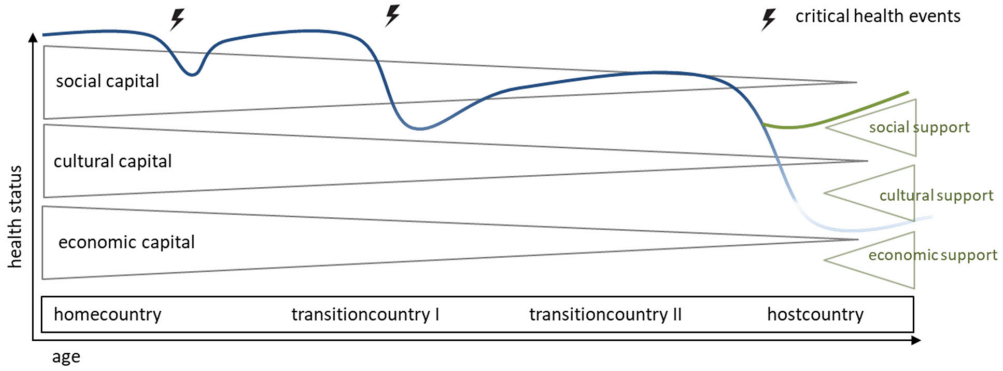


Figure 15: Model of the potentally negative influence of the duration of escape on the asylum-seeking families´ capital and the ability to provide sufficient social, cultural and economic support by the host country to prevent further loss of the health status. Figure inspired by (53).

To prevent the decrease of personal capital and increase in health risks not only in host countries but also during the whole journey, trans-national social protection, valid in home, transit and host countries could be part of a solution (140) or the realisation of a universal health coverage as claimed in SDG 3 (141). For a minority of asylum-seeking families, continuous support during escape is already available, namely as UNHCR resettlement programme (142). In Annex 2, two caregivers explained that their family was selected for the resettlement program mainly due to a complex disease of the child. The childs' medical file was sent to the hospital in the host country prior to their flight, which allowed the medical team in the host country to know about important health events in the past. It

enabled the team to look at the health of the future patient with a life-course approach. Accompanied by their case manager, the child was directly brought to the hospital right after arrival. Within weeks, the parents received language classes and their asylum-request was accepted. This model of holistic support to quickly regain social, cultural and economic capital could be scaled up to ensure safe journeys for asylum-seeking families worldwide.

Figure 16: Refugee family at Moria refugee camp, waiting to be resettled. With the kind permission of the persons depicted.

Conclusions

- Asylum-seeking patients are a small and diverse part of the pediatric patient population whose needs quickly change with different migration patterns. Continuous monitoring of their characteristics is needed to adapt health care delivery to their changing health needs.
- The health needs of currently asylum-seeking patients in the local context are comparable in terms of communicable diseases. The population of asylum-seeking children in need of complex care has been overlooked so far. Health programs needs to be tailored to the needs of this particularly vulnerable group.
- Findings from this thesis suggest a relatively strong primary care system for asylum-seeking patients in this particular context, which could serve as a model for other regions.
- Strategies to prevent non-urgent visits at emergency departments are needed to ensure an efficient use of the health care system by all persons living in the country.
- For a cost-effective and high-quality health service delivery to asylum-seeking patients, primary care needs to be adapted to their needs. This implies the availability of interpreter services for primary care physicians and new models of holistic care, facilitating a trustful relationship between health care providers and asylum-seeking caregivers.

Recommendations for policy-making

- As the field of migration and health is subject to intensive public discussions, it is particularly important to base policies and decision-making on solid evidence and communicate it to the public. The evidence needs to be applicable to the specific context to prevent harmful consequences, both for asylum-seeking and non-asylum-seeking populations.
- Asylum-seeking patients in need of complex care are a particularly vulnerable group. Health programs, tailored to their particular health needs are required.
- There is clear evidence from this and other studies that a strong primary care system, adapted to the needs of asylum-seeking patients is important to provide efficient, good quality, cost-effective health care to asylum-seeking families. Financing interpreter services for primary care physicians is of central importance to reach this goal. Models of holistic care, including social, health, and law counselling of asylum-seeking families need to be further developed and implemented to allow a patient-centred care.

Recommendations for further research

- Continuous monitoring of the characteristics of asylum-seeking patients is needed to ensure that changing patterns are detected and health care delivery is adapted to their changing needs. Systematic registration of the asylum-status at reception desks is important to allow high quality research in this field. Europe-wide electronic health records could facilitate longitudinal monitoring of the health status of asylum-seeking patients.
- Research on asylum-seeking patients in need of complex care needs to become a priority to learn about their health needs and develop targeted health programs.
- Further evidence on non-urgent visits of asylum-seeking patients compared to non-asylum-seeking patients at emergency departments is needed to understand the reasons for untimely presentations and ensure the efficient use of the health care system.

References

1. Gmünder M, Brandenberger J, Buser S, Pohl C, Ritz N. Reasons for admission in asylum-seeking and non-asylum-seeking patients in a paediatric tertiary care centre. Swiss medical weekly. 2020;150:w20252.
2. Brandenberger J, Bozorgmehr K, Vogt F, Tylleskär T, Ritz N. Preventable admissions and emergency-department-visits in pediatric asylum-seeking and non-asylum-seeking patients. Int J Equity Health. 2020;19(1):58.
3. Abubakar I, Aldridge RW, Devakumar D, Orcutt M, Burns R, Barreto ML, et al. The UCL-Lancet Commission on Migration and Health: the health of a world on the move. Lancet (London, England). 2018;392(10164):2606-54.
4. The UN Refugee Agency. global trends: forced displacement in 2018. 2018.
5. United Nations International Children's Emergency Fund. Uprooted: The growing crisis for refugee and migrant children 2015 [15.04.2017]. Available from: https://www.unicef.org/publications/index_92710.html.
6. World Health Organization, editor Transforming our world: the 2030 Agenda for Sustainable Development. World Health Assembly 2015; Geneva United Nations.
7. World Health Organization. Report on the health of refugees and migrants in the WHO European Region. Denmark: Europe; Ro; 2018.
8. Baauw A, Ritz N. Towards better healthcare for migrant and refugee children in Europe. European journal of pediatrics. 2018;177(2):161-2.
9. World Health Organization regional office for Europe. Strategy and action plan for refugee and migrant health in the WHO European Region. regional committee for Europe 66th session; 01.08.2016; Kopenhagen 2016.
10. International Society for Social Pediatrics and Child Health. ISSOP position statement on migrant child health. Child: care, health and development. 2018;44(1):161-70.
11. International Organization for Migration. Key Migration Terms: International Organization for Migration; 2020 [cited 2020 22.02.2020]. Available from: https://www.iom.int/key-migration-terms.
12. State Secretary of Migration. Residence permits for non-EU/EFTA nationals 2020. Available from: https://www.sem.admin.ch/sem/en/home/themen/aufenthalt/nicht_eu_efta.html.
13. The UN Refugee Agency. convention and protocol relating the status of refugees. 1951. Report No.: 1.
14. Ingleby D, Bhopal RS, Gruer L, Krasnik A, Pace P, Petrova-Benedict R. Why we shouldn't use the term "illegal migrant". BMJ (Clinical research ed). 2018;363:k4885.
15. International Organization for Migration. World Migration Report 2020. 2019:496.
16. The UN Refugee Agency. global trends - forced displacement in 2017 2017 [updated 19.06.201712.12.2018]. 72]. Available from: www.unhcr.org/statistics
17. European Asylum Support Office. Annual Report on the Situation of Asylum in the European Union 2018. 01.06.2010 ed2019.

18. United Nations International Children's Emergency Fund. A child is a child 2017 [cited 2018 12.12.2018]. Available from: https://www.unicef.org/publications/files/UNICEF_A_child_is_a_child_May_2017_EN.pdf.
19. United Nations International Children's Emergency Fund. Latest statistics and graphics on refugee and migrant children 2018 [updated 26 December 2017; cited 2018 11.09.2018]. Available from: https://www.unicef.org/eca/what-we-do/emergencies/latest-statistics-and-graphics-refugee-and-migrant-children.
20. Bundesamt für Statistik. Bevölkerung: Migration-Integration 2018 [22.01.2020]. Available from: https://www.bfs.admin.ch/bfs/de/home/statistiken/bevoelkerung/migration-integration/auslaendische-bevoelkerung.assetdetail.9466879.html.
21. Bundesamt für Statistik. Die Bevölkerung der Schweiz. Schweizerische Eidgenossenschaft, 2018.
22. Bischoff A, Schneider M, Denhaerynck K, Battegay E. Health and ill health of asylum seekers in Switzerland: an epidemiological study. European journal of public health. 2009;19(1):59-64.
23. Staatssekretariat für Migration. Asylstatistik Übersichten 1986-2018 [cited 2018 03.04.18]. Available from: https://www.sem.admin.ch/sem/de/home/publiservice/statistik/asylstatistik/uebersichten.html.
24. Staatssekretariat für Migration. Migrationsbericht. Staatssekretariat für Migration, 2018.
25. Carrasco-Sanz A, Leiva-Gea I, Martin-Alvarez L, Del Torso S, van Esso D, Hadjipanayis A, et al. Migrant children's health problems, care needs, and inequalities: European primary care paediatricians' perspective. 2018;44(2):183-7.
26. Castañeda H, Holmes SM, Madrigal DS, Young ME, Beyeler N, Quesada J. Immigration as a social determinant of health. Annual review of public health. 2015;36:375-92.
27. Giuntella O, Kone ZL, Ruiz I, Vargas-Silva C. Reason for immigration and immigrants' health. Public Health. 2018;158:102-9.
28. Aldridge RW, Nellums LB, Bartlett S, Barr AL, Patel P, Burns R, et al. Global patterns of mortality in international migrants: a systematic review and meta-analysis. Lancet (London, England). 2018;392(10164):2553-66.
29. Gimeno-Feliu LA, Calderon-Larranaga A, Diaz E, Poblador-Plou B, Macipe-Costa R, Prados-Torres A. The healthy migrant effect in primary care. Gaceta sanitaria. 2015;29(1):15-20.
30. Muller M, Khamis D, Srivastava D, Exadaktylos AK, Pfortmueller CA. Understanding Refugees' Health. Seminars in neurology. 2018;38(2):152-62.
31. Juster RP, Russell JJ, Almeida D, Picard M. Allostatic load and comorbidities: A mitochondrial, epigenetic, and evolutionary perspective. Development and psychopathology. 2016;28(4pt1):1117-46.
32. McEwen BS. Stress, adaptation, and disease. Allostasis and allostatic load. Annals of the New York Academy of Sciences. 1998;840:33-44.
33. Eiset AH, Wejse C. Review of infectious diseases in refugees and asylum seekers—current status and going forward. Public Health Reviews. 2017;38(1):22.

34. Gergely A, Bechet S, Goujon C, Benabdelmoumen G, Consigny PH. Hepatitis B screening in travelers: a retrospective analysis. Travel medicine and infectious disease. 2014;12(6 Pt B):707-12.
35. Greenaway C, Thu Ma A, Kloda LA, Klein M, Cnossen S, Schwarzer G, et al. The Seroprevalence of Hepatitis C Antibodies in Immigrants and Refugees from Intermediate and High Endemic Countries: A Systematic Review and Meta-Analysis. PloS one. 2015;10(11):e0141715.
36. Pavli A, Maltezou H. Health problems of newly arrived migrants and refugees in Europe. J Travel Med. 2017;24(4).
37. Keygnaert I, Ivanova O, Guieu A, Van Parys AS, Leye E, Roelens K. WHO Health Evidence Network Synthesis Reports. What is the Evidence on the Reduction of Inequalities in Accessibility and Quality of Maternal Health Care Delivery for Migrants? A Review of the Existing Evidence in the WHO European Region. Copenhagen: WHO Regional Office for Europe (c) World Health Organization 2016.; 2016.
38. Akik C, Ghattas H, Mesmar S, Rabkin M, El-Sadr WM, Fouad FM. Host country responses to non-communicable diseases amongst Syrian refugees: a review. Confl Health. 2019;13:8.
39. Chen H, Wang L, Wei Y, Ye B, Dai J, Gao J, et al. The Potential Psychological Mechanism of Subjective Well-Being in Migrant Workers: A Structural Equation Models Analysis. International journal of environmental research and public health. 2019;16(12).
40. Masten AS. Global perspectives on resilience in children and youth. Child development. 2014;85(1):6-20.
41. Bhopal R. Is research into ethnicity and health racist, unsound, or important science? BMJ (Clinical research ed). 1997;314(7096):1751-6.
42. Oxford University. Ethnicity. Oxford Reference. Oxford2020.
43. Foster MW, Bernsten D, Carter TH. A Model Agreement for Genetic Research in Socially Identifiable Populations. The American Journal of Human Genetics. 1998;63(3):696-702.
44. Dolezsar CM, McGrath JJ. Perceived racial discrimination and hypertension: a comprehensive systematic review. 2014;33(1):20-34.
45. Brewis AA. Stigma and the perpetuation of obesity. Social science & medicine (1982). 2014;118:152-8.
46. Priest N, Paradies Y, Trenerry B, Truong M, Karlsen S, Kelly Y. A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. Social science & medicine (1982). 2013;95:115-27.
47. Parker LS, Majeske RA. Standards of care and ethical concerns in genetic testing and screening. Clinical obstetrics and gynecology. 1996;39(4):873-84.
48. World Bank Group. Migration and development : a role for the World Bank Group. 2016.
49. The Lancet. Migrant and refugee children need our actions now. Lancet (London, England). 2016;388(10050):1130.

50. Kadir A, Battersby A, Spencer N, Hjern A. Children on the move in Europe: a narrative review of the evidence on the health risks, health needs and health policy for asylum seeking, refugee and undocumented children. BMJ Paediatr Open. 2019;3(1):bmjpo-2018-000364.
51. Jaeger FN, Hossain M, Kiss L, Zimmerman C. The health of migrant children in Switzerland. International journal of public health. 2012;57(4):659-71.
52. Cohen E, Berry JG, Sanders L, Schor EL, Wise PH. Status Complexicus? The Emergence of Pediatric Complex Care. Pediatrics. 2018;141(Suppl 3):S202-s11.
53. Kumar BN, Diaz E. Migrant health - a primary care perspective. World Organization of Family Doctors - Family Medicine. Boca Raton: CRC Press; 2019.
54. World Health Organization. Promoting migrant health – striving for peace and decent life for all. Promoting migrant health – striving for peace and decent life for all; 22 September 2017; Geneva: WHO; 2017.
55. Rahman AA. Rising Up to the Challenge: Strategies to Improve Health Care Delivery for Resettled Syrian Refugees in Canada. University of Toronto Medical Journal. 2016;94(1):42-4.
56. Omeri A, Lennings C, Raymond L. Beyond asylum: Implications for nursing and health care delivery for Afghan refugees in Australia. Journal of Transcultural Nursing. 2006;17(1):30-9.
57. Fassaert T, de Wit MAS, Verhoeff AP, Tuinebreijer WC, Gorissen WHM, Beekman ATF, et al. Uptake of health services for common mental disorders by first-generation Turkish and Moroccan migrants in the Netherlands. Bmc Public Health. 2009;9.
58. Espinoza R, Martinez I, Levin M, Rodriguez A, Chan T, Goldenberg S, et al. Cultural Perceptions and Negotiations Surrounding Sexual and Reproductive Health Among Migrant and Non-migrant Indigenous Mexican Women from Yucatan, Mexico. Journal of immigrant and minority health. 2014;16(3):356-64.
59. Blignault I, Ponzio V, Rong Y, Eisenbruch M. A qualitative study of barriers to mental health services utilisation among migrants from mainland China in south-east Sydney. International Journal of Social Psychiatry. 2008;54(2):180-90.
60. Benson J, Haris TA, Saaid B. The meaning and the story: reflecting on a refugee's experiences of mental health services in Australia. Mental health in family medicine. 2010;7(1):3-8.
61. Brandenberger J. Perspective of asylum-seeking caregivers on the quality of care provided by a Swiss paediatric hospital: a qualitative study. BMJ Open. 2019;9(9):e029385.
62. Worabo HJ, Hsueh KH, Yakimo R, Worabo E, Burgess PA, Farberman SM. Understanding Refugees' Perceptions of Health Care in the United States. JNP-Journal for Nurse Practitioners. 2016;12(7):487-94.
63. Riggs E, Gibbs L, Kilpatrick N, Gussy M, van Gemert C, Ali S, et al. Breaking down the barriers: a qualitative study to understand child oral health in refugee and migrant communities in Australia. Ethnicity & health. 2015;20(3):241-57.
64. Sandre AR, Newbold KB. Telemedicine: Bridging the Gap between Refugee Health and Health Services Accessibility in Hamilton, Ontario. Refuge. 2016;32(3):108-18.
65. Robertshaw L, Dhesi S, Jones LL. Challenges and facilitators for health professionals providing primary healthcare for refugees and asylum seekers in high-income countries: a

systematic review and thematic synthesis of qualitative research. BMJ Open. 2017;7(8):e015981.
66. Juárez SP, Honkaniemi H, Dunlavy AC, Aldridge RW, Barreto ML, Katikireddi SV, et al. Effects of non-health-targeted policies on migrant health: a systematic review and meta-analysis. The Lancet Global Health. 2019;7(4):e420-e35.
67. World Health Organization. New York Declaration for Refugees and Migrants. New York: General Assembly WHO; 2016.
68. The United Nation Refugee Agency. Bringing the New York Declaration to Life: Applying the Comprehensive Refugee Response Framework (CRRF) 2018 [cited 2020 18.6.2020]. Available from: www.unhcr.org/593e5ce27.pdf.
69. The United Nations Refugee Agency. The global compact on refugees 2018. Available from: https://www.unhcr.org/events/conferences/5b6d574a7/global-compact-refugees-unhcr-quick-guide.html.
70. World Health Organization. Promoting the health of refugees and migrants - framework of priorities and guiding principles to promote the health of refugees and migrants. Geneva: World Health Organisation; 2017.
71. World Health Organization. Promoting the health of refugees and migrants: Draft global action plan 2019-2023. WHO; 2019.
72. Migration Ethnicity RHWC. Edinburgh Declaration 2018. Available from: http://www.merhcongress.com/welcome/edinburgh-declaration/.
73. West-Oram PGN. From self-interest to solidarity: One path towards delivering refugee health. Bioethics. 2018;32(6):343-52.
74. Diaz E, Thulesius H, Razum O. Shifting migrant health care away from an agenda of conflicts and problems toward solutions. Scandinavian journal of primary health care. 2016;34(3):213-4.
75. World Health Organization Collaborating Centre for Hospitals and Health Promotion. project summary migrant-friendly hospital projects Vienna, Austria: Ludwig Boltzmann Institute for the Sociology of Health and Medicine, 2005 2005. Report No.
76. Migrant friendly hospital project. The Amsterdam Declaration Towards Migrant-Friendly Hospitals in an ethno-culturally diverse Europe. Hospitals in a culturally diverse Europe" International conference on quality-assured health care and health promotion for migrants and ethnic minorities; Amsterdam2004.
77. Schrier L, Wyder C, Del Torso S, Stiris T, von Both U, J. B, et al. Medical care for migrant children in Europe: a practical recommendation for first and follow-up appointments. European journal of pediatrics. 2019;178(9):1449-67.
78. Migration Policy Group. Migrant Integration Policy Index. 2015.
79. World Health Organization - Regional Committee for Europe. progress report on implementation of the strategy and action plan for refugee and migrant health in the WHO European Region Rome: WHO; 2018 [cited 2018]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0003/378237/68wd08e_F_PR_MIG_180434.pdf?ua=1,.
80. Migration Policy Group. Migrant Integration Policy Index Switzerland. 2015.

81. Houmard S. Swiss Hospitals for Equity Bern: Bundesamt für Gesundheit BAG; 2018 [cited 2018 03.05.2018]. Available from: http://www.hospitals4equity.ch/index.php/de/.
82. Swiss Hospitals for Equity. Positionspapier Fachgruppe interkulturelles Dolmetschen 2016 [16.04.2017]. Available from: http://www.hospitals4equity.ch/files/BAG/Documents/Communication/SH4E_Positionspapier_Ueberwindung%20von%20Sprachbarrieren%20im%20Gesundheitswesen.pdf.
83. Johanna Probst GDA, Samantha, Dunning, Denise Efionayi-Mäder, Joëlle Fehlmann, Andreas Perret, Didier Ruedin, Irina Sille. Kantonale Spielräume im Wandel. Swiss Forum for Migration and Population Studies. 2019.
84. Gkiouleka A, Huijts T, Beckfield J, Bambra C. Understanding the micro and macro politics of health: Inequalities, intersectionality & institutions - A research agenda. Social science & medicine (1982). 2018;200:92-8.
85. Acevedo-Garcia D, Sanchez-Vaznaugh EV, Viruell-Fuentes EA, Almeida J. Integrating social epidemiology into immigrant health research: a cross-national framework. Social science & medicine (1982). 2012;75(12):2060-8.
86. Bourdieu P. Ökonomisches Kapital, kulturelles Kapital, soziales Kapital. Soziale Ungleichheiten. Göttingen: Reinhard Kreckel; 1983. p. 183-98.
87. Sontag K. Highly skilled asylum seekers: Case studies of refugee students at a Swiss university. Migration letters. 2018;15(4):533-44.
88. Dyer JS, Rosenfeld CR. Metabolic Imprinting by Prenatal, Perinatal, and Postnatal Overnutrition: A Review. Semin Reprod Med. 2011;29(03):266-76.
89. Kuh D, Ben-Shlomo Y, Lynch J, Hallqvist J, Power C. Life course epidemiology. Journal of epidemiology and community health. 2003;57(10):778-83.
90. Band PR, Le ND, Fang R, Deschamps M. Carcinogenic and endocrine disrupting effects of cigarette smoke and risk of breast cancer. Lancet (London, England). 2002;360(9339):1044-9.
91. Joinson C, Sullivan S, von Gontard A, Heron J. Stressful Events in Early Childhood and Developmental Trajectories of Bedwetting at School Age. Journal of pediatric psychology. 2016;41(9):1002-10.
92. Sweileh WM, Wickramage K, Pottie K, Hui C, Roberts B, Sawalha AF, et al. Bibliometric analysis of global migration health research in peer-reviewed literature (2000-2016). BMC Public Health. 2018;18(1):777.
93. State Secretary for Migration. Asylum regions and federal asylum centres 2019 [22.01.2020]. Available from: https://www.sem.admin.ch/sem/en/home/asyl/asylverfahren/asylregionen-baz.html.
94. ICD 10 Online Versions [Internet]. 2020 [cited 23.01.2020]. Available from: https://www.who.int/classifications/icd/icdonlineversions/en/.
95. Prevention Quality Indicators Overview [Internet]. U.S. Department of Health & Human Services,. 2019 [cited 20.03.2019]. Available from: https://www.qualityindicators.ahrq.gov/Modules/pqi_resources.aspx.
96. Ebrahimi M, Heydari A, Mazlom R, Mirhaghi A. The reliability of the Australasian Triage Scale: a meta-analysis. World journal of emergency medicine. 2015;6(2):94-9.

97. Dinh MM, Berendsen Russell S, Bein KJ, Chalkley DR, Muscatello D, Paoloni R, et al. Statewide retrospective study of low acuity emergency presentations in New South Wales, Australia: who, what, where and why? BMJ Open. 2016;6(5):e010964.
98. Newbold KB. Self-rated health within the Canadian immigrant population: risk and the healthy immigrant effect. Social science & medicine (1982). 2005;60(6):1359-70.
99. United Nations Refugee Agency. Resettlement criteria 2020 [updated 03.04.2020]. Available from: https://www.unhcr.org/protection/resettlement/558c015e9/resettlement-criteria.html.
100. Canadian Collaboration for Immigrant and Refugee Health. working together to improve the health of refugees and migrants 2020 [cited Centre for Global Health, University of Ottawa 05.06.2020]. Available from: https://ccirhken.ca/ccirh_main/.
101. Bhopal RS, Gruer L, Cezard G. Mortality, ethnicity, and country of birth on a national scale, 2001-2013: A retrospective cohort (Scottish Health and Ethnicity Linkage Study). 2018;15(3):e1002515.
102. Basel Sans-Papiers. Anlaufstelle für Sans-Papiers Basel: Anlaufstelle für Sans-Papiers 2020 [cited 2020 19.06.2020]. Available from: https://sans-papiers-basel.ch/.
103. Salas-Wright CP, Vaughn MG, Schwartz SJ, Cordova D. An "immigrant paradox" for adolescent externalizing behavior? Evidence from a national sample. Soc Psychiatry Psychiatr Epidemiol. 2016;51(1):27-37.
104. Lichtl C, Lutz T, Szecsenyi J, Bozorgmehr K. Differences in the prevalence of hospitalizations and utilization of emergency outpatient services for ambulatory care sensitive conditions between asylum-seeking children and children of the general population: a cross-sectional medical records study (2015). BMC health services research. 2017;17(1):731.
105. Blitz BK, d'Angelo A, Kofman E, Montagna N. Health Challenges in Refugee Reception: Dateline Europe 2016. International journal of environmental research and public health. 2017;14(12).
106. Hargreaves S, Friedland JS, Gothard P, Saxena S, Millington H, Eliahoo J, et al. Impact on and use of health services by international migrants: questionnaire survey of inner city London A&E attenders. BMC health services research. 2006;6:153.
107. Bloch-Infanger C, Battig V, Kremo J, Widmer AF, Egli A, Bingisser R, et al. Increasing prevalence of infectious diseases in asylum seekers at a tertiary care hospital in Switzerland. PloS one. 2017;12(6):e0179537.
108. Blochliger C, Junghanss T, Weiss R, Herzog C, Raeber PA, Tanner M, et al. [Asylum seekers and refugees in general practice: problems and possible developments]. Sozial- und Praventivmedizin. 1998;43(1):18-28.
109. Blochliger C, Osterwalder J, Hatz C, Tanner M, Junghanss T. [Asylum seekers and refugees in the emergency department]. Sozial- und Praventivmedizin. 1998;43(1):39-48.
110. Blochliger C, Ries N, Gonon M, Loutan L, Mark K, Vetterli S, et al. [Asylum seekers and refugees in the medical polyclinic: a comparison between the Basel, Bern and Geneva polyclinics]. Sozial- und Praventivmedizin. 1998;43(1):29-38.
111. Blochliger C, Tanner M, Hatz C, Junghanss T. [Asylum seekers and refugees in ambulatory health care: communication between physician and patient]. Praxis. 1997;86(19):800-10.

112. Pfeil J, Kobbe R, Trapp S, Kitz C, Hufnagel M. [Recommendations for the diagnosis and prevention of infectious diseases in pediatric and adolescent refugees in Germany : Statement of the German Society of Pediatric Infectious Diseases, the Society of Tropical Pediatrics and International Child Health, and the Professional Association of Pediatricians]. Der Internist. 2016;57(5):416-33.
113. Abbott KL, Woods CA, Halim DA, Qureshi HA. Pediatric care during a short-term medical mission to a Syrian refugee camp in Northern Jordan. Avicenna journal of medicine. 2017;7(4):176-81.
114. Alberer M, Wendeborn M, Loscher T, Seilmaier M. [Spectrum of diseases occurring in refugees and asylum seekers: data from three different medical institutions in the Munich area from 2014 and 2015]. Deutsche medizinische Wochenschrift (1946). 2016;141(1):e8-15.
115. Dang K, Tribble AC. Strategies in infectious disease prevention and management among US-bound refugee children. Current problems in pediatric and adolescent health care. 2014;44(7):196-207.
116. Pohl C, Mack I, Schmitz T, Ritz N. The spectrum of care for pediatric refugees and asylum seekers at a tertiary health care facility in Switzerland in 2015. European journal of pediatrics. 2017.
117. Kien C, Sommer I, Faustmann A, Gibson L, Schneider M, Krczal E, et al. Prevalence of mental disorders in young refugees and asylum seekers in European Countries: a systematic review. 2019;28(10):1295-310.
118. Lau W, Silove D, Edwards B, Forbes D, Bryant R, McFarlane A, et al. Adjustment of refugee children and adolescents in Australia: outcomes from wave three of the Building a New Life in Australia study. BMC medicine. 2018;16(1):157.
119. Fadnes LT, Diaz E. Primary healthcare usage and use of medications among immigrant children according to age of arrival to Norway: a population-based study. BMJ Open. 2017;7(2):e014641.
120. Olaru ID, Van Den Broucke S, Rosser AJ, Salzer HJF, Woltmann G, Bottieau E, et al. Pulmonary Diseases in Refugees and Migrants in Europe. Respiration; international review of thoracic diseases. 2018;95(4):273-86.
121. Cutuli SL, De Pascale G, Spanu T, Dell'Anna AM, Bocci MG, Pallavicini F, et al. Lice, rodents, and many hopes: a rare disease in a young refugee. Critical care (London, England). 2017;21(1):81.
122. Quaak MSW, Bavelaar HHJ, Berkhout J, Truin GJ, Bijker EM. [A 14-year-old Syrian refugee with neurobrucellosis]. Nederlands tijdschrift voor geneeskunde. 2017;161:D1663.
123. Brandenberger J, Buser S, Gmünder M, Ritz N. Characteristics of children with medical complexity. Journal for Immigrant and minority health, publication in progress. 2020.
124. Rappenecker J KA, Moussoubahou M, Moumina A, Wind A, Martinez D,. Clinique Sikila: building up an outpatient clinic for children with sickle-cell disease in rural Niger. Pan African Medical Journal. 2018.
125. Lichtl C, Bozorgmehr K. Effects of introducing a walk-in clinic on ambulatory care sensitive hospitalisations among asylum seekers in Germany: a single-centre pre-post intervention study using medical records. BMJ Open. 2019;9(12):e027945.

126. Sarria-Santamera A, Hijas-Gomez AI, Carmona R, Gimeno-Feliu LA. A systematic review of the use of health services by immigrants and native populations. Public Health Rev. 2016;37:28.
127. Sandvik H, Hunskaar S, Diaz E. Immigrants' use of emergency primary health care in Norway: a registry-based observational study. BMC health services research. 2012;12:308.
128. Van Son CR, Gileff TY. Relying on What They Know: Older Slavic Emigres Managing Chronic Health Conditions. Qualitative Health Research. 2013;23(12):1660-71.
129. Brisset C, Leanza Y, Rosenberg E, Vissandjee B, Kirmayer LJ, Muckle G, et al. Language Barriers in Mental Health Care: A Survey of Primary Care Practitioners. Journal of immigrant and minority health. 2014;16(6):1238-46.
130. Brandenberger J. A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model. Bmc Public Health. 2019;19(1):755.
131. Ruud SE, Hjortdahl P, Natvig B. Is it a matter of urgency? A survey of assessments by walk-in patients and doctors of the urgency level of their encounters at a general emergency outpatient clinic in Oslo, Norway. BMC emergency medicine. 2016;16(1):22.
132. Rurik I, Kolozsvari LR, Aarendonk D, Angelaki A, Ajdukovic D, Dowrick C, et al. [Primary care of refugees and migrants. Lesson learnt from the EUR-HUMAN project]. Orvosi hetilap. 2018;159(35):1414-22.
133. Kaplan I, Stow HD, Szwarc J. Responding to the Challenges of Providing Mental Health Services to Refugees: An Australian Case Report. Journal of Health Care for the Poor and Underserved. 2016;27(3):1159-70.
134. Nkulu Kalengayi FK, Hurtig AK, Nordstrand A, Ahlm C, Ahlberg BM. Perspectives and experiences of new migrants on health screening in Sweden. BMC health services research. 2016;16:14.
135. Rowe DR, Spees HP. The Fresno County Refugee Health Volunteer Project: a case study in cross-cultural health care delivery. Migration world magazine. 1987;15(4):22-7.
136. Sansani I. Responses by health care providers in Ireland to the experiences of women refugees who have survived gender- and ethnic-based torture. Womens Studies International Forum. 2004;27(4):351-67.
137. de Crespigny C, Gronkjaer M, Liu D, Moss J, Cairney I, Procter N, et al. Service provider barriers to treatment and care for people with mental health and alcohol and other drug comorbidity in a metropolitan region of South Australia. Advances in Dual Diagnosis. 2015;8(3):120-8.
138. Ranaghan C, Boyle K, Meehan M, Moustapha S, Fraser P, Concert C. Effectiveness of a patient navigator on patient satisfaction in adult patients in an ambulatory care setting: a systematic review. JBI database of systematic reviews and implementation reports. 2016;14(8):172-218.
139. Laverack G. The Challenge of Promoting the Health of Refugees and Migrants in Europe: A Review of the Literature and Urgent Policy Options. Challenges. 2018;9(2):32.
140. Levitt P, Viterna J, Mueller A, Lloyd C. Transnational social protection: setting the agenda. Oxford Development Studies. 2016;45:1-18.

141. United Nations Development Programme. Universal Health Coverage for Sustainable Development - Issue Brief. 2019.
142. The UN Refugee Agency. https://www.unhcr.org/information-on-unhcr-resettlement.html 2020 [cited 2020 04.06.2020]. Available from: https://www.unhcr.org/information-on-unhcr-resettlement.html.

Papers and annexes

I

II

Established in 1871

Swiss Medical Weekly

Formerly: Schweizerische Medizinische Wochenschrift

An open access, online journal • www.smw.ch

Original article | Published 18 May 2020 | doi:10.4414/smw.2020.20252
Cite this as: Swiss Med Wkly. 2020;150:w20252

Reasons for admission in asylum-seeking and non-asylum-seeking patients in a paediatric tertiary care centre

Gmünder Myriam[a*], Brandenberger Julia[bc*], Buser Sina[a], Pohl Christian[bd], Ritz Nicole[bef]

[a] Faculty of Medicine, University of Basel, Switzerland
[b] Migrant Health Service, University of Basel Children's Hospital, Basel, Switzerland
[c] Paediatric Emergency Department, Inselspital, University of Bern, Switzerland
[d] Neonatal Intensive Care Unit, Perth Children's and King Edward Memorial Hospitals, Perth, Australia
[e] Paediatric Infectious Disease and Vaccinology, University of Basel Children's Hospital, Basel, Switzerland
[f] Department of Paediatrics, Royal Children's Hospital Melbourne, University of Melbourne, Australia

Summary

BACKGROUND: In the last decade an increasing number of asylum-seeking children arrived in Europe and local healthcare systems have been challenged to adapt to their health needs. The aim of this study was to compare the spectrum of disease and management of asylum-seeking and non-asylum-seeking children requiring hospital admission.

METHODS: This was a retrospective cohort study including health data from recently arrived asylum-seeking and non-asylum-seeking children admitted between January 2016 and December 2017. Data were collected using electronic administrative and medical records.

RESULTS: Of 11,794 admissions of 9407 patients, 149 (1%) were asylum-seeking and 11,645 (99%) from non-asylum-seeking children. In asylum-seeking children the median age was 4 years (interquartile range [IQR] 0–13) with 61% males and in non-asylum-seeking children 4 years (IQR 0–11) years with 56% males. Respiratory infections accounted for 17–19% of admissions in both groups. Rare infectious diseases were more frequent in asylum-seeking children (15 vs 7%; difference in proportions 0.08, 95% confidence interval [CI] 0.02–0.14; p <0.001,). Injuries were more frequent in non-asylum-seeking children (22 vs 13%; difference in proportions 0.09, 95% CI 0.04–0.014; p <0.01). Admissions for mental health disorders were infrequent but more common in asylum-seeking children (6 vs 3%; difference in proportions 0.03, 95% CI −0.01 – 0.07; p = 0.02) Prescription of analgesics was lower in asylum-seeking than non-asylum-seeking children (3.4 vs 6.5 accounting units per admission). Antibiotic prescription was comparable in both groups.

CONCLUSION: Asylum-seeking children represent a small number of total admissions. Age distribution and main reason for admission being diseases of the respiratory system were comparable in asylum-seeking and non-asylum-seeking children. Rare infections and mental health disorders are important diseases in asylum-seeking children and require special attention and training of staff working with paediatric asylum seekers.

Keywords: *migrant health, refugee health, children, immigrant, Europe*

Introduction

The United Nations High Commissioner for Refugees estimated that in 2017 there were 25.4 million refugees and 3.1 million asylum-seekers worldwide, of whom 52% were younger than 18 years [1]. Switzerland registered over 45,000 asylum requests in 2016 and 2017 [2–4], of which 43–46% were submitted by minors aged <18 years (personal communication, 31 July 2018, Sandra Binggeli, Swiss State Secretariat for Migration) [4]. Globally, an estimated 173,800 were unaccompanied minors and in Switzerland 2730 were registered, accounting for 6% of the total asylum requests [1].

Asylum-seeking children are among the most vulnerable groups in the migration crisis. Their health status is influenced by several factors including their health before leaving the country of origin, and conditions during the journey and in the host country. Many suffer from malnutrition, and communicable and mental health disorders, as they may have experienced exploitation, violence, war, separation from family and trauma [5]. In host countries asylum-seeking children face cultural and linguistic barriers, which have been shown to be a major risk factor for poor health [5, 6]. The World Health Organization (WHO) encourages local healthcare systems in host countries to adapt to the health needs and problems of refugees and asylum-seekers and underlines the importance to implement refugee and migrant health in public health programmes.

Studies about the healthcare and health needs of asylum-seeking children in high-income host countries in Europe

*
Shared authorship

Author contributions
MG: conceived the study, performed data analysis, drafted the initial manuscript, and approved the final manuscript as submitted. JB: conceived the study, performed data analysis, reviewed the manuscript, and approved the final manuscript as submitted. SB: conceived the study, reviewed the manuscript, and approved the final manuscript as submitted. CP: Reviewed the manuscript, and approved the final manuscript as submitted. NR: conceived the study, supervised analysis, reviewed and revised the manuscript, and approved the final manuscript as submitted.

Correspondence:
Dr Nicole Ritz, MD, University Children`s Hospital Basel, Basel, Switzerland, Spitalstrasse 33, CH-4056 Basel,
nicole.ritz[at]ukbb.ch

are limited. Infectious diseases seem to be an important reason for hospital admission amongst asylum-seeking children [7, 8] and adults [9–11]. In 2015, a study from our institution found that mostly pathogens with a high prevalence in the local population were responsible for infections of admitted refugee children [12]. None of these studies, however, include detailed information on the further management of admitted asylum-seeking children and systematically compared this with the local population.

The aim of this study was therefore to analyse and compare the epidemiology and spectrum of diseases in asylum-seeking and non-asylum-seeking children admitted to our hospital and detail management differences between the two groups.

Methods

Study design

This was a retrospective cohort study comparing health data from recently arrived asylum-seeking and non-asylum-seeking children admitted to the University Children's Hospital Basel between January 2016 and December 2017. Analysis of data from children who presented in the emergency department but were not admitted is part of a separate study [13].

Study population

Patients admitted between 1 January 2016 and 31 December 2017 were identified using administrative electronic records. The asylum-seeking status was systematically recorded for all children using the following criteria: (i) referral from one of the reception and processing centres run by the State Secretariat for Migration, (ii) presenting any document declaring the patient to be asylum seeking, or (iii) presenting an asylum-seeking identity card. To target only recently arrived asylum-seeking children, identified records were checked for any previous presentation using the unique identifier of the patient and excluded if a record from before January 2015 was detected. Non-asylum-seeking children were identified for the same period using the administrative electronic records. Only children admitted to the hospital were included for further analysis; records from outpatient departments and admissions to the short stay unit were excluded.

Data collection and statistical analysis

Administrative electronic records were used to extract the following variables: main diagnosis, country of origin, age, sex, country of birth, admission and discharge date, admission department, imaging done, treatment prescribed.

Electronic medical records were used to extract detailed information about the asylum-seeking patients including family structure, referring physician, pathogens detected, vaccination status and the use of interpreter services. Main diagnoses were coded using the International Classification of Diseases (ICD)-10 classification according to the WHO. An admission was defined as a documented presentation at our institution with overnight stay. Accounting-units were used for the analysis of prescribed medication. An account-unit was defined as a documented administration of a drug. Data were entered into a REDCap database (REDCap Software, version 6.9.4, 2018). Quality control of the REDCap data was done and records were locked before analysis.

STATA (Stata/IC Version 13.1 2013) was used for analysis and generation of graphs. Analyses were per patient (age, sex, country of origin) or per admission (main diagnosis, duration of admission, medication prescribed). Statistical comparisons were made using the chi-square test for categorical data and t-test for differences in means when data were normally distributed. If the distribution of data was not known, a Wilcoxon test was performed in parallel with the t-test and the t-test result only accepted if the results matched. A two-sample proportion test with a confidence interval (CI) of 95% was used to test differences in proportions. For CIs of medians, centiles with binomial interpolated confidence intervals were calculated. For CIs of proportions, the exact Clopper-Pearson CI was used.

Ethics

Ethics approval (EKNZ 2017-01585) for this study was granted in October 2017 by the Ethics Committee of North-West Switzerland.

Results

Study population

For the final analysis 11,794 admissions of 9407 patients were included. Of these, 1% of admissions (149/11,794) and 1% of patients (117/9407) were asylum-seeking children (fig. 1). In total, there were 9290 patients in the non-asylum-seeking and 117 patients in the asylum-seeking group. The median age in both groups was 4 years; the interquartile range was 0–13 and 0–11 years for asylum-seeking and non-asylum-seeking children, respectively. A total of 61% and 56% were male in the asylum-seeking and non-asylum-seeking children, respectively (table 1). Infants were the largest admitted age group (30%) in both groups. In addition, in the asylum-seeking group a second peak in the age distribution was seen in adolescence with 11% (17/149) being aged ≥15 compared with 5% (565/11'645) in the non-asylum-seeking group (fig. 2).

In the asylum-seeking children the most frequent countries of origin were: Eritrea 21% (25/117); Afghanistan 19% (22/117) and Syria 15% (18/117). The most frequent countries of birth were Switzerland 36% (40/117), Afghanistan 15% (17/117) and Syria 13% (14/117). In the non-asylum-seeking children the most frequent countries of origin were Switzerland 65% (6057/9290), Germany 8% (746/9290) and Italy 3.4% (312/9290). The most frequent countries of birth were Switzerland 91% (8176/9290), Germany 3% (268/9290) and France 0.6% (54/9290).

In the asylum-seeking group, 16% of admissions were unaccompanied minors (24/149). In 63.8% of admissions (95/149), the child was accompanied by both parents, in 6.7% by one parent (10/149) and in one case by a caregiver who was not a parent (1/149; 0.7%). In 12.8% of admissions (19/149), data on the family structure were not available.

Main admission diagnosis and duration of admission

The main admission diagnosis in the asylum-seeking children were: diseases of the respiratory system (ICD-10 codes J00–J99) 17% (26/149), certain infectious and para-

sitic diseases (ICD-10 codes A00–B99) 15% (22/149) and injury, poisoning and other consequences of external causes (ICD-10 codes S00–T98) 13% (19/149). In the non-asylum-seeking group the most frequent reasons for admission were injury, poisoning and other consequences of external causes 22% (2517/11,645), diseases of the respiratory system 19% (2187/11,645) and conditions originating in the perinatal period (ICD-10 codes P00–P96) 9% (1057/11,645). Mean duration of admission was 4 days in the asylum-seeking and 3 days in the non-asylum-seeking children (table 1). Further diseases and details can be found in table 2 and supplementary table S1 in appendix 1.

The frequency of admission for diseases of the respiratory system was comparable in both asylum-seeking and non-asylum-seeking groups at 17% (26/149) and 19% (2187/11,645), respectively (difference in proportions 0.02, 95% CI −0.08 to 0.04; p = 0.73; fig. 3). Admissions for certain infectious and parasitic diseases were more frequent in the asylum-seeking than the non-asylum-seeking children at 15% (22/149) and 7% (824/11,645), respectively (difference in proportions 0.08, 95% CI 0.02 to 0.14; p <0.001). In the asylum-seeking children, 3% of the admissions were caused by malaria (5/149), intestinal infections (4/149) and active tuberculosis (4/149). In the non-asylum-seeking children malaria or active tuberculosis were very rare accounting for <0.1% of admissions (2/11,645 and 4/11,645, respectively).

Admissions for injury, poisoning and certain other consequences of external causes were more frequent in non-asylum-seeking children at 22% (2517/11,645) compared with 13% (19/149) (difference in proportions 0.09, 95% CI 0.04 to 0.14; p <0.01). Within this category head injuries were the most frequent reason for admission, with intracranial injury being more frequent in asylum-seeking than non-asylum-seeking children 2% (3/149) and 7.5% (871/11,645), respectively, (p = 0.01) (table 2).

Admission for mental health disorders (F00–F99) were more frequent in the asylum-seeking children than the non-

Figure 1: Flow chart – Study population

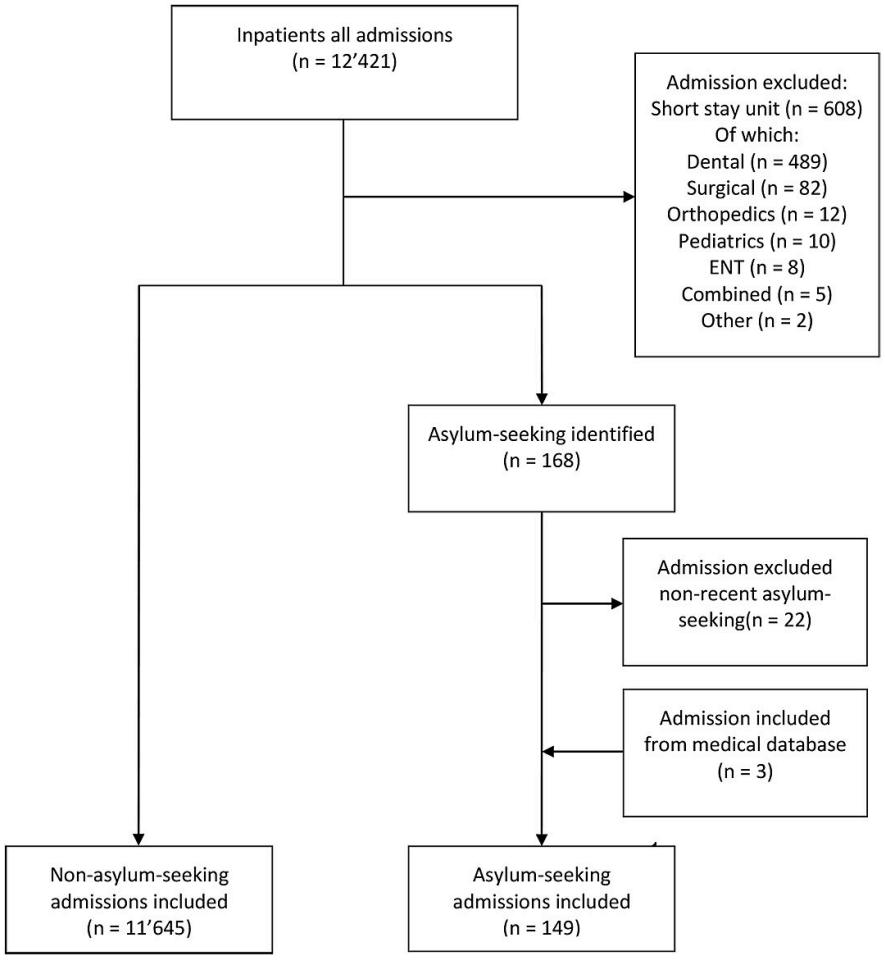
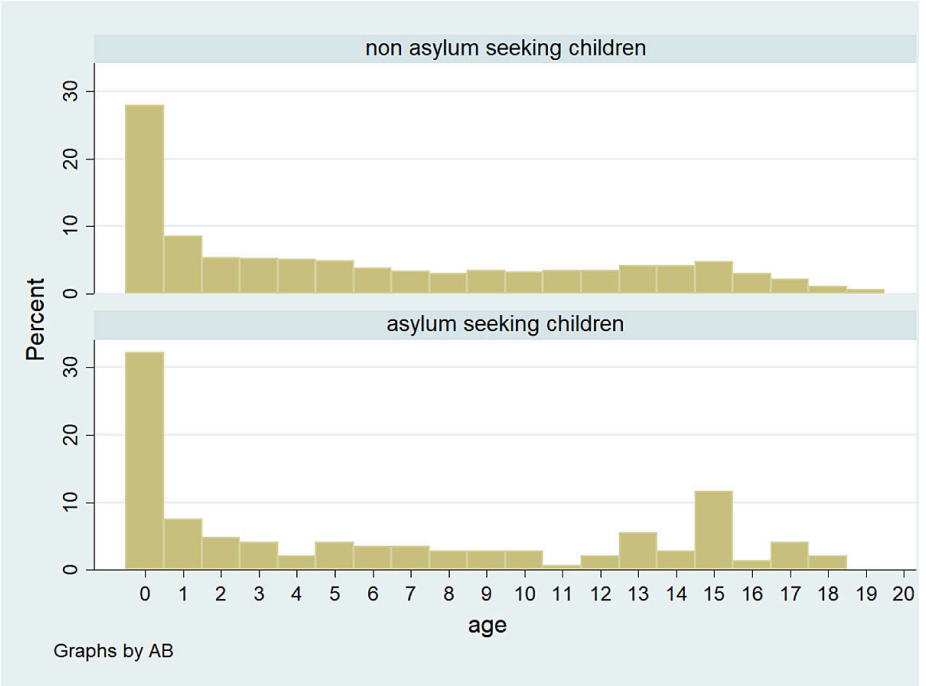


Table 1: Baseline characteristics, countries of origin, native country by asylum-seeking and non-asylum-seeking patients in 2016/17.

Characteristics	Asylum-seeking				Non-asylum-seeking			
	Admissions n = 149		Patients n = 117		Admissions n = 11,645		Patients n = 9290	
	n	IQR/%	n	IQR/%	n	IQR/%	n	IQR/%
Median age (years) 95% CI			4 2–7	0–13			4 4–4	0–11
Male sex 95% CI			71	60.7 0.51–0.70			5157	55.5 0.55–0.56
Countries of origin:								
Eritrea			25	21.4	Switzerland		6057	65.2
Afghanistan			22	18.9	Germany		746	8.0
Syria			18	15.4	Italy		312	3.4
Somalia			10	8.6	Turkey		285	3.1
Ethiopia			8	6.8	Kosovo		253	2.7
Iraq			8	6.8	Portugal		168	1.8
Other			25	21.4	Other		1466	15.8
ns			1	0.85	ns		3	0.03
Countries of birth:								
Switzerland			40	34.1	Switzerland		8176	91.0
Afghanistan			17	15.3	Germany		268	3.0
Syria			14	12.0	France		54	0.6
Eritrea			13	11.1	US		41	0.5
Iraq			6	5.1	Great Britain		38	0.4
Somalia			5	4.2	Italy		30	0.3
Other			16	13.7	Other		372	4.0
ns			6	5.1	ns		311	3.3
Mean duration of admission (days)	4	2–7			3	2–6		
Patients visited ED before	96	64.9			7013	60.2		

CI = confidence interval; ED = emergency department; ns = not specified

Figure 2: Histogram showing the age distribution of admissions from non-asylum-seeking and asylum-seeking children in the years 2016 and 2017.



asylum-seeking children at 6% (9/149) and 2.6% (304/11,645), respectively (difference in proportions 0.03, 95% CI −0.04 to 0.07; p = 0.01). Severe stress and adjustment disorders, depressive episodes and behavioural disorder due to psychoactive substance use were most common in the asylum-seeking children and eating disorders, depressive episodes in the non-asylum-seeking children.

Prescribed medication

A total of 75,722 accounting-units of the most common analgesics including paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs) and opioids were prescribed (table 3 and supplementary tables S2 and S3 in appendix 1). With 3.4 (506/149) accounting-units per admission in asylum-seeking children, analgesic prescription was lower compared with non-asylum-seeking children with 6.5 (75,216/11,645) accounting-units per admission.

NSAIDs were most frequently prescribed, with a total of 2.3 (27,378/11,794) accounting-units per admission, and a frequency of 1.87 (279/149) accounting-units per admission in the asylum-seeking versus 2.33 (27,099/11,645) in the non-asylum-seeking children. Opioids were rarely used in either group, in total 0.67 (7916/11,794) accounting-units per admission, with 0.37 (55/149) accounting-units per admission in the asylum-seeking and 0.69 (7861/11,645) accounting-units per admission in the non-asylum-seeking children.

Amoxicillin-clavulanic acid and cephalosporins were the most commonly prescribed antibiotics overall with 0.9

Table 2: Top five of main IC-10 category with top five of main admission diagnosis. 95% CI: Confidence Interval for the proportion of the ICD-10 category.

Asylum-seeking					Non-asylum-seeking				
	ICD-10 coding		n	%		ICD-10 coding		n	%
Diseases of the respiratory system (J00-J99)			**26**	**17**	**Injury, poisoning, other consequences of ext. causes (S00-T98)**			**2517**	**22**
	95% CI			**0.12–0.25**		**95% CI**			**0.21–0.22**
	J06	Acute upper respiratory infections of multiple and unspecified sites	9	6.0		S06	Intracranial injury	871	7.5
	J20/21	Acute bronchitis/bronchiolitis	4	2.6		S00	Superficial injury of head	380	3.4
	J10	Influenza due to identified seasonal influenza virus	2	1.3		S52	Fracture of forearm	225	1.9
	J12	Viral pneumonia, not elsewhere classified	2	1.3		S42	Fracture of shoulder and upper arm	110	0.9
	J18	Pneumonia, organism unspecified	2	1.3		T78	Adverse effects, not elsewhere classified	84	0.7
Certain infectious and parasitic diseases (A00-B99)			**22**	**15**	**Diseases of the respiratory system (J00–J99)**			**2187**	**19**
	95% CI			**0.09–0.21**		**95% CI**			**0.18–0.20**
	B50/51	Plasmodium falciparum and vivax malaria	5	2.7		J20	Acute bronchitis	528	4.5
	A09	Other gastroenteritis and colitis of infectious and unspecified origin	3	2.0		J35	Chronic diseases of tonsils and adenoids	422	3.6
	A15	Respiratory tuberculosis, bact. and histol. confirmed	3	2.0		J06	Acute upper respiratory infections of multiple and unspecified sites	396	3.4
	B86	Scabies	3	2.0		J21	Acute bronchiolitis	297	2.6
	A38	Scarlet fever	2	1.3		J10	Influenza due to identified seasonal influenza virus	85	0.7
Injury, poisoning, other consequences of external causes (S00-T98)			**19**	**13**	**Certain conditions originating in the perinatal period (P00–P96)**			**1057**	**9.1**
	95% CI			**0.08–0.19**		**95% CI**			**0.09–0.10**
	S00	Superficial injury of head	3	2.0		P22	Respiratory distress of newborn	424	3.6
	S06	Intracranial injury	3	2.0		P39	Other infections specific to the perinatal period	117	1.0
	T81	Complications of procedures, not elsewhere classified	2	1.3		P92	Feeding problems of newborn	112	1.0
	S42	Fracture of shoulder and upper arm	1	0.7		P59	Neonatal jaundice from other and unspecified causes	73	0.6
	S52	Fracture of forearm	1	0.7		P28	Other respiratory conditions originating in the perinatal period	72	0.6
Certain conditions originating in the perinatal period (P00-P96)			**11**	**7.4**	**Diseases of the musculoskeletal system/connective tissue (M00–M99)**			**930**	**8.0**
	95% CI			**0.04–0.13**		**95% CI**			**0.08–0.08**
	P22	Respiratory distress of newborn	7	4.7		M21	Other acquired deformities of limbs	244	2.1
	P28	Other respiratory conditions originating in the perinatal period	1	0.7		M41	Scoliosis	125	1.1
	P39	Other infections specific to the perinatal period	1	0.7		M24	Other specific joint derangements	102	0.9
	P55	Haemolytic disease of fetus and newborn	1	0.7		M23	Internal derangement of knee	58	0.5
	P92	Feeding problems of newborn	1	0.7		M84	Disorders of continuity of bone	52	0.5
Mental and behavioural disorders (F00-F99)			**9**	**6.0**	**Certain infectious and parasitic diseases (A00–B99)**			**824**	**7.1**
	95% CI			**0.03–0.11**		**95% CI**			**0.07–0.08**
	F43	Reaction to severe stress, and adjustment disorders	5	3.4		A08	Viral and other specifies intestinal infections	273	2.3
	F32	Depressive episode	3	2.0		A09	Other gastroenteritis and colitis of infectious and unspecified origin	256	2.2
	F10	Mental and behavioural disorders due to use of alcohol	1	0.7		B34	Viral infection of unspecified site	70	0.6
						A87	Viral meningitis	26	0.2
						A04	Other bacterial intestinal infections	24	0.2

(10,608/11,794) accounting-units per admission. Prescription of amoxicillin-clavulanic acid was comparable in both groups with 0.7 accounting-units per admission in the asylum-seeking children (109/149) and in non-asylum-seeking children (8139/11,645). Cephalosporins were less frequently prescribed with 0.1 (15/149) and 0.2 (2345/11645) accounting-units per admission in asylum-seeking and non-asylum-seeking children, respectively.

Figure 3: Proportion of main admission diagnosis according to the international disease classification (ICD) 10 for the non-asylum-seeking children (blue bars) and the asylum-seeking children (red bars).* p-value < 0.05

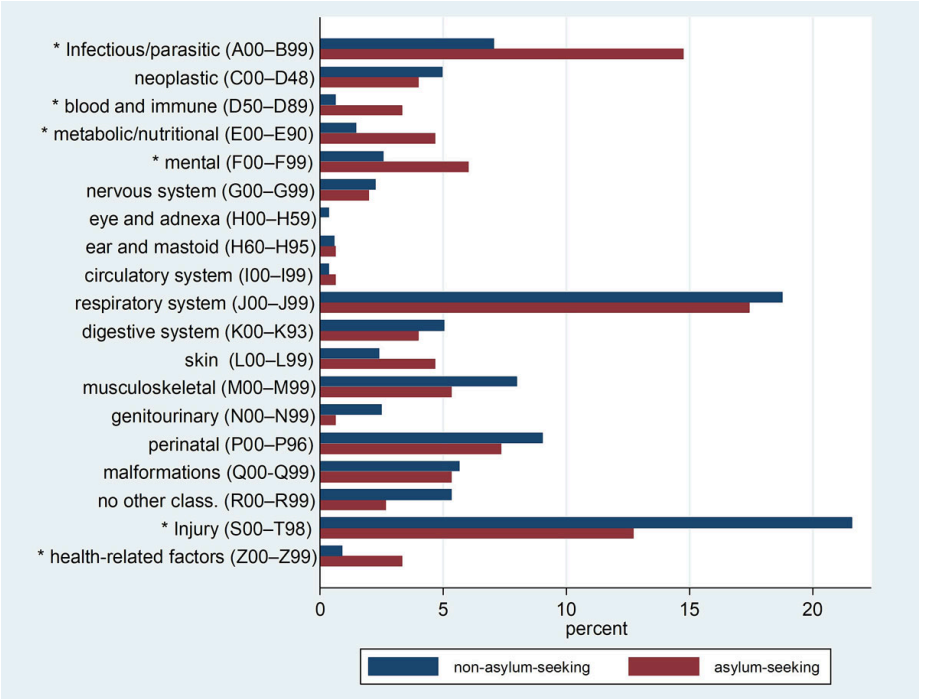


Table 3: Prescribed analgesic and antibiotic medication in asylum-seeking and non-asylum-seeking children admitted to the hospital.

Type of medication	Administration route	Asylum-seeking		Non-asylum-seeking	
		Accounting units	Unit/hosp.	Accounting units	Unit/hosp.
Paracetamol	Oral	85	0.57	20370	1.75
	Rectal	55	0.37	7751	0.67
	i.v.	32	0.21	12015	1.03
	Total	172	0.15	40136	3.45
Non-steroidal anti-inflammatory drugs (NSAID)	Oral	230	1.54	20803	1.79
	Rectal	2	0.01	833	0.07
	i.v.	47	0.32	5463	0.47
	Total	279	1.87	27099	2.33
Opioids	Oral	0	0	1044	0.09
	i.v.	55	0.37	6801	0.58
	Others	0	0	16	0.001
	Total	55	0.37	7861	0.68
Total, analgesics		**506**	**3.39**	**75096**	**6.45**
Amoxicillin – clavulanic acid	Oral	54	0.36	3749	0.32
	i.v.	55	0.37	4390	0.38
	Total	109	0.73	8139	0.7
Cephalosporins	Oral	0	0	326	0.03
	i.v.	15	0.1	2019	0.17
	Total	15	0.1	2345	0.2
Total, antibiotics		**124**	**0.83**	**10484**	**0.9**

i.v. = intra venous; unit/hosp. = unit per hospitalisation

Discussion

This study analysing the spectrum of diseases of asylum-seeking children admitted to a tertiary care hospital found respiratory infections to be common in both groups, but rare infectious diseases to be more frequent in asylum-seeking children and injuries more frequent in non-asylum-seeking children. The strength of this study lies in its comparison of admitted asylum-seeking with non-asylum-seeking children in the same institution.

The age distribution in both groups shows striking similarity in younger children but a remarkably higher proportion in the adolescent asylum-seeking group. This is because adolescents and young adults have become an important refugee group in all European countries over the past few years [14]. This age group includes unaccompanied minor refugees with special health needs. Their vulnerability leads to an increased susceptibility to disease, malnutrition and physical injury and their dependence requires qualified special care to support physical and psychological needs, and social well-being [15, 16].

Our study showed a high number of asylum-seeking children admitted with respiratory diseases. This is in accordance with other studies reporting a high prevalence of respiratory tract diseases in asylum-seeking children [8, 12, 17–19]. Importantly, admission for respiratory tract infections is also very common in non-asylum-seeking children. Several other studies reported acute respiratory infections, including pneumonia [20–22] and influenza [23], to be among the most prevalent diseases of children all over the world – in developing as well as in developed countries.

Other types of infection including malaria, active tuberculosis and scabies were rare in admitted patients and almost exclusively in asylum-seeking children. This finding is in contrast to other studies. For example, a prospective cross-sectional study in Germany including unaccompanied asylum-seeking adolescents found infectious and parasitic diseases, including intestinal parasites, scabies and hepatitis B, in almost 50% [24]. Another German study reporting screening results that detected intestinal parasite infections in 22% of unaccompanied minors [25]. This discrepancy might be explained by the fact that intestinal parasitic infections are usually not severe and, generally, affected children do not require admission to hospital. Also, we did not consistently screen our patients on admission.

Surprisingly, trauma and injury were less frequently the cause of admission in asylum-seeking children than the non-asylum-seeking children. A limited number of trauma- and injury-related admissions were also seen in our previous study; however at that time we were unable to compare results with the local population. One explanation for this finding might be that asylum-seeking children are less likely to be admitted for trauma and injury as these occur less commonly. Alternatively, the injuries are equally common but asylum-seeking children potentially experience barriers to presenting to an emergency department, including lack of information about the local health care system, worries about high charges or language barriers [26–28].

In the current study, mental disorders were the fifth most common reason of admission and the incidence was increased compared with our previous study [12]. Mental health disorders have been identified as one of the most important issues for asylum-seeking children in other studies, particularly in young adults and unaccompanied minor refugees [29–34]. A literature search showed that screening and intervention for post-traumatic stress disorder in minor refugees are rare. About 25% of asylum-seeking children might develop this disorder, but few are being diagnosed and treated [35]. A Danish study found a higher prevalence of mental health disorders in unaccompanied than in accompanied asylum-seeking children [31]. In our study, only a few patients were admitted because of mental health disorders, in contrast to a Norwegian study where 48% of unaccompanied adolescent asylum-seekers met the diagnostic criteria [36]. One possible explanation is that these disorders were underestimated in our study as we only analysed the main diagnosis for admission and underlying mental health disorders was not included in the analysis. In addition, patients might have been referred directly to a psychiatric clinic. Nevertheless, healthcare workers in host countries should be aware of mental health disorder in asylum-seeking children; however it remains controversial if routine screening should be used [37].

A further important finding was the difference in prescriptions for asylum-seeking and non-asylum-seeking admitted patients. Lower rates of analgesic prescription in the asylum-seeking patients may result from fewer admissions due to injuries. However, a possible other explanation is the language barrier, preventing asylum-seeking patients and their families from verbalising discomfort and pain.

This study has several limitations. First, only data of patients at our institution were included, so applicability to other regions in Switzerland and Europe might be limited. Second, the systematic registration as asylum-seeking patients may have been missed at the registration desk, and therefore a potential underestimation of the number of asylum-seeking children cannot be excluded. Third, the retrospective collection of data from a large number of patients presents potential sources of reporting bias and missing data, which limited in depth analysis. For example, data on vaccination status and interpreter use was not systematically recorded, and further data regarding factors influencing pain medication use were not recorded at all.

Conclusion

Asylum-seeking children represent a small number of total admissions in a tertiary hospital in Switzerland. Respiratory infectious were among the most common admission diagnoses in asylum-seeking and non-asylum-seeking children. In addition, rare infections and mental health disorders are important diseases in asylum-seeking children, and require special attention and training of staff working with paediatric asylum-seekers. In non-asylum-seeking children, injuries and neonatal diseases are also frequent. Asylum-seeking children received half as much analgesics as non-asylum-seeking children which may result from language barriers.

Acknowledgements
We would like to thank kindly Robert Kopf (Controlling), Matthias Tschudin (Application and Services) and Angelika Fix (Accounting) for their support.

Financial disclosure
We do not have any funding source for this study.

Potential competing interests
The authors declare that they have no conflict of interest.

References

1 United Nations High Commissioner for Refugees. Global trends 2017. 2018. Available from: http://www.unhcr.org/globaltrends2017/.
2 Statssekretariat für Migration. Asylstatistik Übersichten 1986-2018. Available from: https://www.sem.admin.ch/sem/de/home/publiservice/statistik/asylstatistik/uebersichten.html.
3 Staatssekretariat für Migration. Asylstatistik 2017. 2018. Available from: https://www.sem.admin.ch/sem/de/home/aktuell/news/2018/2018-01-22.html.
4 Staatssekretariat für Migration. Statistik UMA 2017. 2018. Available from: https://www.sem.admin.ch/dam/data/sem/publiservice/statistik/asylstatistik/statistiken_uma/uma-2017-d.pdf.
5 ISSOP Migration Working Group. ISSOP position statement on migrant child health. Child Care Health Dev. 2018;44(1):161–70. doi: http://dx.doi.org/10.1111/cch.12485. PubMed.
6 Williams B, Cassar C, Siggers G, Taylor S. Medical and social issues of child refugees in Europe. Arch Dis Child. 2016;101(9):839–42. doi: http://dx.doi.org/10.1136/archdischild-2016-310657. PubMed.
7 Güngör A, Çatak AI, Çuhaci Çakir B, Öden Akman A, Karagöl C, Köksal T, et al. Evaluation of Syrian refugees who received inpatient treatment in a tertiary pediatric hospital in Turkey between January 2016 and August 2017. Int Health. 2018;10(5):371–5. doi: http://dx.doi.org/10.1093/inthealth/ihy034. PubMed.
8 Bucak IH, Almis H, Benli S, Turgut M. An overview of the health status of Syrian refugee children in a tertiary hospital in Turkey. Avicenna J Med. 2017;7(3):110–4. PubMed.
9 van Loenen T, van den Muijsenbergh M, Hofmeester M, Dowrick C, van Ginneken N, Mechili EA, et al. Primary care for refugees and newly arrived migrants in Europe: a qualitative study on health needs, barriers and wishes. Eur J Public Health. 2018;28(1):82–7. doi: http://dx.doi.org/10.1093/eurpub/ckx210. PubMed.
10 Bloch-Infanger C, Bättig V, Kremo J, Widmer AF, Egli A, Bingisser R, et al. Increasing prevalence of infectious diseases in asylum seekers at a tertiary care hospital in Switzerland. PLoS One. 2017;12(6):e0179537. doi: http://dx.doi.org/10.1371/journal.pone.0179537. PubMed.
11 Aldridge RW, Nellums LB, Bartlett S, Barr AL, Patel P, Burns R, et al. Global patterns of mortality in international migrants: a systematic review and meta-analysis. Lancet. 2018;392(10164):2553–66. doi: http://dx.doi.org/10.1016/S0140-6736(18)32781-8. PubMed.
12 Pohl C, Mack I, Schmitz T, Ritz N. The spectrum of care for pediatric refugees and asylum seekers at a tertiary health care facility in Switzerland in 2015. Eur J Pediatr. 2017;176(12):1681–7. doi: http://dx.doi.org/10.1007/s00431-017-3014-9. PubMed.
13 Brandenberger J, Bozorgmehr K, Vogt F, Tylleskär T, Ritz N. Preventable admissions and emergency-department-visits in pediatric asylum-seeking and non-asylum-seeking patients. Int J Equity Health. 2020;19(1):58. doi: http://dx.doi.org/10.1186/s12939-020-01172-w. PubMed.
14 World Health Organization Europe. Report on the health of refugees and migrants in the WHO European Region. 2018. Available from: http://www.euro.who.int/__data/assets/pdf_file/0004/392773/ermh-eng.pdf?ua=1.
15 United Nations High Commissioner for Refugees. Refugee Children: Guidelines on Protection and Care: Refugee Children: Guidelines on Protection and Care; 1994. Available from: https://www.unhcr.org/3b84c6c67.pdf.
16 United Nations Children's Fund. A child is a child 2017 [Available from: https://www.unicef.org/publications/files/UNICEF_A_child_is_a_child_May_2017_EN.pdf.
17 Pfeil J, Kobbe R, Trapp S, Kitz C, Hufnagel M. [Recommendations for the diagnosis and prevention of infectious diseases in pediatric and adolescent refugees in Germany : Statement of the German Society of Pediatric Infectious Diseases, the Society of Tropical Pediatrics and International Child Health, and the Professional Association of Pediatricians]. Internist (Berl). 2016;57(5):416–33. doi: http://dx.doi.org/10.1007/s00108-016-0040-z. PubMed.
18 Alberer M, Wendeborn M, Löscher T, Seilmaier M. [Spectrum of diseases occurring in refugees and asylum seekers: data from three different medical institutions in the Munich area from 2014 and 2015]. Dtsch Med Wochenschr. 2016;141(1):e8–15. PubMed.
19 Abbott KL, Woods CA, Halim DA, Qureshi HA. Pediatric care during a short-term medical mission to a Syrian refugee camp in Northern Jordan. Avicenna J Med. 2017;7(4):176–81. doi: http://dx.doi.org/10.4103/ajm.AJM_100_17. PubMed.
20 El Baroudy NR, Refay ASE, Hamid TAA, Hassan DM, Soliman MS, Sherif L. Respiratory Viruses and Atypical Bacteria Co-Infection in Children with Acute Respiratory Infection. Open Access Maced J Med Sci. 2018;6(9):1588–93. doi: http://dx.doi.org/10.3889/oamjms.2018.332. PubMed.
21 Walker CLF, Rudan I, Liu L, Nair H, Theodoratou E, Bhutta ZA, et al. Global burden of childhood pneumonia and diarrhoea. Lancet. 2013;381(9875):1405–16. doi: http://dx.doi.org/10.1016/S0140-6736(13)60222-6. PubMed.
22 Bhuiyan MU, Snelling TL, West R, Lang J, Rahman T, Granland C, et al. The contribution of viruses and bacteria to community-acquired pneumonia in vaccinated children: a case-control study. Thorax. 2019;74(3):261–9. doi: http://dx.doi.org/10.1136/thoraxjnl-2018-212096. PubMed.
23 Lafond KE, Nair H, Rasooly MH, Valente F, Booy R, Rahman M, et al.; Global Respiratory Hospitalizations—Influenza Proportion Positive (GRIPP) Working Group. Global Role and Burden of Influenza in Pediatric Respiratory Hospitalizations, 1982-2012: A Systematic Analysis. PLoS Med. 2016;13(3):e1001977. doi: http://dx.doi.org/10.1371/journal.pmed.1001977. PubMed.
24 Laukamp A, Prüfer-Krämer L, Fischer F, Krämer A. Health of Syrian unaccompanied asylum seeking adolescents (UASA) at first medical examination in Germany in comparison to UASA from other world regions. BMC Int Health Hum Rights. 2019;19(1):5. doi: http://dx.doi.org/10.1186/s12914-019-0192-8. PubMed.
25 Mockenhaupt FP, Barbre KA, Jensenius M, Larsen CS, Barnett ED, Stauffer W, et al. Profile of illness in Syrian refugees: A GeoSentinel analysis, 2013 to 2015. Euro Surveill. 2016;21(10):30160. doi: http://dx.doi.org/10.2807/1560-7917.ES.2016.21.10.30160. PubMed.
26 Chiarenza A, Dauvrin M, Chiesa V, Baatout S, Verrept H. Supporting access to healthcare for refugees and migrants in European countries under particular migratory pressure. BMC Health Serv Res. 2019;19(1):513. doi: http://dx.doi.org/10.1186/s12913-019-4353-1. PubMed.
27 Brandenberger J, Sontag K, Duchêne-Lacroix C, Jaeger FN, Peterhans B, Ritz N. Perspective of asylum-seeking caregivers on the quality of care provided by a Swiss paediatric hospital: a qualitative study. BMJ Open. 2019;9(9):e029385. doi: http://dx.doi.org/10.1136/bmjopen-2019-029385. PubMed.
28 Brandenberger J, Tylleskär T, Sontag K, Peterhans B, Ritz N. A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model. BMC Public Health. 2019;19(1):755. doi: http://dx.doi.org/10.1186/s12889-019-7049-x. PubMed.
29 Gadeberg AK, Montgomery E, Frederiksen HW, Norredam M. Assessing trauma and mental health in refugee children and youth: a systematic review of validated screening and measurement tools. Eur J Public Health. 2017;27(3):439–46. doi: http://dx.doi.org/10.1093/eurpub/ckx034. PubMed.
30 Hodes M, Vasquez MM, Anagnostopoulos D, Triantafyllou K, Abdelhady D, Weiss K, et al. Refugees in Europe: national overviews from key countries with a special focus on child and adolescent mental health. Eur Child Adolesc Psychiatry. 2018;27(4):389–99. doi: http://dx.doi.org/10.1007/s00787-017-1094-8. PubMed.
31 Norredam M, Nellums L, Nielsen RS, Byberg S, Petersen JH. Incidence of psychiatric disorders among accompanied and unaccompanied asylum-seeking children in Denmark: a nation-wide register-based cohort study. Eur Child Adolesc Psychiatry. 2018;27(4):439–46. doi: http://dx.doi.org/10.1007/s00787-018-1122-3. PubMed.
32 Reavell J, Fazil Q. The epidemiology of PTSD and depression in refugee minors who have resettled in developed countries. J Ment Health. 2017;26(1):74–83. doi: http://dx.doi.org/10.1080/09638237.2016.1222065. PubMed.
33 United Nations Children's Fund. Unaccompanied minors from Afghanistan: Problems and protection in the European Union 2016 [Available from: https://www.unicef-irc.org/article/1389-unaccompanied-minors-from-afghanistan-problems-and-protection-in-the-european-union.html.
34 Vervliet M, Meyer Demott MA, Jakobsen M, Broekaert E, Heir T, Derluyn I. The mental health of unaccompanied refugee minors on arrival in the host country. Scand J Psychol. 2014;55(1):33–7. doi: http://dx.doi.org/10.1111/sjop.12094. PubMed.
35 Horlings A, Hein I. Psychiatric screening and interventions for minor refugees in Europe: an overview of approaches and tools. Eur J Pediatr. 2018;177(2):163–9. doi: http://dx.doi.org/10.1007/s00431-017-3027-4. PubMed.

36 Wittkowski A, Patel S, Fox JR. The Experience of Postnatal Depression in Immigrant Mothers Living in Western Countries: A Meta-Synthesis. Clin Psychol Psychother. 2017;24(2):411–27. doi: http://dx.doi.org/10.1002/cpp.2010. PubMed.

37 Pottie K, Greenaway C, Feightner J, Welch V, Swinkels H, Rashid M, et al.; coauthors of the Canadian Collaboration for Immigrant and Refugee Health. Evidence-based clinical guidelines for immigrants and refugees. CMAJ. 2011;183(12):E824–925. doi: http://dx.doi.org/10.1503/cmaj.090313. PubMed.

Appendix 1

Supplementary data

The appendix is available as a separate file at https://smw.ch/article/doi/smw.2020.20252.

III

Brandenberger et al. International Journal for Equity in Health (2020) 19:58
https://doi.org/10.1186/s12939-020-01172-w

International Journal for Equity in Health

RESEARCH Open Access

Preventable admissions and emergency-department-visits in pediatric asylum-seeking and non-asylum-seeking patients

Julia Brandenberger[1,2*], Kayvan Bozorgmehr[3,4], Florian Vogt[5], Thorkild Tylleskär[6] and Nicole Ritz[1,7,8]

Abstract

Background: Migrant health has become an essential part of public health. According to the World Health Organization, many health systems in Europe have not yet adapted adequately to the needs of asylum-seekers, which might result in untimely and inefficient health care for asylum-seeking patients. The aim of this study was to assess the number of preventable hospital admissions and emergency department visits in asylum-seeking and non-asylum-seeking pediatric patients.

Methods: This is a retrospective, hospital-based study. The study was done at the University Children's Hospital Basel in Switzerland. Patients admitted or presenting to the emergency department were included and split into the groups of asylum-seeking and non-asylum-seeking patients.
All admissions and emergency-department visits were extracted from the administrative electronic health records from 1st Jan 2016-31st Dec 2017. The main outcome was the proportion of admissions due to ambulatory-care-sensitive conditions (which refer to conditions for which admission can be prevented by early interventions in primary care) in asylum-seeking and non-asylum-seeking patients. Ambulatory-care-sensitive conditions were defined by a validated list of ICD-10 codes.
The secondary objective was to assess the number of preventable emergency-department visits by asylum-seeking patients defined as proportion of visits with a non-urgent triage score.

Results: A total of 75'199 hospital visits were included, of which 63'405 were emergency department visits and 11'794 were admissions. Ambulatory-care-sensitive conditions accounted for 12.1% (18/149) of asylum-seeking and 10.9% (1270/11645) of non-asylum seeking patients' admissions. Among the emergency department visits by asylum-seeking patients, non-urgent conditions accounted for 82.2% (244/297).

Conclusions: Admissions due to ambulatory-care-sensitive conditions are comparable in asylum-seeking and non-asylum-seeking children, suggesting few delayed presentations to ambulatory care facilities. Strategies to prevent non-urgent visits at pediatric emergency department facilities are needed.

Keywords: Migrant health, Refugee health, Immigrant children, Use of health care, Ambulatory-care-sensitive conditions, Emergency department, Health care delivery, Equitable access to health care

* Correspondence: Julia.brandenberger@ukbb.ch
[1]University of Basel Children's Hospital, Migrant Health Service, Basel, Switzerland
[2]Pediatric Emergency Department, University Children's Hospital, Bern, Switzerland
Full list of author information is available at the end of the article

Background

Migrant health has become an essential part of public health, with one billion people on the move globally [1, 2]. Health systems in Europe may require adaptation for the needs of migrants and asylum-seekers and according to the World Health Organization, many health systems in Europe have not yet adapted adequately [3, 4]. For effective health care, it is essential that everyone – including asylum-seekers – has timely access to the required level of care [5–7]. Asylum-seekers may have an increased risk of delayed or restricted access to health care and consequently a protracted disease course [8, 9]. This can result from a reluctance to access the health care system by asylum-seekers or the absence of knowledge on ways to seek for medical help [7, 10, 11]. Asylum-seeking pediatric patients are a vulnerable group and their health status may be additionally affected by limited access to health care before leaving the country of origin and detrimental conditions during the journey [12, 13].

To measure an effective primary health care system, ambulatory-care-sensitive conditions have become a commonly used indicator [14]. Ambulatory-care-sensitive conditions are defined as conditions for which hospital admission can be prevented by early interventions in primary care [14]. Little data is available on ambulatory-care-sensitive conditions in asylum-seeking patients. An older study from Australia based on hospital discharge data between 1998 and 2004 found that admissions for ambulatory-care-sensitive conditions were lower among refugee-born individuals compared the resident population [15]. Two recent studies from Germany report contrasting findings. A study based on health care insurance data in children and adults including 3′639 asylum-seeking and 18′191 non-asylum-seeking individuals showed higher admission rates for ambulatory-care-sensitive conditions in asylum-seeking compared to non-asylum-seeking individuals [16].

Similarly, another study investigating ambulatory-care-sensitive conditions in over 32′000 pediatric patients in a single center emergency department in 2015 found a higher rate of asylum-seeking children admitted for ambulatory-care-sensitive conditions compared to non-asylum-seeking children [17].

Low integration in a primary health care system may result in delayed presentations leading to hospital admissions due to ambulatory-care-sensitive conditions. It may also result in increased numbers of presentations with non-urgent conditions at emergency departments. There is a global trend of an increase in non-urgent visits at emergency departments in high-income countries, which could also potentially be prevented by primary health care [18–21]. Asylum-seeking children are at risk of lacking integration into the primary health care system and may therefore have higher rates of ambulatory-care-sensitive admissions and non-urgent emergency-department presentations than their local peers.

The aim of this study was to assess the number of preventable hospital admissions and emergency department visits in asylum-seeking and non-asylum-seeking pediatric patients.

Methods

Study design

The study was a retrospective hospital-based study of the years 2016–2017, comparing asylum-seeking pediatric patients with non-asylum-seeking patients. The primary outcome was the proportion of admissions due to ambulatory-care-sensitive conditions in the asylum-seeking group compared to the non-asylum-seeking group. Secondary outcomes were the proportion of non-urgent visits in asylum-seeking outpatients presenting at the emergency department and the proportion of asylum-seeking children having an assigned primary care physician.

Study setting

Located in Switzerland at the border to France and Germany, the University Children's Hospital Basel delivers health care to a multicultural population. The hospital is part of the Swiss hospitals for equity program [22] and the only tertiary pediatric health care provider for two regions in North-West Switzerland. Basel has of the largest of the six Swiss reception centers for asylum-seeking individuals run by the Swiss State Secretary of Migration where asylum-seekers stay for a maximum of 3 months after arrival.

Study population

Data of all visits at the University Children's Hospital Basel was extracted from the administrative electronic health records from 1st Jan 2016 to 31st Dec 2017. For this analysis only visits of the emergency department and admissions were included. An admission was defined as a hospital visit including at least one overnight stay. To prevent an overestimation of visits, an emergency department contact which led to admission was counted as admission and marked as admission initiated by the emergency department but not counted as additional emergency department visit. Records showing visits of multiple departments during the same admission were counted as one admission. The asylum-seeking status is systematically assessed and recorded at this institution for all patients since 2016. Patients were registered as asylum-seeking if any of the following conditions were met: (i) referred from one of the reception centers run by the State Secretary for Migration; (ii) referral sheet stating that the patient is asylum-seeking;

(iii) patient showing an asylum-seeking identity card, which is routinely issued to all individuals lodging an asylum request in Switzerland. Asylum-seeking children with visits recorded 1 year or longer before the study period (i.e. before 1st January 2015) were excluded from the current analysis, to ensure only recently arrived asylum-seeking patients were included in the analysis.

Data collection

Data extraction for all identified patients was done using electronic administrative and medical health records for the following variables in all hospitalized patients: main diagnosis, asylum status, nationality, age, gender, duration of hospitalization, department hospitalized and admitting authority. For all visits of the asylum-seeking group, the following variables were manually extracted and added to the database: family structure, registered personal pediatrician, triage score, radiological exams and therapies prescribed. Extracted data was transferred to a Redcap-database (Vanderbilt University/IC 6.9.4). Data cleaning and automatic as well as manual quality control tests were performed. Automatic data cleaning was performed using validation rules for data entries as built-in checks for missing values, out of range data or outliers for numerical fields. In addition, data entry was manually checked by an independent person. The records were locked prior to analysis.

Definition of ambulatory-care-sensitive conditions

Ambulatory-care-sensitive conditions were defined using criteria from previously published studies [23–29]. The final list defining ambulatory-care-sensitive conditions in our study was based on a recent study done in a context comparable to ours [17]. The list included 304 International Classification of Diseases-10 codes summarized in 17 categories (Supplementary material 1).

Definition of non-urgent visits

To assess the proportion of non-urgent visits, the Australasian Triage Scale was used. The score was developed by the Australasian College for Emergency Medicine, revised in 2000, validated and is widely used [30]. It ranges from 1 (resuscitation) to 4 (less-urgent condition) and 5 (non-urgent condition). The score is routinely assessed by trained nurses in all patients presenting at the emergency department of the University Children's Hospital Basel. Non-urgent visits were defined as triage score 4 or 5 as proposed in previous studies [31].

Analysis

STATA (Stata/IC 13.12013) was used for the statistical analysis as for the generation of graphs. The statistical analysis was mainly descriptive. Inferential statistics were used to describe the primary outcome parameter. The two sample Chi-square test was used to compare proportions of the primary outcome parameter, namely the proportion of admissions due to ambulatory-care-sensitive conditions in the asylum-seeking group compared to the non-asylum-seeking group. Confidence intervals were provided to describe the precision around the summary statistic using a confidence level of 95%. To provide information about the completeness of the dataset, records with missing data were not excluded from analysis but reported as such.

Ethics approval

The study was approved by the Ethics committee of North-West Switzerland (EKNZ 2017–01585).

Results

General

A total of 75′199 hospital visits were included, of which 63′405 were emergency department visits and 11′794 were admissions. Baseline Characteristics are summarized in Table 1:

Of the admissions, 149/11′794 (1.3%) were by asylum-seeking and 11′645/11′794 (98.7%) by non-asylum-seeking patients (Fig. 1). Admissions were mainly initiated by the emergency department in both groups: in 97/149 (65%) of the asylum-seeking and in 7013/11′645 (60%) of the non-asylum-seeking group. The remaining were admissions initiated by outpatient departments or planned admissions (Table 1).

Admission for ambulatory-care-sensitive conditions

Ambulatory-care-sensitive conditions accounted for 18/149 (12.1%; CI: 0.07–0.18) of the admissions in asylum-seeking and for 1270/11′645 (10.9%; CI: 0.1–0.11) in the non-asylum-seeking patients ($p = 0.65$; CI: − 0.04-0.06). The distribution within the different categories of ambulatory-care-sensitive conditions varied between the groups (Fig. 2). The most frequent category in both groups was "severe infections of ear, nose, throat or upper respiratory tract". This ambulatory-care-sensitive condition category was more frequent in visits by asylum-seeking compared to non-asylum seeking patients, 12/18 (67%) and 475/1270 (37%) respectively. Skin infections were the second most common category in admissions for ambulatory-care-sensitive conditions by asylum-seeking patients with 3/18 (17%), compared to 124/1270 (10%) in non-asylum-seeking patients. In the non-asylum-seeking patients, admissions for "gastroenteritis and dehydration" was also common with 175/1270 (14%), compared to no admission for this reasons in the asylum-seeking patients. Nutritional deficiency was more common in asylum-seeking patients 1/18 (6%) compared to non-asylum-seeking patients 2/1270 (0%).

Table 1 Baseline characteristics of emergency department visits and admissions by asylum-seeking and non-asylum-seeking patients in 2016–2017

Characteristics	Visits by asylum-seeking patients				Visits by non-asylum-seeking patients			
	Admissions *n* = 149		Outpatient ED *n* = 297		Admissions *n* = 11'645		Outpatient ED *n* = 63'108	
	N	IQR/ %	N	IQR/%	N	IQR/%	N	IQR/%
Median age	4	0–13	5	1–11	4	0–11	5	2–10
Male gender	88	59	175	59	6'456	55	34'416	55
Most frequent nationalities:								
Eritrea	34	23	48	16	Switzerland 7612	65	35'776	57
Afghanistan	26	17	40	13	Germany 916	8	4005	6
Syria	24	16	59	20	Italy 377	3	2475	4
Somalia	11	7	20	7	Turkey 363	3	3446	5
Iraq	9	6	17	6	Kosovo 331	3	2389	4
Missing data	1	1	4	1	Missing data 4	0	4	0
Other	44	30	109	37	Other 1991	17	15'013	24
Average days admitted	4	2–7	na	na	3	2–6	na	na
Admitted by					Admitted by			
ED	97	65	na	na	ED 7013	60	na	na
Referral	30	20	na	na	Referral 3223	28	na	na
Transfer other hospital	22	15	na	na	Transfer other hospital 1409	12	na	na
Missing	0	0						

ED Emergency department, *na* not applicable

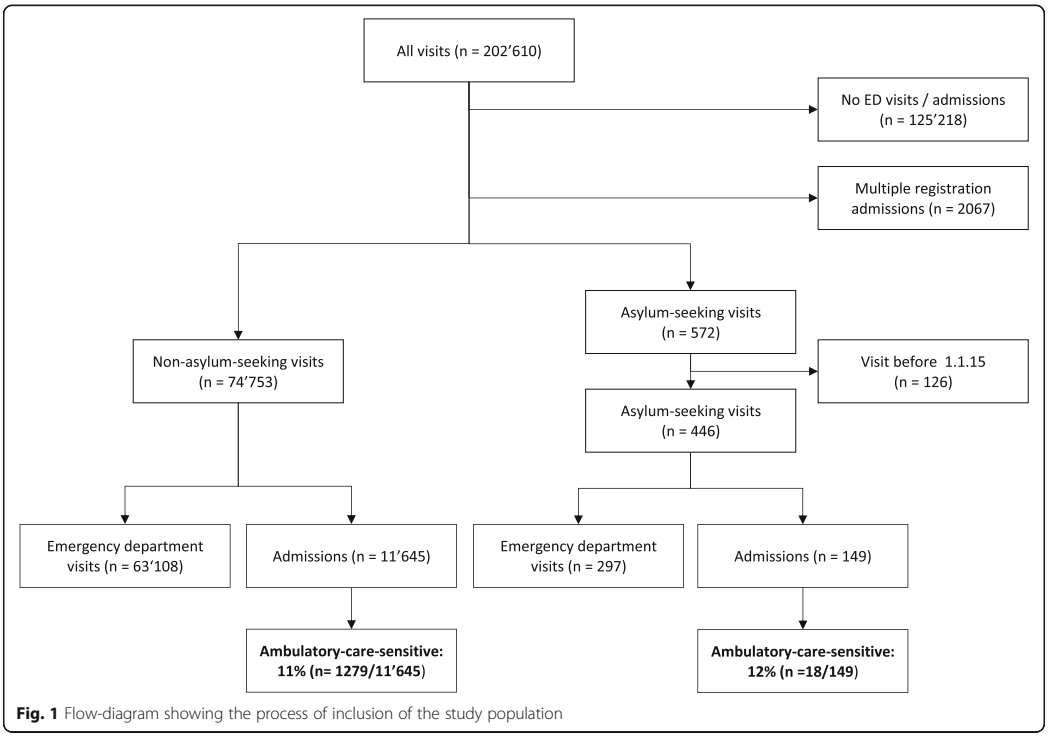


Fig. 1 Flow-diagram showing the process of inclusion of the study population

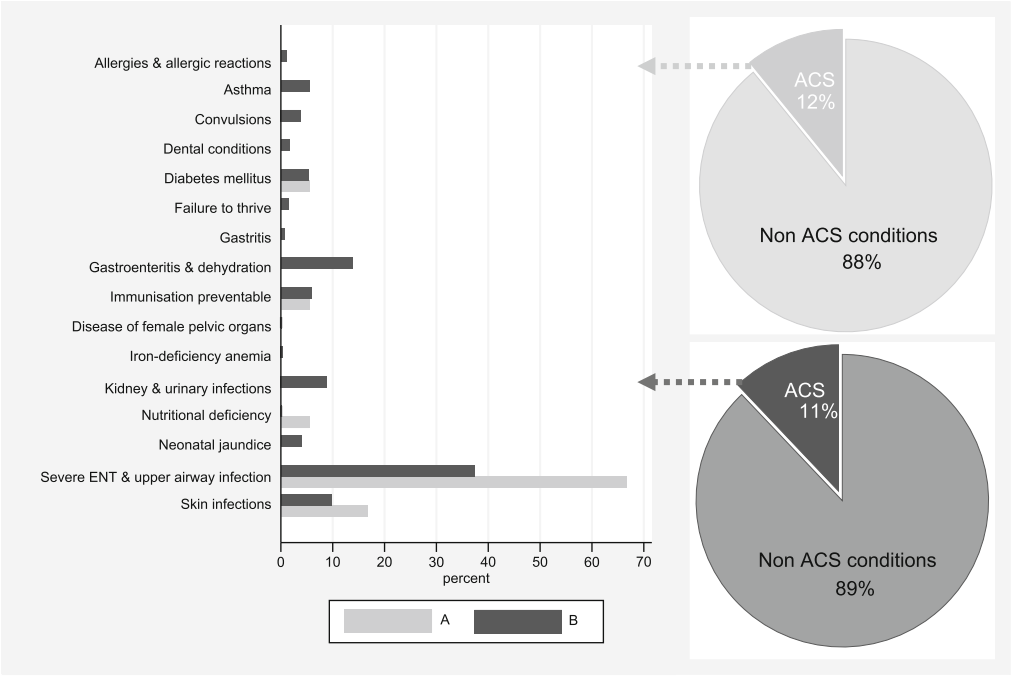


Fig. 2 Bar-graph depicting the distribution and proportion of ambulatory-care-sensitive admissions in asylum-seeking (**A**) and non-asylum-seeking (**B**) patients. ACS = ambulatory-care sensitive conditions

In both groups, the majority of admissions due to ambulatory-care-sensitive conditions were through the emergency department: 16/18 (89%) in the asylum-seeking and 1101/1270 (87%) in the non-asylum-seeking patients, respectively. Few patients were transferred from other hospitals: 1/18 (6%) in the asylum-seeking and 39/1270 (3%) or in the non-asylum-seeking patients; or referred by primary care physicians 1/18 (6%) in the asylum-seeking and 130/1270 (10%) in the non-asylum-seeking patients. A primary care physician was documented in 66/149 (44%) of the admissions of asylum-seeking patients. There was no difference in the proportion of admissions for ambulatory-care-sensitive conditions in visits with and without a documented primary care physician: 8/66 (12%) and 10/83 (12%), respectively.

Emergency department visits and admissions through the emergency department

In total, 70′515 visits at the emergency department were recorded of which 63′405 were emergency department visits and 7′110 were admissions initiated by the emergency department. In total, 394/70′515 (0.5%) were by asylum-seeking and 70′121/70′515 (99.5%) by non-asylum-seeking patients. The proportion of emergency department contacts leading to admission was higher in asylum-seeking compared to non-asylum-seeking patients, 97/394 (25%) and 7013/70′121 (10%), respectively. In both groups, a large proportion of emergency department visits were by patients below 2 years of age: 115/394 (29%) in asylum-seeking and 15′126/70′121 (26%) in non-asylum-seeking patients.

Details of emergency department visits in the asylum-seeking patients

Non-urgent visits were frequent in asylum-seeking patients with 82% (244/297) of the total visits. A primary care physician was documented in 122/297 (47%) of the asylum-seeking outpatient visits. The median (IQR) triages score for those with and without a documented primary care physician was similar: 5 (3–5) and 5 (4–5), respectively. The proportion of office-hours visits was similar in visits of patients with a primary care physician documented compared to visits of those without: 57% (70/122) versus 59% (99/168), respectively.

A detailed analysis of the spectrum of diseases in asylum-seeking patients with emergency department outpatient visits is shown in Fig. 3. A total of 165/297 (56%) of the visits in the asylum-seeking patients were

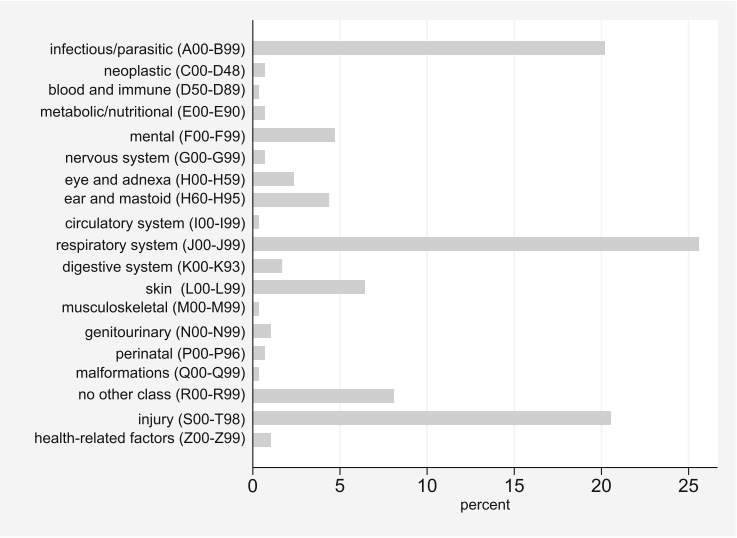


Fig. 3 Bar-graph depicting the spectrum of disease (using ICD-10 coding) and proportion in emergency department outpatient visits in asylum-seeking patients. ICD = International classification of diseases

due to an infectious disease, most commonly infection of the "respiratory system". The most common single ICD-10 code was "Acute upper respiratory infections of multiple and unspecified sites" (J 06) with 54/297 (18%) visits. The second most frequent category was "injury" (S00-T98) with 61/297 (21%) visits, with most frequent single ICD-10 code being "superficial injury of head" (S00; 8/297; 3%) and "open wound of head" (S01; 7/297; 2%).

Discussion

The current study is the largest study to-date which has systematically compared ambulatory-care-sensitive conditions in admissions of recent asylum-seeking and non-asylum-seeking pediatric patients. We found 11 to 12% overall of admissions to be ambulatory-care-sensitive conditions with no significant difference in the proportions in asylum-seeking and non-asylum-seeking pediatric patients. This finding contrasts results from two previous studies in Germany. One of these studies in a similar setting used the same ICD-10 codes to define ambulatory-care-sensitive conditions. It showed higher proportions of ambulatory-care-sensitive conditions leading to admission with 17% in the asylum-seeking compared to 10% in the non-asylum-seeking patients [17]. One potential reason for lower rates in our setting is the different local primary care system with nursing staff being present at reception center and co-operation with primary and tertiary care providers preventing admission for ambulatory-care-sensitive conditions. This is also shown by the fact that in half of the visits by asylum-seeking patients a primary care physician was documented in our setting. An alternative explanation for the difference between the two studies may be that children included in the study in Germany in 2015 were more likely admitted as local health care systems were overwhelmed by the high number of arriving asylum-seekers at that time [4, 32].

Of the few studies that reported ambulatory-care-sensitive conditions in asylum-seeking patients, an older Australian study reported similar admission rates to our study and also found no difference in rates between patients from refugee-source countries and residents [15]. Australia is a county with a long-standing immigrant health history and well-developed health systems for refugees and asylum-seekers. This fact may lead to similar levels of health care provided to asylum-seekers non asylum-seekers consequently reduces admissions for ambulatory-care-sensitive conditions. However these results may entail misclassification bias as the country of birth was used as a proxy to define the patient as refugee or resident.

In our study, the overall proportion of outpatient visits to the emergency department by asylum-seeking patients was low. This was confirmed in another study from the same institution that investigated all visits including other non-emergency-department outpatient visits showing that visits by asylum-seeking patients were less

than 2% of the total visits [33]. A detailed analysis of the emergency department triage scores showed non-urgent visits to be frequent with over 80% in asylum-seeking children. This proportion is considerably higher than in previous reports of 30–40% of non-urgent visits in pediatric emergency care centers in Canada and Australia [19, 34], 40% in Belgium and Italy [35, 36] and 60% in the United States [37] . However, the tendency to provide primary care by tertiary health care institutions is described as global problem and one reason for growing health expenses [20]. In a study from the UK, no association between non-urgent presentations and the asylum-status was found [38]. Reasons for presenting to an emergency department rather than to a primary care physician have been investigated in a Canadian study and included high sense of urgency, the feeling of trust in the emergency health care workers and presence of equipment [19]. A potential solution may be anticipatory parent education as shown in a study in Minnesota where emergency department visits for ear pain were reduced by 80% after nurses provided preventive education and treatment for ear pain [39].

In our study, the spectrum of disease found in asylum-seeking outpatient visits in an emergency department was mainly consisting of respiratory tract infections and minor injuries of the head. Interestingly this is not different from non-asylum-seeking patients in high-income countries [40]. Differences between asylum-seeking and non-asylum seeking patients seem to be more pronounced in the way how health care is best delivered as asylum-seeking patients require particular attention to communication, confidence achieved by a trustful patient-provider relationship and continuity of care [6, 41].

Results from our study, which is the largest study to-date that systematically compared ambulatory-care-sensitive conditions in admissions of asylum-seeking and non-asylum-seeking pediatric patients, have several limitations. First, admissions due to ambulatory-care-sensitive conditions were relatively few in the asylum-seeking group, not allowing further stratification for sex and age. However, the risk of a significant influence is low as the sex and age distribution was comparable in both groups. Second the coding of ICD-10 codes might be subject to inter-individual variation of the coders. However, the coding of both groups was done by the same staff of the accounting unit of the hospital. Third, we were unable to analyze the frequency of non-urgent visits in the non-asylum seeking patients as this data was not available at the time analysis was performed.

Conclusion

Admissions due to ambulatory-care-sensitive conditions were not significantly different in asylum-seeking and non-asylum-seeking children in a Swiss tertiary care pediatric hospital. This suggests a well-developed primary health-care system for asylum-seeking children in the local context. Non-urgent visits were frequent in asylum-seeking patients and new strategies are required to reduce this burden and improve cost-effectiveness of the current system.

Supplementary information

Supplementary information accompanies this paper at https://doi.org/10.1186/s12939-020-01172-w.

Additional file 1 Supplementary data 1: Ambulatory-care-sensitive conditions categories and their codes adapted from Lichtl et al [17].

Acknowledgements

We want to kindly thank Matthias Tschudin (application and services, UKBB), Robert Kopf (controlling, UKBB) and Angelika Fix (accounting, UKBB) for their support in data acquisition.

Authors' contributions

Julia Brandenberger: Conceived the study, performed data analysis, drafted the initial manuscript, revised the manuscript and approved the final manuscript as submitted. Kayvan Bozorgmehr, Florian Vogt and Thorkild Tylleskär: Contributed to the interpretation of data, reviewed the manuscript and approved the final manuscript as submitted. Nicole Ritz: Conceived the study, supervised analysis, reviewed and revised the manuscript and approved the final manuscript as submitted.

Funding

JB received a one year research fellowship from the Botnar foundation.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

The study was approved by the Ethics committee of North-West Switzerland (EKNZ 2017–01585).

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no conflict of interest.

Author details

[1]University of Basel Children's Hospital, Migrant Health Service, Basel, Switzerland. [2]Pediatric Emergency Department, University Children's Hospital, Bern, Switzerland. [3]Department of General Practice and Health Services Research, University Hospital Heidelberg, Heidelberg, Germany. [4]Department of Population Medicine and Health Services Research School of Public Health, Bielefeld University, Bielefeld, Germany. [5]Unit of NTDs, Department of Clinical Sciences, Institute of Tropical Medicine, Antwerp, Belgium. [6]Centre for International Health, University of Bergen, Bergen, Norway. [7]University of Basel Children's Hospital, Pediatric Infectious Disease and Vaccinology, Basel, Switzerland. [8]Department of Pediatrics, Royal Children's Hospital Melbourne, University of Melbourne, Melbourne, Australia.

Received: 4 December 2019 Accepted: 13 April 2020
Published online: 01 May 2020

References

1. Abubakar I, Aldridge RW, Devakumar D, Orcutt M, Burns R, Barreto ML, Dhavan P, Fouad FM, Groce N, Guo Y, et al. The UCL-Lancet Commission on migration and health: the health of a world on the move. Lancet. 2018;392:2606–54.
2. The Lancet Public Health. No public health without migrant health. Lancet Public Health. 2018;3:e259.

3. Organisation; WH. Report on the health of refugees and migrants in the WHO European Region, vol. 1. Denmark: World Health Organization; 2018.
4. Baauw A, Ritz N. Towards better healthcare for migrant and refugee children in Europe. Eur J Pediatr. 2018;177:161–2.
5. Kaur M, Singh S, Gupta M, Bahuguna P, Rani S. Inequity in access to health services between migrants and natives of Chandigarh, India. Int J Migr Health Soc Care. 2015;11:147–55.
6. Joshi C, Russell G, Cheng IH, Kay M, Pottie K, Alston M, Smith M, Chan B, Vasi S, Lo W, et al. A narrative synthesis of the impact of primary health care delivery models for refugees in resettlement countries on access, quality and coordination. Int J Equity Health. 2013;12:88.
7. Koller TS. Beyond the barriers. Geneva: World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/259486/9789241513364-eng.pdf;jsessionid=5B03733815A718928E59D1AD6BF6AC75?sequence=1.
8. Pottie K, Batista R, Mayhew M, Mota L, Grant K. Improving delivery of primary care for vulnerable migrants Delphi consensus to prioritize innovative practice strategies. Can Fam Physician. 2014;60:E32–40.
9. Ritz N, Brinkmann F, Santiago Garcia B, Tebruegge M, Kampmann B. Paediatric tuberculosis network European trials g: tuberculosis in young refugees. Lancet. 2015;386:2475–6.
10. The Lancet. Migrant and refugee children need our actions now. Lancet. 2016;388:1130.
11. Worabo HJ, Hsueh KH, Yakimo R, Worabo E, Burgess PA, Farberman SM. Understanding Refugees' perceptions of health Care in the United States. J Nurse Pract. 2016;12:487–94.
12. Group IMW. ISSOP position statement on migrant child health. Child Care Health Dev. 2018;44:161–70.
13. Pohl C, Mack I, Schmitz T, Ritz N. The spectrum of care for pediatric refugees and asylum seekers at a tertiary health care facility in Switzerland in 2015. Eur J Pediatr. 2017;176:1681–7.
14. Agency for Healthcare Research and Quality. Prevention Quality Indicators Overview. Rockville: U.S. Department of Health & Human Services; 2019. https://www.ahrq.gov/contact/index.html.
15. Correa-Velez I, Ansari Z, Sundararajan V, Brown K, Gifford SM. A six-year descriptive analysis of hospitalisations for ambulatory care sensitive conditions among people born in refugee-source countries. Popul Health Metrics. 2007;5:9.
16. Bauhoff S, Gopffarth D. Asylum-seekers in Germany differ from regularly insured in their morbidity, utilizations and costs of care. PLoS One. 2018;13:e0197881.
17. Lichtl C, Lutz T, Szecsenyi J, Bozorgmehr K. Differences in the prevalence of hospitalizations and utilization of emergency outpatient services for ambulatory care sensitive conditions between asylum-seeking children and children of the general population: a cross-sectional medical records study (2015). BMC Health Serv Res. 2017;17:731.
18. Elkon-Tamir E, Rimon A, Scolnik D, Glatstein M. Fever phobia as a reason for pediatric emergency department visits: does the primary care physician make a difference? Rambam Maimonides Med J. 2017;8:6. https://doi.org/10.5041/rmmj.10282.
19. Farion KJ, Wright M, Zemek R, Neto G, Karwowska A, Tse S, Reid S, Jabbour M, Poirier S, Moreau KA, Barrowman N. Understanding low-acuity visits to the pediatric emergency department. PLoS One. 2015;10:e0128927.
20. Kim BS, Kim JY, Choi SH, Yoon YH. Understanding the characteristics of recurrent visits to the emergency department by paediatric patients: a retrospective observational study conducted at three tertiary hospitals in Korea. BMJ Open. 2018;8:e018208.
21. Sturm JJ, Hirsh D, Weselman B, Simon HK. Reconnecting patients with their primary care provider: an intervention for reducing nonurgent pediatric emergency department visits. Clin Pediatr (Phila). 2014;53:988–94.
22. Positionspapier Fachgruppe interkulturelles Dolmetschen. http://www.hospitals4equity.ch/files/BAG/Documents/Communication/SH4E_Positionspapier_Ueberwindung%20von%20Sprachbarrieren%20im%20Gesundheitswesen.pdf.
23. Anderson P, Craig E, Jackson G, Jackson C. Developing a tool to monitor potentially avoidable and ambulatory care sensitive hospitalisations in New Zealand children. N Z Med J. 2012;125:25–37.
24. Becker DJ, Blackburn JL, Kilgore ML, Morrisey MA, Sen B, Caldwell C, Menachemi N. Continuity of insurance coverage and ambulatory care-sensitive hospitalizations/ED visits: evidence from the children's health insurance program. Clin Pediatr (Phila). 2011;50:963–73.
25. Casanova C, Colomer C, Starfield B. Pediatric hospitalization due to ambulatory care-sensitive conditions in Valencia (Spain). Int J Qual Health Care. 1996;8:51–9.
26. Flores G, Abreu M, Tomany-Korman S, Meurer J. Keeping children with asthma out of hospitals: parents' and physicians' perspectives on how pediatric asthma hospitalizations can be prevented. Pediatrics. 2005;116:957–65.
27. Jaeger MW, Ambadwar PB, King AJ, Onukwube JI, Robbins JM. Emergency Care of Children with ambulatory care sensitive conditions in the United States. J Emerg Med. 2015;49:729–39.
28. Lu S, Kuo DZ. Hospital charges of potentially preventable pediatric hospitalizations. Acad Pediatr. 2012;12:436–44.
29. Prezotto KH, Chaves MM, Mathias TA. Hospital admissions due to ambulatory care sensitive conditions among children by age group and health region. Rev Esc Enferm USP. 2015;49:44–53.
30. Ebrahimi M, Heydari A, Mazlom R, Mirhaghi A. The reliability of the Australasian triage scale: a meta-analysis. World J Emerg Med. 2015;6:94–9.
31. Dinh MM, Berendsen Russell S, Bein KJ, Chalkley DR, Muscatello D, Paoloni R, Ivers R. Statewide retrospective study of low acuity emergency presentations in New South Wales, Australia: who, what, where and why? BMJ Open. 2016;6:e010964.
32. Nicolai T, Fuchs O, von Mutius E. Caring for the wave of refugees in Munich. N Engl J Med. 2015;373:1593–5.
33. Brandenberger J, Tylleskar T, Sontag K, Peterhans B, Ritz N. A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model. BMC Public Health. 2019;19(1):755.
34. Alele FO, Callander EJ, Emeto TI, Mills J, Watt K. Socio-economic composition of low-acuity paediatric presentation at a regional hospital emergency department. J Paediatr Child Health. 2018;54:1341–7.
35. Vedovetto A, Soriani N, Merlo E, Gregori D. The burden of inappropriate emergency department pediatric visits: why Italy needs an urgent reform. Health Serv Res. 2014;49:1290–305.
36. Benahmed N, Laokri S, Zhang WH, Verhaeghe N, Trybou J, Cohen L, De Wever A, Alexander S. Determinants of nonurgent use of the emergency department for pediatric patients in 12 hospitals in Belgium. Eur J Pediatr. 2012;171:1829–37.
37. Kubicek K, Liu D, Beaudin C, Supan J, Weiss G, Lu Y, Kipke MD. A profile of nonurgent emergency department use in an urban pediatric hospital. Pediatr Emerg Care. 2012;28:977–84.
38. Hargreaves S, Friedland JS, Gothard P, Saxena S, Millington H, Eliahoo J, Le Feuvre P, Holmes A. Impact on and use of health services by international migrants: questionnaire survey of inner city London A&E attenders. BMC Health Serv Res. 2006;6:153.
39. McWilliams DB, Jacobson RM, Van Houten HK, Naessens JM, Ytterberg KL. A program of anticipatory guidance for the prevention of emergency department visits for ear pain. Arch Pediatr Adolesc Med. 2008;162:151–6.
40. McDermott KW, Stocks C, Freeman WJ. Overview of Pediatric Emergency Department Visits, 2015: Statistical Brief #242. In Healthcare Cost and Utilization Project (HCUP) Statistical Briefs. Rockville: Agency for Healthcare Research and Quality (US); 2006.
41. Robertshaw L, Dhesi S, Jones LL. Challenges and facilitators for health professionals providing primary healthcare for refugees and asylum seekers in high-income countries: a systematic review and thematic synthesis of qualitative research. BMJ Open. 2017;7:e015981.

Publisher's Note

Annex I

Brandenberger et al. BMC Public Health (2019) 19:755
https://doi.org/10.1186/s12889-019-7049-x

BMC Public Health

RESEARCH ARTICLE Open Access

A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model

Julia Brandenberger[1,2,3,4*], Thorkild Tylleskär[5], Katrin Sontag[3,6], Bernadette Peterhans[2,3] and Nicole Ritz[1,3,7,8]

Abstract

Background: Migrants and refugees have important health needs and face inequalities in their health status. Health care delivery to this patient group has become a challenging public health focus in high income countries. This paper summarizes current knowledge on health care delivery to migrants and refugees in high-income countries from multiple perspectives.

Methods: We performed a systematic literature review including primary source qualitative and quantitative studies between 2000 and 2017. Articles were excluded if the study setting was in low- or middle-income countries or focused on skilled migration. Quality assessment was done for qualitative and quantitative studies separately. Predefined variables were extracted in a standardized form. Authors were approached to provide missing information.

Results: Of 185 identified articles, 35 were included in the final analysis. We identified three main topics of challenges in health care delivery: communication, continuity of care and confidence. All but one study included at least one of the three main topics and in 21/35 (60%) all three topics were mentioned. We further developed the 3C model and elaborated the interrelatedness of the three topics. Additional topics identified showed that the specific regional context with legal, financial, geographical and cultural aspects is important and further influences the 3C model.

Conclusions: The 3C model gives a simple and comprehensive, patient-centered summary of key challenges in health care delivery for refugees and migrants. This concept is relevant to support clinicians in their day to day practice and in guiding stakeholders in priority setting for refugee and migrant health policies.

Keywords: Asylum, Confidence, Continuity of care, Communication, Interpreter, Immigrant, Quality of care, Translator, Refugee, Trust

Background

The number of migrants worldwide has risen by over 105 million, or by 69% since 1990 [1]. In 2017, an estimated 68.5 million individuals were displaced globally, including 25.4 million Refugees [2]. The health needs of this increasing population of migrants and refugees are a global challenge for health care systems. Access to high quality health care is particularly important for these individuals as they face unequal medical treatment opportunities. Rising numbers of migrants and refugees in host countries put migrant's and refugee's health on the public health agenda [3].

The vision of the United Nations 2030 Sustainable Development Goals is to leave no one behind and to strive for peace and reduction of inequity [4]. For migrants and refugees, ways to improve health care delivery are detailed by the World Health Organization (WHO) which include the need for patient-centered and intercultural approaches [5].

Even though the largest group of displaced individuals and refugees are hosted in resource poor countries, the

* Correspondence: julia.brandenberger@hotmail.com
[1]University Children's Hospital Basel, Migrant Health Service, University of Basel, Spitalstr.33, Basel, Postbox CH 4031, Switzerland
[2]Swiss Tropical and Public Health Institute, P.O. Box, CH-4002, Basel, Switzerland
Full list of author information is available at the end of the article

health needs of migrants and refugees need to be addressed in high income countries. As one strategy to improve migrant health care delivery, the European Union started an initiative called the "migrant-friendly hospital project" in 2002. The approach focused on improving interpreting services, providing migrant-friendly information and training staff in cultural competence [6]. Based on the experience of this project the "Amsterdam Declaration" identified the need for a comprehensive training of health care providers to understand the specific requirements of migrants and refugees [7].

It is key to adequately train health care providers in health care delivery to migrants and refugees. In this paper, we review the literature on knowledge, perceptions and attitudes of migrants, refugees and healthcare providers regarding health care delivery in high-income countries. We aim to develop a comprehensive, patient-centered model summarizing the main challenges described.

Methods

A mixed method literature review was performed [8] guided by the preferred reporting items for systematic reviews and meta-analyses (PRISMA [9]) and the mixed methods research synthesis framework (MMRS [10]). The systematic literature review was done using three separate search strings for primary source qualitative and quantitative studies published between 1 Jan 2000 and 31 Dec 2017.

First, the search included medical subject headings (MeSH) terms ("delivery of health care" AND "health services") AND ("migrant*" OR MeSH term "refugees") in all databases of Web of Science (Clarivate Analytics) including Web of Science Core Collection, Current Contents Connect, Data Citation Index, MEDLINE, Russian Science Citation Index, SciELO Citation index. Second, the search term "health care delivery" AND "migrant*" and third "health care delivery" AND "refugee*" were used in the Web of Science Core Collection to allow for a less restricted search. The two terms "migrant*" and "refugee*" were used to allow for search results that were as broad as possible including asylum seekers, resettlement refugees, recognized refugees, undocumented refugees and migrants. There was no language restriction. Identified studies were excluded according to the following criteria: a) study setting in low- or middle-income countries, b) skilled migration, c) no focus on health care delivery to migrants and/or refugees, d) migrants for medical reasons, e) insufficient description of design and methods. Inclusion and exclusion of studies were discussed between JB and NR.

Quality assessment was done by JB and NR and disagreements discussed until consensus was reached. For cross-sectional studies a modified Newcastle-Ottawa scale, as recommended by the Cochrane Collaboration [11] was used and for qualitative studies the critical appraisal check list for qualitative research from the Oxford-based Critical Appraisal Skills Programme [12]. For the completeness of the review we also included good practice reports and expert opinion articles.

As heterogeneity of the included studies was substantial, a qualitative synthesis approach was chosen. A thematic analysis was done for both qualitative and quantitative data. (Additional file 1: Figure S1) [10]. Variables were extracted in a standardized form, including the following: title, first author, publication date, setting, timeframe of the study, described challenges (literal approach). If information was unavailable, authors were contacted to provide missing information. In a stepwise approach, the described challenges were condensed into topics using a narrative approach. Views of health workers and patients were compared where necessary. The interrelation of the main challenges was visualized in the final model.

The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication. There was no funding source for this study.

Results

A total of 195 search results of 185 publications were identified. Following screening and full text analysis 35 publications were included in the final assessment (Fig. 1) . These comprised 12 cross-sectional studies, 17 qualitative studies, 3 good practice studies and 3 expert opinion articles. Most of the studies were from Australia, the US and the UK, followed by studies on Europe. Characteristics and the quality assessment of the included studies are summarized in Tables 1, 2 and 3. The three main topics discussed were: communication 29/35 (83%), continuity of care 28/35 (80%) and confidence 28/35 (80%). All but one study (34/35, 97%) included at least one of the three main topics and in 21/35 (60%) all three topics were mentioned (Fig. 2). The interrelation of the main categories was visualized in the 3 C Model (Fig. 3). Further topics mentioned were: context, collaboration, gender, holistic health care, social network and time.

Communication

Communication was the topic most commonly mentioned. Generally, communication is required for the understanding of the reason for the presentation of a patient and allows to exchange information about symptoms, presumed diagnosis, diagnostic tests required, treatment and Prognosis [46]. Speaking the same language was mentioned as a gateway to health care [39].

Communication was reported to be challenging for health care providers and patients alike [25]. Health care workers stated that a different language was an obvious

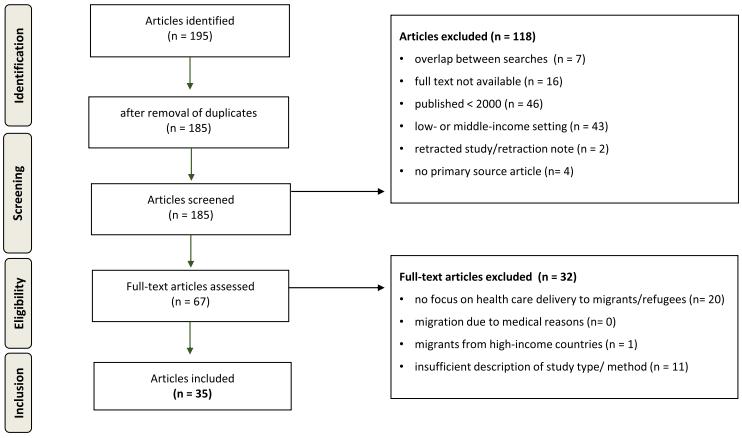


Fig. 1 Flow diagram showing the process of study selection (adapted from [11])

barrier and may lead to misunderstanding or lack of understanding [19, 25].

In a study including Mexican women in the United States, Espinoza et al. described that communication barriers resulted in reduced utilization of health services [30]. In host countries not offering free language courses to migrants and refugees, patients found it difficult to improve their communication skills in the local language [39]. If free language courses were available time was required to learn a language to be able to explain health problems appropriately as shown in a study including Sudanese boys in the US [20]. Beyond basic communication skills were required to express feelings and beliefs and particularly challenged patients with mental health disorders [20].

Interpreter services therefore played a key role in medical consultations [19, 45]. The availability of interpreters was described as directly increasing adequate health service provision and use among migrants and refugees. This resulted in a decrease of social vulnerability [38, 40]. Different types of interpreter services including phone or video interpreters, in-person professional or non-professional interpreters were mentioned. Quality regarding the accuracy of the translation was considered important by health care providers and patients. In a qualitative study from Montreal, health care providers preferred professional to non-professional interpreters. They were considered to offer the advantages of knowledge of the health care system, specialized health vocabulary and enabled them to fulfil their professional responsibilities [23]. The absence of system flexibility to allocate time for interpreter-mediated appointments was described as problematic [27]. The consistent availability of a preferred professional interpreter enhanced provider-patient communication and relationship [23, 44]. A briefing and debriefing before and after the consultation with the health care provider was considered helpful to prevent misunderstandings and help professional interpreters to cope with challenging topics [41]. As opposed to health care providers who were reluctant to use the patients´ family members or friends as interpreters, migrants and refugees generally trusted them and appreciated their help [13, 23]. Beyond transmission of information, the interpreting individual was reported to influence relationships, judgments and decisions [28].

According to Yelland et al. systematic assessment and documentation of the need for an interpreter should be included in the provision of migrant health care [43]. A mismatch of patient and interpreter for gender, age, dialect or ethno-cultural factors was considered challenging, as specifically pointed out by a study on the access to mental health facilities by young people with a refugee-background in Australia [32]. Sometimes the use of an interpreter was not only considered positive, as the need for translation frustrated older migrants and refugees who had been functioning independently in their home countries .

Continuity of care

Continuity of care was the second most common topic mentioned in the studies. Most important factors influencing the continuity of care were: a) information and education for migrants and refugees about the health care system of the host country b) ease of access of health facilities, c) integration of medical appointments into the personal schedule of migrants and refugees and d) collaboration of different institutions, ensuring minimal loss of health care information.

Table 1 Characteristics of included studies. Descending order according to study type and study period

Study period	Country code	N participants	Details and focus of the study	C1	C2	C3	Other topics	First author & Reference
Cross-sectional studies								
2012–2015	US	363	Acceptance of mental health services in relation to age, gender, and country of origin	0	1	0	–	Ballard-Kang [13]
2013–2014	US	40	Refugees' satisfaction with home health services visits	0	1	0	Home visits	Miner [14]
2008–2014	IT	151,311	Access to preventive health in national health surveys of Belgium, Italy, Malta, Portugal and Spain	0	0	0	Context	Rosano [15]
2001–2013	US	370	Analysis on initiation of antenatal care for migrant women who gave birth	1	1	1	Initiation visits	Kentoffio [16]
2008	US	810	Use of preventive medicine by Somali patients at US health facility	1	1	1	–	Morrison [17]
2005	UK	1611	Questionnaire survey of patients at an accident and emergency centre in London	1	1	0	–	Hargreaves [18]
2004	NL	580	Mental health service uptake of Turkish/Moroccan migrants and Dutch in NL	1	0	1	–	Fassaert [19]
2002	US	304	Impact of health counselling and health services on functional health outcomes of Sudanese youth arrived by Unaccompanied Refugee Minors Program	1	1	0	–	Geltman [20]
2001–2002	AU	199	East African children attending an immigrant health clinic for the first time	1	1	1	–	Cooke [21]
ns	US	70	Trauma related psychiatric symptoms in Bosnian refugees	0	0	1	–	Weine [22]
2011	CA	113	Language barriers in mental health; practitioners self-report survey in Montreal	1	1	1	–	Brisset [23]
2011	CA	41	Primary care practitioners performing modified Delphi consensus process on innovative strategies improving primary health care delivery to vulnerable populations	1	1	1	–	Pottie [24]
Qualitative studies								
2015–2016	CA	6	Interviews with health care providers about telemedicine for migrant health care delivery	1	1	1	Telemedicine	Sandre [25]
2012–2013	AU	64	Interviews/focus groups with Afghan parents who had recently had a child and health professionals on quality of care	1	1	1	Time, legal status	Yelland [26] [27]
2012–2013	AU	16	Evaluation of Australian mental health services from the perspective of young people with refugee background	1	1	1	–	Valibhoi [28]
2012	US	39	Focus groups with refugees from Iraq, Eritrea, Somalia, Bhutan on US health care	1	1	1	Context	Worabo [29]
2012	US & MX	33	Interviews on sexual health with indigenous women and nurses in migrant-sending and migrant-receiving communities	1	1	1	Gender	Espinoza [30]
2012	AU	87	Focus groups with mothers from refugee and migrant backgrounds on maternal and child health services	1	1	1	–	Riggs [31]
2010–2011	AU	115	Focus groups and key informant interviews with service providers experienced in young refugee's mental health in Melbourne	1	1	1	–	Colucci [32]``
2010–2011	CA	15	Interviews with young mental health patients, caregivers and clinicians on quality of care	1	1	1	Collaboration	Nadeau [33]
2009–2010	UK	16	Interviews with NGO workers at HIV clinic on access to health services	0	1	0	–	Whyte [34]
2010	US & MX	15	Interviews with female patients and key informants in Mexico and California on access to and quality of sexual and reproductive health services	1	1	1	Context, gender	Deeb-Sossa [35]
2008–2009	UK	40	Interviews with adolescent refugees investigating school as convenient location for mental health services	0	1	1	Stigma, Collaboration	Fazel [36]
2005–2008	CA	47	Focus groups with Immigrants, refugees, non-status patients living with HIV/AIDS	1	1	1	Social events	Chen [37]
2005–2006	AU	34	Chinese mental health patients and providers on	1	0	1	–	Blignault [38]

Table 1 Characteristics of included studies. Descending order according to study type and study period *(Continued)*

Study period	Country code	N participants	Details and focus of the study	C1	C2	C3	Other topics	First author & Reference
			barriers to mental health care					
2004–2006	AU	38	Focus groups and interviews with informants, providing health services to Afghans	1	0	1	–	Omeri [39]
ns	US	28	Interviews with Slavic emigres and key informants on chronic health conditions	1	1	1	Context	Van Son [40]
ns	UK	6	Interviews with Kurdish interpreters in UK	1	0	0	–	Green [41]
ns	US	20	Interviews with migrant farmworkers on health beliefs regarding their children	1	1	1	Context	Newton [42]
Good practice reports								
2017	AU	na	Characteristics to be collected in medical records to improve health care for migrants	1	0	0	Data collection	Yelland [43]
1987–2016	AU	na	Individualized mental health clinic	1	1	1	Holistic approach	Kaplan [44]
2010	AU	na	Narrative medicine in refugee mental health	1	1	1	–	Benson [45]
Expert opinions								
2016	CA	na	Description of migrant health care delivery in Canada	1	1	1	Context	Rahman [46]
2009	IT	na	Expert analysis of reason for results of Swedish cohort study on psychotropic substance use	0	1	1	–	Nose [47]
2002	AU	na	Problems refugees face in accessing effective health care; ways in which health services can respond	1	1	1	–	Lamb [48]
TOTAL				**29**	**28**	**28**		

AIDS: acquired immune deficiency syndrome; C1: Communication; C2: Continuity of Care; C3: Confidence; HIV: Human immunodeficiency virus; na; not applicable; N: number
NGO: Non-governmental organisation

Knowledge on the health care system of the host country was considered integral to become health literate and to make the continuity of care possible. In case such information was not provided, patients were more likely to present to an emergency department [18, 29]. Several concepts such as general practitioners and preventive health may be new to migrants and refugees and required careful explanation [29]. Unfamiliar with the concept of prevention visits and systematic screening of diseases, patients saw no reason to attend an appointment "when there [was] no health problem" [29].

An important factor limiting the continuity of care was access to health care services. For example being located in remote facilities may complicate the journey to medical appointments [25]. Generally, refugees and migrants may have no access to private transportation soon after arrival and depend on public transport use, which they found challenging [31]. After arrival, the process of adjusting to a new culture is complex and stressful and may stand in the way of attending health care appointments [49]. Integration of health care visits into other appointments related to the asylum process or education enhanced the continuity of care. For example, in a study from the UK young adults preferred having their mental health service at school so they could easily integrate treatment into their class schedule [36].

Coordination between different health care providers was reported as a further way to enhance attendance to medical appointments and reduce health information loss [32, 33, 37]. A clear guidance on why, where and when to continue treatment was essential for the continuity of care [37]. Community members, knowledgeable in the health care system of the host country were described as important resources to bridge between refugees and migrants and public services [32]. Ensuring regular attendance of follow-up appointments may require holistic strategies including home visits [14, 31], arranging transportation or using reminder phone calls for appointments [44]. Models allowing flexibility in the scheduling of consultations were particularly welcomed by adolescent patients living in Canada, allowing them to adapt the timing of their medical appointments spontaneously [33].

Confidence

Confidence was the third most common topic mentioned. It consisted of two main parts: the development of trust in someone or something and the ability to control a situation [50–52]. Health care providers and patients agreed that finding a common ground was required to establish a trustful relationship and this was a bilateral process requiring mutual education [45]. In a study including migrant farm workers in the US, a

Table 2 Quality assessment tool for cross sectional studies: Newcastle-Ottawa Scale (adapted from Modesti PA et al. [21])

First author & reference	Selection				Comparability	Outcome		Score
	Representativeness of the sample	Sample size justified	Non-respondents	Ascertainment of exposure (max**)	Confounding controlled (max**)	Outcome assessment (max**)	Statistics	Total
Ballard-Kang [13]	*	*	*	–	*	**	*	7/10
Miner [14]	*	*	na	**	na	**	*	7/10
Rosano [15]	*	*	–	**	**	**	*	9/10
Kentoffio [16]	*	*	na	**	**	**	*	9/10
Morrison [17]	*	*	na	**	**	**	*	9/10
Hargreaves [18]	*	*	*	*	**	*	*	8/10
Fassaert [19]	*	*	*	**	**	*	*	9/10
Geltman [20]	*	*	*	**	**	*	*	9/10
Cooke [21]	*	–	–	**	na	*	–	4/10
Weine [22]	–	*	–	**	**	*	*	7/10
Brisset [23]	*	*	–	**	–	*	*	6/10
Pottie [24]	*	*	*	**	na	*	*	7/10

respectful health care provider was described as a person greeting by name, listening, engaging in conversation, and allowing family members to stay with the patient during procedures [42]. Respect shown by health care providers was essential for migrants and refugees with traumatic experiences [28, 45]. If the patient had been tortured by health care providers or if they were part of the persecuting regime, a lack of trust in institutions and professionals, including hospitals and people in any kind of uniform resulted [28, 45, 48]. One study described that respectful treatment was the most important criteria for migrants and refugees when choosing a health care provider for their children [42]. In case no trustful relationship was established, patients used traditional medicine and trusted "their own resources" from their community for health related questions [40].

For migrants and refugees health literacy education and training about the country's health care system was key [45]. Information about the new health care also lead to familiarity and ultimately trust in the system. Studies pointed out that trust in the new system and concepts was needed to integrate them into own

Table 3 Quality assessment tool for qualitative studies according to CASP [11]

First author & reference	Clear aim	Method appropriate	Study design	Recruitment	Data collection	Relationship researcher- participants	Ethics	Rigorous analysis	Findings	Valuable results	Score
Sandre [25]	*	*	–	*	*	–	*	*	*	*	8/10
Yelland [26] [27]	*	*	*	*	*	–	*	*	*	*	9/10
Valibhoi [28]	*	*	*	*	*	–	*	–	*	*	8/10
Worabo [29]	*	*	*	–	*	–	*	*	*	*	8/10
Espinoza [30]	*	*	*	*	*	–	*	–	*	*	8/10
Riggs [31]	*	*	*	*	*	–	*	*	*	*	9/10
Colucci [32]	*	*	*	*	*	–	*	–	*	*	8/10
Nadeau [33]	*	*	*	*	*	–	*	*	*	*	9/10
Whyte [34]	*	*	–	–	–	–	–	–	*	*	4/10
Deeb-Sossa [35]	*	*	*	*	*	–	*	*	*	*	9/10
Fazel [36]	*	*	*	*	*	–	*	*	*	*	9/10
Chen [37]	*	*	*	*	*	–	*	*	*	*	9/10
Blignault [38]	*	*	*	*	*	–	*	*	*	*	9/10
Omeri [39]	*	*	*	*	*	*	*	*	*	*	10/10
Van Son [40]	*	*	*	*	*	*	*	*	*	*	10/10
Green [41]	*	*	*	*	–	–	*	*	*	*	8/10
Newton [42]	*	*	*	*	*	*	*	–	*	*	9/10

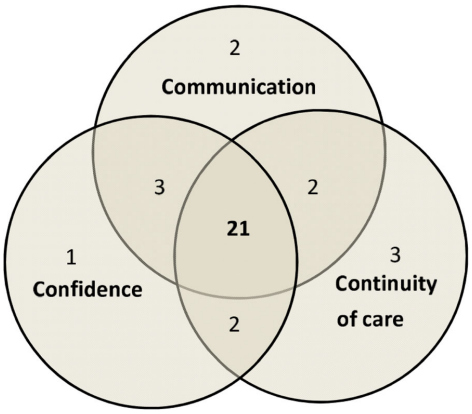


Fig. 2 Venn-Diagram depicting the main categories discussed in the included studies. Of note only 34 studies are depicted as one study included did not mention any of the three main categories

concepts. The inclusion of family members and friends in health care decisions was further increasing a trustful relationship and confidence [13, 22].

For health care providers education on the background of refugees and migrants and development of intercultural skills has been described as enhancing confidence in patients [22]. Intercultural trainings help to acknowledge the culturally different roles of religion and spirituality and to understand the potentially different importance of family structure, relations and gender roles [46].

A trustful relationship was also required before patients disclosed delicate health needs. In one study, a nurse reported that it took her one year to develop a trusting relationship before the mother disclosed domestic violence [31]. In another study a participant stated that the real treatment was not medical but friendship: "The healing power of love, humor and kindness should not be ignored. It is rare for these elements to be added to our evidence base, but for people who have suffered dreadfully at the hands of our fellow human beings these may be rare commodities" [45]. Previous experiences influenced perception of health service delivery in the host country. Positively associated similarities between health care delivery in home and host countries improved access to care and satisfaction [29, 30].

Besides the development of trust into someone or something, the feeling of being in control was important for confidence. To be able to control health care decisions, understanding facts and applying own health beliefs and priorities for decision making is required. The ability to feel self-sufficient and being ahead of decisions was described as particularly important in migrant mental health [45]. Language barriers or interpreter requirement impeded the feeling of control over health care decisions [40]. In a study on maternal and child health conducted in Melbourne, a Sudanese mother needed three days to make an appointment by phone due to a lack of confidence in her ability to manage health care visits by phone, despite basic knowledge of the local language [31]. In some cultures, the ability to have control over health care is gender-dependent. In two studies on Mexican migrants living in the United States, male family members decided on women's sexual and reproductive health. These gender structures affected women's ability to choose and therefore control their sexual health, despite official laws of the host country stating otherwise [30, 35]. Confidentiality by the health care providers and interpreters regarding personal information was also considered important for confidence [30, 32]. Simple behavioral patterns of health workers may help refugees and migrants to gain control

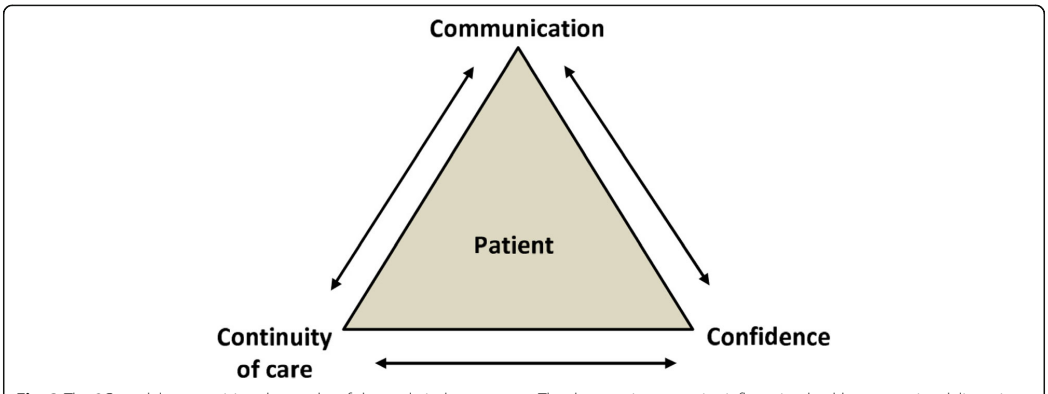


Fig. 3 The 3C model summarizing the results of the analytical assessment. The three main categories influencing health care service delivery in refugees and migrants and are depicted, including their interrelation and the importance of a patient-centered perspective

and feel confident. For migrant farmworkers in the US, it was considered helpful if health care providers avoided frequent questions about the legal status [42].

Other studies emphasized collaborative decision making [32, 33]. On a structural level, confidence was improved if migrants and refugees were empowered to take control for example in planning and deciding about the right location of health services for their communities [39].

Context challenges

Further to the three main topics, all studies mentioned that health care delivery was embedded in the regional context. Consequently communication, continuity of care and confidence were influenced by the specific context of the host countries. Main factors determining the context were legal, financial, geographical and cultural aspects specific to the host countries, as illustrated in the extension of the 3C model (Figure 4) [53].

First, legal aspects have a considerable influence in many settings as shown by migrants and refugees views' that citizenship is a prerequisite to access health care [34, 37, 40]. Reciprocally, concerns about legal status affected their health and wellbeing [28, 36, 39]. Second, cost and limited finances deterred migrants and refugees from utilizing health care services [37]. However in one study investigating the effect of near-universal health coverage for refugees and migrants, they still showed an increased risk for delayed prenatal care [16]. This underlines the importance of other factors, like concerns about housing or family separation that kept refugees and migrants from seeking health care [32, 47]. Third, geographical aspects are also important as migrants and refugees living in rural areas were challenged to access health facilities far away from their housing [48].

Finally, the cultural aspect including intolerance of the host communities towards migrants in general or religious beliefs posed important barriers, as shown in a study including Afghan refugees in Australia [39].

Discussion

Communication, continuity of care and confidence were identified as the three main factors influencing migrant and refugee health care delivery in high income countries. The three categories are closely interrelated, and reciprocal influence was frequently described (Fig. 3). Communication has been recognized as the key starting point allowing to build-up confidence between the health care provider and the patient. This further enhanced continuity of care. Importantly, studies pointed to the fact that the use of interpreters may be viewed differently by health care workers and patients. Health care workers preferred standardized settings including professional interpreters as these are perceived to convey information in the best way, whereas refugee and migrant patients however felt that family members and friends are convenient interpreters as they are trusted persons. These examples show the complexity of and delicate balance in the challenges in migrant and refugee health care delivery within the 3C model. Flexibility is therefore required for systems and health care workers to permit more than standard solutions in order to allow patient-centered care.

Comparision of views of health workers and patients

It is important that health care workers are aware of discrepancies in their perceptions and those of the refugee and migrant patients. Studies have shown that the health workers´ critical self-reflection is a prerequisite for good quality care and particularly important when providers and patients are from different sociocultural backgrounds [54]. Critical self-reflection enables health care workers to discover dissimilar concepts, for example in the migrants´ and refugees´ views of preventive care. Interestingly, our systematic review showed that in many instances the views of health care workers and refugee and migrant patients were however similar in many key aspects including the importance of confidence and mutual learning.

The specific context of the host country largely determines the conditions, in which communication, continuity of care and confidence can be provided. A recently published qualitative literature review focuses on the views of primary health care professionals on health care delivery to asylum-seekers and refugees. The results highlight the importance of the health system level and the level of asylum and resettlement for the provision of care [55]. Legal factors defined by international, regional and national policies have a major impact on access to health care. For example, non-EU migrants experienced the largest gap in access to preventative health care compared to the resident population or the EU migrants [15]. As contributing factors, the lack of targeted health policies focusing on the most vulnerable was identified. Furthermore, in countries where the legal status directly defines the extent by which health services are accessible, negative health implications for refugees and migrants are the consequence [56]. Absence of continuous financial coverage for health expenditures on refugees and migrants also directly limited the continuity of care provided [57]. Cooperation and coordination between different stakeholders was considered important by a systematic review assessing different health care models for refugees [58]. A recent study described the lack of standardization in health assessments, data collection and health information regarding potential infectious diseases

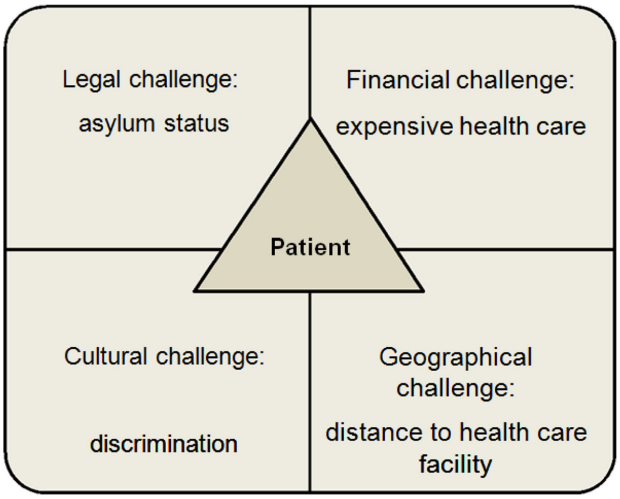


Fig. 4 Extension of the 3C model, summarizing the main context challenges

of migrants and refugees in Europe. This lowered the health system performance and the preparedness for epidemics [59].

A limitation with this study is that it deals with a heterogeneous group of migrants and refugees, similar to the one described in detail by the UCL-Lancet Commission on Migration and Health [60]. We were able to exclude studies on "skilled migrants" as this is a well-defined group with clearly different predispositions and different access to health care. We were unable to analyze results separately for different specific situations or groups of migrants, potentially neglecting significant discrepancies between groups and local conditions. However, this heterogeneity mirrors the reality in which health care delivery to migrants and refugees takes place and increases the likelihood that the 3C model is relevant for the diversity of patient's backgrounds and settings. Another limitation is that the studies included only refugees and migrants who attended official health care services. Those not presenting to any health care services or to unofficial services are not represented. In addition, this review included only studies published until December 2017. Therefore, the data and the model will need to be reevaluated in the light of evidence published after this date. We also acknowledge that delivery of health care to refugees and migrants is complex, involving a myriad of different aspects and stakeholders. The reduction to a model including only three categories may result in an oversimplification. It is important to recognize that each category itself contains a large range of aspects, for which we are unable to include an in-depth discussion of each. In addition, some aspects may be discussed under one category but equally influence others. The condensation of the current evidence to the three categories was done with methodological rigor and based on current best research methodology including the mixed methods research synthesis framework.

Conclusion

The 3C model summarizes the major challenges in migrant health care delivery, namely communication, continuity of care and confidence. We also found how important the context is and identified four key factors namely legal, financial, geographical and cultural challenges. The model gives a comprehensive, patient-centered summary of important areas relevant to support clinicians in their day-to-day practice, in training of health care providers and to guide priority setting in migrant health policies. Coordination and cooperation of stakeholders, relevant to migrant health care delivery is needed to ensure efficient action and to maximize the impact of available human and financial resources.

Additional file

Additional file 1: Figure S1. Mixed methods research synthesis used for this review (adapted from Heyvaert M et al. [9]) (DOCX 20 kb)

Abbreviations

AIDS: Acquired immune deficiency syndrome; AU: Australia; CA: Canada; HIV: Human Immunodeficiency Virus; IT: Italy; MMRS: Mixed methods research synthesis framework; MX: Mexico; NGO: Non-governmental Organisation; NL: Netherlands; PRISMA: Preferred reporting items for systematic reviews and meta-analyses; UK: United Kingdom; US: United States of America; WHO: World Health Organisation

Acknowledgements
Not applicable.

Authors' contributions
JB and NR conceived the review, coordinated the contributors and revised drafts of the manuscript. JB selected the studies, designed and performed the analysis, interpreted the findings, wrote the first draft, revised further drafts and prepared the manuscript. TT and NR contributed to the design of the analysis, the study selection, data extraction and data analysis. TT, KS and BP revised drafts of the manuscript. All authors approved the final manuscript. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Authors' information
All listed authors have approved the manuscript before submission, including the names and order of authors. All authors received the submission.

Funding
There was no funding source for this particular study. JB is a Research Fellow, working in Migrant Health Research, receiving funding from the Botnar Foundation.

Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
We declare no competing interests. The authors alone are responsible for the views summarized in this article and they do not necessarily represent perspectives of the institutions with which they are affiliated.

Author details
[1]University Children's Hospital Basel, Migrant Health Service, University of Basel, Spitalstr.33, Basel, Postbox CH 4031, Switzerland. [2]Swiss Tropical and Public Health Institute, P.O. Box, CH-4002, Basel, Switzerland. [3]University of Basel, P.O. Box, CH-4003,, Basel, Switzerland. [4]Paediatric Emergency Department, Inselspital, University of Bern, Bern, Switzerland. [5]Centre for International Health, University of Bergen, Bergen, Norway. [6]Department of Social Sciences, Subject Area Cultural Anthropology, University of Basel, Basel, Switzerland. [7]University Children's Hospital Basel, Pediatric Infectious Disease and Vaccinology, University of Basel, Basel, Switzerland. [8]Royal Children's Hospital Melbourne, Department of Pediatrics, University of Melbourne, Parkville, Australia.

Received: 11 December 2018 Accepted: 27 May 2019
Published online: 14 June 2019

References

1. United Nations DoEaSA, Population Division: International Migration Report 2017. 2017, ST/ESA/SER.A/403.
2. UNHCR: global trends - forced displacement in 2017. In: UNHCR. 2017: 72.
3. The Lancet Public Health. No public health without migrant health. Lancet Public Health. 2018;3(6):e259.
4. WHO: Transforming our world: the 2030 agenda for sustainable development. In: World Health Assembly 2015; *Geneva* United Nations; 2015.
5. WHO. Promoting migrant health – striving for peace and decent life for all. In: Promoting migrant health – striving for peace and decent life for all. Geneva: WHO. p. 2017.
6. Promotion; WCCfHaH: project summary migrant-friendly hospital projects in. Vienna, Austria: Ludwig Boltzmann Institute for the Sociology of Health and Medicine; 2005.
7. project; Mfh: The Amsterdam declaration towards migrant-friendly hospitals in an ethno-culturally diverse Europe. In: Hospitals in a culturally diverse Europe" International conference on quality-assured health care and health promotion for migrants and ethnic minorities. Amsterdam: European Commission; 2004. http://ec.europa.eu/health/ph_projects/2002/promotion/fp_promotion_2002_annex7_14_en.pdf.
8. Grant MJ, Booth A. A typology of reviews: an analysis of 14 review types and associated methodologies. Health Inf Libr J. 2009;26(2):91–108.
9. Moher D, Liberati A, Tetzlaff J, Altman DG. The PG: preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med. 2009;6(7):e1000097.
10. Heyvaert M, Maes B, Onghena P. Mixed methods research synthesis: definition, framework, and potential. Qual Quant. 2013;47(2):659–76.
11. Green; JPHaS: Cochrane handbook for systematic reviews of interventions, vol. 5.1.0: the Cochrane collaboration; 2011.
12. Critical appraisal check list for qualitative research [https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist-2018.pdf].
13. Ballard-Kang JL, Lawson TR, Evans J. Reaching out for help: an analysis of the differences between refugees who accept and those who decline community mental Health services. J Immigr Minor Health. 2017.
14. Miner SM, Liebel D, Wilde MH, Carroll JK, Zicari E, Chalupa S. Meeting the needs of older adult refugee populations with home Health services. J Transcult Nurs. 2017;28(2):128–36.
15. Rosano A, Dauvrin M, Buttigieg SC, Ronda E, Tafforeau J, Dias S. Migrant's access to preventive health services in five EU countries. BMC Health Serv Res. 2017;17.
16. Kentoffio K, Berkowitz SA, Atlas SJ, Oo SA, Percac-Lima S. Use of maternal health services: comparing refugee, immigrant and US-born populations. Matern Child Health J. 2016;20(12):2494–501.
17. Morrison TB, Wieland ML, Cha SS, Rahman AS, Chaudhry R. Disparities in preventive health services among Somali immigrants and refugees. J Immigr Minor Health. 2012;14(6):968–74.
18. Hargreaves S, Friedland JS, Gothard P, Saxena S, Millington H, Eliahoo J, Le Feuvre P, Holmes A. Impact on and use of health services by international migrants: questionnaire survey of inner city London a&E attenders. BMC Health Serv Res. 2006;6:153.
19. Fassaert T, de Wit MAS, Verhoeff AP, Tuinebreijer WC, Gorissen WHM, Beekman ATF, Dekker J. Uptake of health services for common mental disorders by first-generation Turkish and Moroccan migrants in the Netherlands. BMC Public Health. 2009;9.
20. Geltman PL, Grant-Knight W, Ellis H, Landgraf JM. The "lost boys" of Sudan: use of Health services and functional Health outcomes of unaccompanied refugee minors resettled in the US. J Immigr Minor Health. 2008;10(5):389–96.
21. Cooke R, Murray S, Carapetis J, Rice J, Mulholland N, Skull S. Demographics and utilisation of health services by paediatric refugees from East Africa: implications for service planning and provision. Australian health review : a publication of the Australian Hospital Association. 2004;27(2):40–5.
22. Weine SM, Razzano L, Brkic N, Ramic A, Miller K, Smajkic A, Bijedic Z, Boskailo E, Mermelstein R, Pavkovic I. Profiling the trauma related symptoms of Bosnian refugees who have not sought mental health services. J Nerv Ment Dis. 2000;188(7):416–21.
23. Brisset C, Leanza Y, Rosenberg E, Vissandjee B, Kirmayer LJ, Muckle G, Xenocostas S, Laforce H. Language barriers in mental Health care: a survey of primary care practitioners. J Immigr Minor Health. 2014;16(6):1238–46.
24. Pottie K, Batista R, Mayhew M, Mota L, Grant K. Improving delivery of primary care for vulnerable migrants Delphi consensus to prioritize innovative practice strategies. Can Fam Physician. 2014;60(1):E32–40.
25. Sandre AR, Newbold KB. Telemedicine: bridging the gap between refugee Health and Health services accessibility in Hamilton, Ontario. Refuge. 2016;32(3):108–18.
26. Yelland J, Riggs E, Szwarc J, Casey S, Duell-Piening P, Chesters D, Wahidi S, Fouladi F, Brown S. Compromised communication: a qualitative study exploring afghan families and health professionals' experience of interpreting support in Australian maternity care. BMJ quality & safety. 2016;25(4):e1.
27. Yelland J, Riggs E, Wahidi S, Fouladi F, Casey S, Szwarc J, Duell-Piening P, Chesters D, Brown S. How do Australian maternity and early childhood health services identify and respond to the settlement experience and social context of refugee background families? BMC pregnancy and childbirth. 2014;14.
28. Valibhoy MC, Kaplan I, Szwarc J: "It comes down to just how human someone can be": a qualitative study with young people from refugee backgrounds about their experiences of Australian mental health services. Transcultural Psychiatry 2017, 54(1):23–45.
29. Worabo HJ, Hsueh KH, Yakimo R, Worabo E, Burgess PA, Farberman SM. Understanding Refugees' perceptions of Health Care in the United States. JNP-Journal for Nurse Practitioners. 2016;12(7):487–94.

30. Espinoza R, Martinez I, Levin M, Rodriguez A, Chan T, Goldenberg S, Zuniga ML. Cultural perceptions and negotiations surrounding sexual and reproductive Health among migrant and non-migrant indigenous Mexican women from Yucatan, Mexico. J Immigr Minor Health. 2014;16(3):356–64.
31. Riggs E, Davis E, Gibbs L, Block K, Szwarc J, Casey S, Duell-Piening P, Waters E. Accessing maternal and child health services in Melbourne, Australia: reflections from refugee families and service providers. BMC Health Serv Res. 2012;12.
32. Colucci E, Minas H, Szwarc J, Guerra C, Paxton G. In or out? Barriers and facilitators to refugee-background young people accessing mental health services. Transcultural Psychiatry. 2015;52(6):766–90.
33. Nadeau L, Jaimes A, Johnson-Lafleur J, Rousseau C. Perspectives of migrant youth, parents and clinicians on community-based mental Health services: negotiating safe pathways. J Child Fam Stud. 2017;26(7):1936–48.
34. Whyte J, Whyte MD, Hires K. A study of HIV positive undocumented African migrants' access to health services in the UK. Aids Care-Psychological and Socio-Medical Aspects of Aids/Hiv. 2015;27(6):703–5.
35. Deeb-Sossa N, Diaz Olavarrieta C, Juarez-Ramirez C, Garcia SG, Villalobos A. Experiences of undocumented Mexican migrant women when accessing sexual and reproductive health services in California, USA: a case study. Cadernos De Saude Publica. 2013;29(5):981–91.
36. Fazel M, Garcia J, Stein A. The right location? Experiences of refugee adolescents seen by school-based mental health services. Clinical Child Psychology and Psychiatry. 2016;21(3):368–80.
37. Chen YYB, Li AT-W, Fung KP-L, Wong JP-H. Improving access to mental Health Services for Racialized Immigrants, refugees, and non-status people living with HIV/AIDS. J Health Care Poor Underserved. 2015; 26(2):505–18.
38. Blignault I, Ponzio V, Rong Y, Eisenbruch M. A qualitative study of barriers to mental health services utilisation among migrants from mainland China in south-East Sydney. Int J Soc Psychiatry. 2008;54(2):180–90.
39. Omeri A, Lennings C, Raymond L. Beyond asylum: implications for nursing and health care delivery for afghan refugees in Australia. J Transcult Nurs. 2006;17(1):30–9.
40. Van Son CR, Gileff TY. Relying on what they know: older Slavic emigres managing chronic Health conditions. Qual Health Res. 2013;23(12):1660–71.
41. Green H, Sperlinger D, Carswell K. Too close to home? Experiences of Kurdish refugee interpreters working in UK mental health services. J Ment Health. 2012;21(3):227–35.
42. Newton AM. The Health beliefs of migrant farmworker parents: an ethnographic exploration. J Immigr Minor Health. 2016;18(3):582–8.
43. Yelland J, Riggs E, Szwarc J, Vanpraag D, Dawson W, Brown S: Improving the ascertainment of refugee-background people in health datasets and health services. *Australian health review : a publication of the Australian Hospital Association* 2017.
44. Kaplan I, Stow HD, Szwarc J. Responding to the challenges of providing mental Health services to refugees: an Australian case report. J Health Care Poor Underserved. 2016;27(3):1159–70.
45. Benson J, Haris TA, Saaid B. The meaning and the story: reflecting on a refugee's experiences of mental health services in Australia. Ment Health Fam Med. 2010;7(1):3–8.
46. Rahman AA. Rising up to the challenge: strategies to improve Health care delivery for resettled Syrian refugees in Canada. Univ Tor Med J. 2016;94(1):42–4.
47. Nose M, Turrini G, Barbui C. Access to mental health services and psychotropic drug use in refugees and asylum seekers hosted in high-income countries. Epidemiology and Psychiatric Sciences. 2015;24(5):379–81.
48. Lamb CF, Smith M. Problems refugees face when accessing health services. New South Wales public health bulletin. 2002;13(7):161–3.
49. Davenport LA. Living with the choice: a grounded theory of Iraqi refugee resettlement to the US. Issues in Mental Health Nursing. 2017;38(4):352–60.
50. Piotr C: Trust, Complexity and Control: Confidence in a Convergent World. Chichester, West Sussex, England: Wiley; 2007.
51. dictionary; O: confidence. In. Edited by dictionary O; 2017.
52. Das TK, Teng B-S. Between trust and control: developing confidence in partner cooperation in alliances. Acad Manag Rev. 1998;23(3):491–512.
53. Rosano A, Buttigieg S, Dauvrin M, Dias S, Ronda E, Tafforeau J. Access to preventive health services of migrants in five EU countries. Eur J Pub Health. 2016;26.
54. Casillas A, Paroz S, Green AR, Wolff H, Weber O, Faucherre F, Ninane F, Bodenmann P. Cultural competency of health-care providers in a Swiss University hospital: self-assessed cross-cultural skillfulness in a cross-sectional study. BMC medical education. 2014;14:19.
55. Robertshaw L, Dhesi S, Jones LL. Challenges and facilitators for health professionals providing primary healthcare for refugees and asylum seekers in high-income countries: a systematic review and thematic synthesis of qualitative research. BMJ Open. 2017;7(8):e015981.
56. Razum O, Wenner J, Bozorgmehr K. When chance decides about access to Health care: the case of refugees in Germany. Gesundheitswesen. 2016; 78(11):711–4.
57. Rink N, Muttalib F, Morantz G, Chase L, Cleveland J, Rousseau C, Li P. The gap between coverage and care-what can Canadian paediatricians do about access to health services for refugee claimant children? Paediatr Child Health. 2017;22(8):430–7.
58. Joshi C, Russell G, Cheng IH, Kay M, Pottie K, Alston M, Smith M, Chan B, Vasi S, Lo W, et al. A narrative synthesis of the impact of primary health care delivery models for refugees in resettlement countries on access, quality and coordination. Int J Equity Health. 2013;12.
59. Bozorgmehr K, Samuilova M, Petrova-Benedict R, Girardi E, Piselli P, Kentikelenis A. Infectious disease health services for refugees and asylum seekers during a time of crisis: a scoping study of six European Union countries. Health Policy. 2018.
60. Abubakar I, Aldridge RW, Devakumar D, Orcutt M, Burns R, Barreto ML, Dhavan P, Fouad FM, Groce N, Guo Y, et al. The UCL-Lancet Commission on migration and Health: the health of a world on the move. Lancet (London, England). 2018;392(10164):2606–54.

Publisher's Note

Annex II

BMJ Open

Perspective of asylum-seeking caregivers on the quality of care provided by a Swiss paediatric hospital: a qualitative study

Julia Brandenberger,[1,2] Katrin Sontag,[3] Cédric Duchêne-Lacroix,[4] Fabienne Nicole Jaeger,[5] Bernadette Peterhans,[5] Nicole Ritz[1]

To cite: Brandenberger J, Sontag K, Duchêne-Lacroix C, *et al*. Perspective of asylum-seeking caregivers on the quality of care provided by a Swiss paediatric hospital: a qualitative study. *BMJ Open* 2019;**9**:e029385. doi:10.1136/bmjopen-2019-029385

► Prepublication history and additional material for this paper are available online. To view please visit the journal (http://dx.doi.org/10.1136/bmjopen-2019-029385).

Received 29 January 2019
Revised 01 July 2019
Accepted 05 July 2019

[1]Migrant Health Services, Universitats-Kinderspital beider Basel (UKBB), Basel, Switzerland
[2]Department of Pediatric Emergency Medicine, Inselspital Universitatsspital Bern, Bern, Switzerland
[3]Department of Social Sciences, Subject Area Cultural Anthropology, University of Basel, Basel, Switzerland
[4]Department of Social Sciences, University of Basel, Basel, Switzerland
[5]Professional Postgraduate Training Unit, Swiss Tropical and Public Health Institute, Basel, Switzerland

Correspondence to
Dr Nicole Ritz;
nicole.ritz@unibas.ch

ABSTRACT

Objectives This study investigated the perspective of asylum-seeking caregivers on the quality of healthcare delivered to their children in a qualitative in-depth interview study. The health of asylum-seeking children is of key interest for healthcare providers, yet knowledge of the perspective of asylum-seeking caregivers when accessing healthcare is limited.

Setting The study took place in a paediatric tertiary care hospital in Basel, Switzerland.

Participants Interviews were done with 13 asylum-seeking caregivers who had presented with their children at the paediatric tertiary care hospital. Nine female and four male caregivers from Tibet, Eritrea, Afghanistan, Syria, Iraq, Albania and Macedonia were included. A diverse sample was chosen regarding cultural and social background, years of residence in Switzerland and reasons for seeking care. A previously developed and pilot-tested interview guide was used for semistructured in-depth interviews between 36 and 92 min in duration. Data analysis and reporting was done according to Consolidated Criteria for Reporting Qualitative Research. The number of interviews was determined by saturation of data.

Results The interviewees described a mismatch of personal competencies and external challenges. Communication barriers and unfamiliarity with new health concepts were reported as challenges. These were aggravated by isolation and concerns about their child's health. The following factors were reported to strongly contribute to satisfaction of healthcare delivery: a respectful and trusting caregiver–provider relationship, the presence of interpreters and immediate availability of treatment.

Conclusions A mismatch of personal competencies and external challenges importantly influences the caregiver–provider relationship. To overcome this mismatch establishment of confidence was identified as a key factor. This can be achieved by availability of interpreter services, sufficient consultation time and transcultural trainings for healthcare workers. Coordination between the family, the government's asylum system and the medical system is required to facilitate this process.

Strengths and limitations of this study

- The inclusion of a cross-language concept and theoretical background.
- A thoroughly validated interview guide.
- A rigorous analysis, supported by an interdisciplinary research team.
- As in-depth qualitative study, this study comprises a relatively small sample.
- Due to the heterogeneity of the study population minor, culturally specific aspects might not have been sufficiently covered.

BACKGROUND

The recent increase of the global refugee population to 22.5 million people is the highest level ever recorded and poses challenges to healthcare systems and public health of host countries.[1] In 2017, European countries recorded 209 756 asylum claims by children.[2] Despite decreasing overall numbers of refugees arriving in Europe, national asylum services still registered over 115 000 asylum applications by children from January to September 2018.[3] In Switzerland over 45 000 asylum applications were registered in 2016 and 2017.[4] The age of asylum seekers has dramatically decreased in the last decade with 82% of asylum seekers in Europe being aged below 35 years and approximately one-third being children and adolescents below 18 years of age in 2017.[5]

Many refugees have had limited access to healthcare for years and therefore arrive in host countries with neglected health conditions.[6–8] The health of asylum-seeking children and adolescents is of key interest, as these represent an increasing refugee population in recent years and are a particularly vulnerable group.[9–11]

Access to quality healthcare for asylum seekers and refugees remains challenging and it is critical to identify underlying reasons.[12 13] This needs to be done from the perspective of healthcare providers as well as

patients and their caregivers alike as the perception of challenges and expectations on quality of care provided may vary substantially.[14 15]

Current understanding and evidence regarding challenges for the healthcare provision to asylum seekers and refugees is growing. A recent systematic review focused on qualitative studies investigating challenges and facilitators in providing healthcare to asylum seekers and refugees. It identified three main fields influencing healthcare: the asylum process, the healthcare system and the healthcare encounter.[16] An important limitation of the review is that all included studies reported on the providers' perspective.[16] A recent review by our group on challenges in healthcare delivery to asylum seekers and refugees in high-income countries included several studies assessing the asylum-seeking patients' perspective[17–28] and identified financial, legal, geographical and cultural challenges as additional external factors influencing access to healthcare.[29]

Very few studies have explored the perspectives of migrant caregivers and, to date, there have been no studies performed exclusively including asylum-seeking and refugee caregivers. Two Australian studies investigated their perspective on the quality of antenatal and early child healthcare.[24 28] One study from the USA focused on health beliefs of migrant parents, working on farms[23] and one European study investigated migrant caregivers' perception on how to maintain their children's health.[30] Therefore, studies assessing the perspective of asylum-seeking and refugee caregivers on quality of care provided to their children beyond the neonatal period and in the European context are lacking. To reduce this important knowledge gap, the aim of our study was to explore the perspective of asylum-seeking caregivers on the quality of care provided in a Swiss paediatric hospital.

METHODS

Study design and setting

The study was designed as qualitative in-depth interview study at the University Children's Hospital Basel. The hospital is located in the city of Basel, which hosts the largest reception centre for asylum seekers in the area of Northwest Switzerland, where asylum seekers are accommodated immediately after arrival for a maximum of 3 months.[31] The city of Basel also has various accommodations for accepted refugees and those in a prolonged asylum-seeking evaluation process. The hospital receives referrals for children from the asylum reception centre and the various regional accommodations and asylum centres.

Study population

Caregivers of asylum-seeking children who presented to our hospital on working days were eligible for inclusion. We aimed to include a heterogeneous group of caretakers and performed purposive sampling using the following criteria to cover different perspectives: (A) recent and distant (>2 years) arrival in Switzerland; (B) first and regular attendance to the hospital; (C) presentation at the emergency department and at outpatient clinics; and (D) origin from different regions.

Potential participants were approached by the interviewer supported by a phone interpreter. Following oral consent, a separate appointment was scheduled with a face-to-face interpreter. Study participants' preference regarding language, dialect and gender of the interpreter was followed.

Sample size

Sample size determination was based on recommendations by the National Centre for Research Methods in the UK.[32] We aimed to achieve data saturation, expecting to include12 interviews until new data would mainly repeat information that was collected in previous interviews.[33] Saturation of the study results was discussed and determined by the interdisciplinary study team.

Data collection

A semistructured interview guide (table 1 and online supplementary data 1) was designed consisting of open questions mandatorily to be covered, followed by prompts to clarify given answers and allow for exploration of emerging, not previously specified topics.[34]

The interview guide was reviewed by an external organisational psychologist with extensive experience in qualitative research. After external revision two pilot interviews were performed to test intelligibility, acceptability and extensiveness. A further revision was done based on feedback from the caregivers involved in the pilot interviews. To address the challenges in cross-language qualitative research[35–37] and minimise the language barrier, a cross-language concept was developed, describing steps of translation and quality control (figure 1). The cross-language concept was developed using the guidelines on interpreter use of the Qualitative Forum of Social Science.[38]

Baseline data were collected using a case report form (online supplementary data 2). The in-depth interviews were done according to participants' preference at their home, asylum residence or at the hospital. Interview duration was scheduled for 60 min and done once only. All interviews were audiotaped and transcribed as pure verbatim protocols[39] in either English or German with anonymisation of all patients. The transcriptions were reviewed in detail by the interpreter present during the interview according to the cross-language concept. Paraverbal reactions, interactions between family members, other observations and cultural aspects were documented in field notes and discussed by the interviewer and interpreter during debriefing.

The role of the interviewer

The interviewer (JB) is an experienced female clinician-scientist (MD) and conducted all pilot and study interviews. During the study period she was employed by

Table 1 Interview guideline—practical design (translated version)

Open mandatory question	Prompts level I (specification)	Prompts level II (additional specification)
Introduction	Interview done as conversation Present role of interviewer, confidentiality Duration of maximum 1 hour Consent for audio recording	Everything which you mention is important and correct Answers will be summarised together with those of other parents
Think about the moment before you came to the hospital – what made you come?	Who referred you to the hospital? What was the reason for presentation? What information was given to you? How was the communication? Can you comment on waiting times? Were there any uncertainties?	How was the child/your situation before you came? Has anyone done the registration for you or did you do it yourself? Is this your first time at the children's hospital? Were you referred? Did you know what you needed to do? (Information given by staff) Why did you come that day, what illness did your child have? What was helpful when you arrived and were there situations where you needed more support? How did the staff communicate with you? How did you communicate with the staff? Were there moments when you were not sure what to do?
Tell us what happened when you arrived at the hospital.	You arrived at the reception and what happened next? Did you have accompanying persons? Did you feel understood in your concerns? Did you see a doctor a nurse first? Did you think that what the staff did with your child was right? How did you feel?	You presented to the reception / registration at the hospital and then? Was someone there? Did you know how to proceed? How were waiting times? Did you get any information? Was an interpreter present for your consultation? Was this the first time you presented to the hospital? Did you need similar medical treatment before? What was helpful when presenting to the hospital? Where do you think more support is/was needed? Did the staff understand you and your concerns? What happened next? Tell me about the doctor and the care provided. Did you understand her/him? Was there an interpreter required/ organised? Did you trust the staff, that what they did with your child was right? Did you feel safe at home?

Continued

Table 1 Continued

Open mandatory question	Prompts level I (specification)	Prompts level II (additional specification)
How was the care your child received?	Was the care as intended/expected? What is different compared to your country of origin? Would you come back to this hospital for treatment?	Was the care as you thought it would be? Were there situations where you thought it should be different or faster? Did you trust the doctors / other medical staff at the hospital? How did you feel? (sad, insecure, angry) What was particularly well done? What did you tell your friends? Concrete un/helpful behaviour of health care workers? What would have been different in your country of origin? What would you like to introduce here from your country of origin? What would you like to introduce in your country of origin from here? What role does religion play in the hospital for you? Would you return to the hospital, recommend it to your compatriots? If you came back to the hospital, what would you like to be different? What should remain the same? Can you describe what characterises the perfect doctor/nurse for you?
What was your general impression?	Were any drugs given to your child? Did you receive further instructions on treatment from the doctor? Do you think that what the doctor suggested helped? If not, why? Are further appointments planned? Does your child have a paediatrician outside the hospital? Do you know where to go for health issues?	What medication did your child receive? Did you get a prescription? Did you get instructions on how to give the medication to your child? How/Where did you get the medication? Did you follow the doctor's instructions or did you do it differently? Did you have a contact person in case of uncertainty and questions after the hospital consultation? Are more doctor visits planned? Does your child have a paediatrician? If not, why not? If so, how did you find her/him?
Wrap up	Do you have further things to add? Was it easy to express your opinion? Give phone number from interviewer for inquiries arising from today's discussion.	From my point of view, we have addressed all topics. Many thanks for your valuable thoughts and discussion points. Are there any additions from your point of view? How do you feel after the conversation? Do you have more questions? How could we best ask the opinion of your compatriots? How do you ask for feedback in your country? What else can we help you with?
Context	Where were you born? How did you come to Switzerland?	If you were not born in Switzerland, where have you lived previously? Do you have previous experiences with hospitals?
Back up	Experiences in your country of origin with hospitals? What is better here, what do you miss here from your county of origin? Do you have any tips for other parents in a similar situation as yours?	What experiences did you make with hospitals in your country of origin? Did you have experiences with hospital on the way to Switzerland? What is different here? Do you have any tips for other parents before they come to the hospital?

UKBB, Universitats-Kinderspital beider Basel.

the University Children's Hospital Basel in the migrant health service research group. She is experienced in qualitative research, received trainings in interview techniques and qualitative research methods and has a special interest in global health. Not knowing JB beforehand, the interviewer's background, the purpose and goals of the

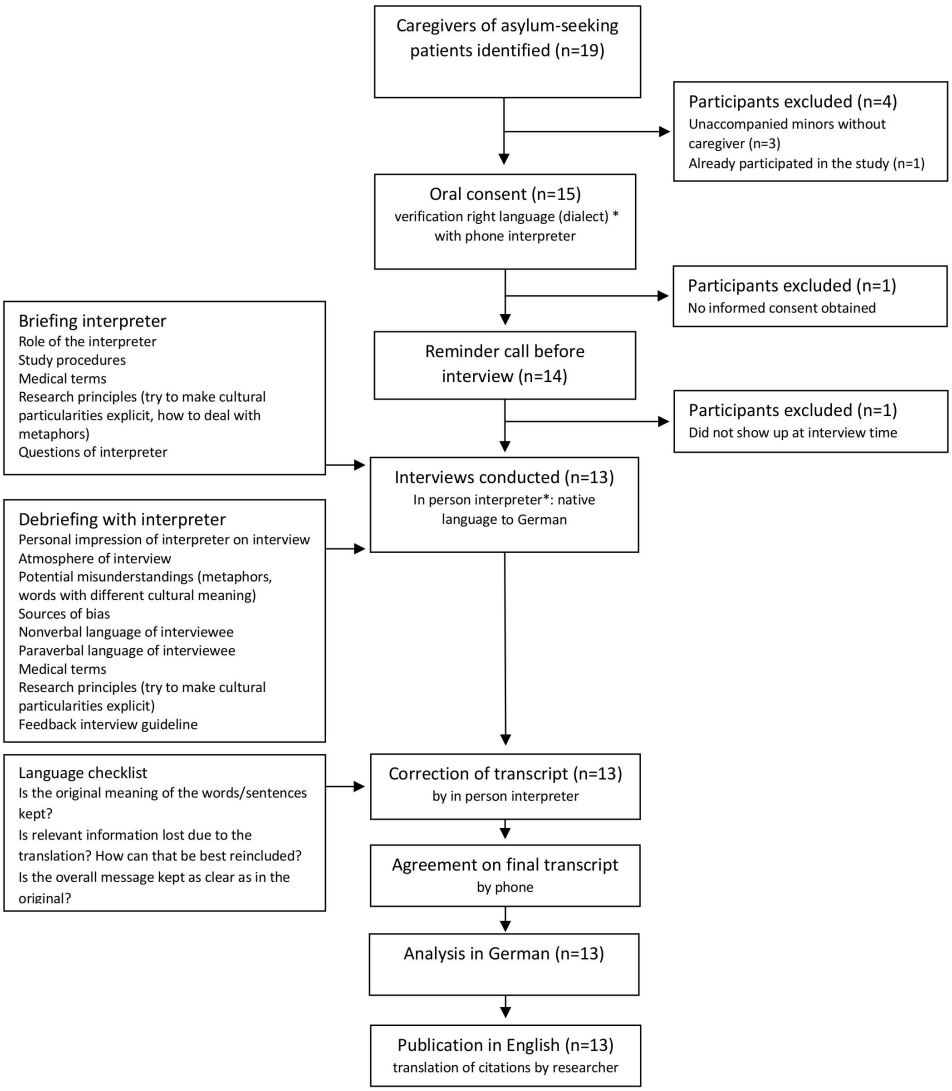


Figure 1 Flow chart depicting the different phases of the patient recruitment and the cross-language concept including transcription, translation and understanding of language.*If communication in German/English not adequate.

study were explained to the participants during the oral consent and repeated during the introduction phase of the interview.

Data analysis and reporting

Data analysis was done according to the qualitative content analysis of Mayring.[39] A codebook (online supplementary data 3) was prepared and refined in several steps, involving team discussion with JB, KS and CDL. Four interviews were coded in parallel by each researcher to ensure the comprehensiveness of the codebook. Code categories were extracted, relations identified and abstracted in networks and graphs to generate a coding tree. Reporting was guided by the Consolidated Criteria for Reporting Qualitative Research (online supplementary data 4).[40] The analysis was done using atlas.ti (ATLAS.ti 8 Scientific Software Development, Berlin). The entire study process was accompanied by the interdisciplinary Migration Research Group at the University of Basel.

Patient and public involvement

During pilot interviews caregivers' feedback was obtained to improve the interview guide and the way the interviews were done. After the pilot phase all participants were asked if the method was suitable and how they felt about expressing their opinion at the end of the interview. An

interim expert panel discussion consisting of staff from the asylum-seeking reception centre and the University Children's Hospital Basel was organised to evaluate results. In addition, one interview participant reviewed the entire paper.

Ethics

As a quality assessment project of the University Children's Hospital Basel, there was no ethical approval required for this study. This was confirmed by the Ethics Committee of Northwest/Central Switzerland on 4 October 2017. We strictly adhered to international research standards rigorously including information about entirely voluntary participation of the interviewees and the possibility to withdraw consent without any negative consequences, separation of research and clinical staff and data confidentiality.

RESULTS

A total of 13 interviews were performed and included in the analysis, conducted in Tigrinya, English, Arabic, Dari, Farsi and German (figure 1). In all interviews, the professional interpreters ensured a smooth dialogue between the participant and the interviewer and helped establish a pleasant atmosphere. The baseline characteristics of participating caregivers and the interview context are summarised in table 2. Caregivers are quoted in the text using the format: x;yy:zz. X is the interview number, yy the paragraph number and zz the line number.

Mismatch of competences and organisational challenges

Caregivers described mismatches between their personal, sociocultural and language competencies and the situation of healthcare. In addition, they faced organisational challenges, for example, orientation to new surroundings after relocations. They described that this created stressful situations leading to feelings of disorientation, dependency and anxiety. This was felt strongest early after arrival and for those who had not previously lived in a cultural context like Switzerland. It became more pronounced if there was an urgent threat such as the illness of their child.

> I was frightened. I didn't know the language, I didn't know anybody. I took care of my children and I didn't know where I was. […] I was extremely worried about [my sick child]. And I didn't know: what happens? Whom should I ask? Where should I go? I had no money with me. In fact, I didn't know where I was. (4; 2:21)

Caregivers who were unable to speak or understand a local language described communication as a challenge. The inability to sufficiently explain the medical history and complaints of their child was reported to be frustrating. Being highly dependent on interpreters, one caregiver recalled feelings of fear when the interpreter was late for the appointment.

> At my second visit I was a bit frightened as the interpreter was not there. I thought: oh my God: how can I understand now [what they say]? How can I talk to them? I was a bit nervous in this moment, this was a bit difficult. (13; 14:31)

Mismatch of health concepts

Caregivers explained that their own health concepts were shaped by their culture and previous experiences. They arrived with certain expectations about Swiss healthcare based on stories they had heard. One important topic was the use of medication. Two caregivers stated that they had wished to receive a prescription for medication.

> In Afghanistan […] doctors have limited resources. We don't have many options. But if you go to the doctor […] you get medication and you get antibiotics if you have an inflammation or something like that. Here, that's not the case. You continue to be sick, after four or five consultations it gets better, yes, but maybe it would have been better anyway. (3; 29:46)

> In Syria, when my son or my daughter was sick, I just went to the pharmacy. It's like a supermarket. And then I buy […] antibiotics too, that's completely normal. (10; 7:24)

Some health concepts such as preventive services were reported to be unfamiliar. For one caregiver the detailed examination of the child during tuberculosis screening suggested to her that the child was seriously sick. The caregiver was unable to imagine why this was required when no obvious health problem was present. She explained that the idea of going to the hospital with an apparently healthy child was completely new to her.

> I knew my children were not having tuberculosis. However, I was frightened. Because they work so thoroughly [at the hospital] and they have done examinations, and that is why I was really frightened. (7; 4:40)

For some caregivers, the way in which physicians would communicate about health was unfamiliar. One caregiver mentioned that bad news was disclosed to her by five physicians which was a shocking and unpleasant experience. In addition, the information was given faster and much more directly than she was used to. She had wished that only one person had given here the information in small steps. Other caregivers, too, wished that physicians would explain more about the disease, causes and resulting treatment.

Limited personal resources

For caregivers being part of a family was considered a resource and being separated from loved ones was a psychological challenge. In many instances mothers described arriving in Switzerland with their children but without their husbands. They were reported to have been forced to stay as soldiers or prisoners or had been killed before the family left. In case of limited financial resources, priority was given to the mother and children leaving the country. The lack of communication with them or other family members was contributing to the feeling of loneliness. This

Table 2 Baseline characteristics of participating caregivers and interview context

	1	2	3	4	5	6	7	8	9	10	11	12	13
Participant characteristics													
Country of origin	Tibet	Eritrea	Afghanistan	Eritrea	Syria	Afghanistan	Syria	Iraq	Albania	Syria	Macedonia	Syria	Syria
Age of child	1–5	1–5	<1	>10	1–5	1–5	1–5	6–10	1–5	<1	1–5	1–5	6–10
Main department visited	OPD	OPD	OPD	OPD	OPD	OPD	OPD	Emergency	Emergency	Emergency	Emergency	Emergency	OPD
Age of caregiver	40–49	30–39	20–29	30–39	20–29	10–19	20–29	30–39	30–39	30–39	30–39	30–39	40–49
Sex of caregiver	Male	Male	Female	Female	Female	Female	Female	Female	Female	Female	Male	Female	Male
Education level of caregiver*	4	3	3	3	3	3	3	4	2	3	3	4	3
Years in CH	6–10	1–5	1–5	1–5	1–5	<1	<1	1–5	6–10	<1	<1	1–5	<1
Mother tongue	Tibetan	Tigrinya	Dari	Saho	Arabic	Farsi	Arabic	Kurdish	Albanian	Arabic	Macedonian	Arabic	Arabic
Other language (level)†	English (C)	English (A)	German (A)	Arabic (C)	Kurdish (C)	–	–	German (B)	German (B)	–	German (C)	English (C)	–
Interview context													
Interpreter present	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Yes
Gender preference	n/a	No	Female	No	No	Female	No	n/a	n/a	Female	n/a	n/a	No
Interview location‡	2	2	3	3	3	1	3	3	3	1	1	3	1
Interview duration (min)	49	36	70	92	68	50	57	52	59	79	44	64	77
Number and (type) of non-participants	2 (wife, child)	0	3 (husband, children)	4 (husband, children)	2 (coach, child)	0	3 (husband, children)	1 (child)	1 (child)	0	0	2 (child, student)	1 (wife)

The results are presented in two sections, focusing on challenges and good practice reports.
*Education levels: 1=illiterate, 2=primary education, 3=secondary education, 4=university degree.
†Language levels: A=basic user, B=independent user, C=proficient user.
‡Interview location: 1=accommodation and provisioning centre, 2=hospital, 3=participants' apartment.
CH, Switzerland; n/a, not applicable; OPD, outpatient department other than emergency.

was aggravated if a child was diagnosed with serious health problems and had to be admitted to the hospital.

> I had no clue about a health insurance, no clue about the law, the law here and the rules. I just endured these days there [on the ward]. […] I felt very lonely. My husband was not here at that time. That was very difficult. (3; 29:16)

Being a single caregiver had practical implications. For example, attendance to medical appointments was challenging as childcare for healthy siblings is usually not available for asylum-seeking families. Another example was that the caregiver refused admission as she was unable to stay with her sick child.

> [The doctor] said you have to stay 7 to 10 days here with your son. That's what he told me just like this. And then I answered: I can't, I have [six] children and their father is not here. (4; 2:11)

Caregivers described how family members residing in neighbouring countries could have been of psychological and practical support. However, as their asylum process was pending, they were not allowed to cross borders. One caregiver reported crossing the border to see family members for support in a desperate situation and being caught by police.

One caregiver reported being the single parent present made it difficult to give her child the prescribed medication. When she reported this to the physician she was treated disrespectfully and asked to leave.

> That's what made me angry: we told the truth to him. We can't just lie […]. Maybe the medication doesn't taste good, doesn't smell good. I thought: […] if I tell it to him we could maybe change it. But he was angry and just left. He said: go home! So I went home. (5; 13:32)

External challenges

Caregivers also expressed difficulty accessing healthcare, particularly if the asylum process was prolonged. In stations with pending asylum decision some participants reported that a health insurance card was not issued, which caused delays, additional administrative work and made caregivers feel inferior.

One caregiver described that the official person in charge brought the sick child to the hospital in a private car, took care of the administrative tasks and stayed with the family during the consultation. Another caregiver reported that the official person in charge was reluctant to address the family's health needs.

> Three years here. My chief [official in charge] said that I'm only parked here. But I'm not a car! We are parked here, 7 years by now! With F status [provisionally admitted refugees]. Tell me, why does it have to be like that? Parked! (9; 6:98)

Caregivers also described insufficient coordination between the asylum reception centres and the hospital. Two recently arrived mothers of admitted children did not have cash money. Unfamiliar with the system that they must buy their own food and unable to communicate that they had no money, the mothers fasted during several days or were eating from their children's meals.

Some caregivers explained that after the consultation they did not know how to return to their asylum centre/home centre. One caregiver had recently moved and did not recall her new address. Others reported to have been driven home by the interpreter or a taxi. One caregiver living in a rural area was worried not to be able to get home and therefore left the emergency department before the end of the consultation.

Understanding and responding to medical needs

Twelve out of 13 caregivers expressed a deep gratitude for the healthcare their child received at the hospital. They also appreciated when help was offered in various situations by interpreters, officials in charge of the asylum process, taxi drivers, engaged citizens, receptionists, social workers, nurses or doctors.

> It is impossible to describe, I can't describe it. Doctors or social workers, everybody supported and helped me. (4; 2:86)

Caregivers appreciated the fact that an interpreter was used, and this led to trust as they felt understood in their most urgent need.

> I swear, if I can talk there, I have the feeling that I'm safe! (5; 13:58)

All but one caregiver explained that they were impressed by the medical help their child received. They mentioned that in the past, they never experienced such a high level of medical care, neither at their home nor in transit countries.

> I don't think you see this facility in any other country. It was around half past 10 at night. We thought he swallowed something. […] We got really scared. […] The doctor said: he will call the lady who is doing the X-ray, from home. Wonderful! This is service to the King! She came from her home to do X-ray to our son. This is fascinating! (1; 12:31)

When asked why they were satisfied with the quality of care, they emphasised the immediateness of medical care. They were used to long waiting hours extending up to days. Understanding and rapidly addressing the child's health needs lead to trust and the feeling of being understood and safe.

> I like the support. The quick treatment, everything included. Not like at home, really. […] I'm so thankful, that the child is in good hands. (11; 8:54)

Access to good quality healthcare was for some caregivers one important reason why they lodged an asylum application in Switzerland.

> Sometimes I get nervous, I say: I'm dead, I have to leave. […] But then I think: I have to be thankful. I have a room and my child gets an immediate check-up if he is sick. (9; 6:91)

Showing respect

Almost all caregivers greatly appreciated that they were treated in a respectful way. Respect was even more important, if they had had negative experiences with healthcare providers in the past.

> In Iran, they don't treat […] people from Afghanistan with respect. […] It is not like here. For example, at the reception: maybe they don't even give you a registration code, they don't listen to you. We are very satisfied and thankful, that we came to this country because we were always treated with respect. (6; 3:18)

Simple and routine practices were acknowledged as good practice such as the physician coming to the room of the patient and not vice versa. Caregivers recalled that the physician helped undress the patient or approached the child in an appropriate and friendly way. One caregiver appreciated that the nurse was playing with the child during the consultation. This allowed her to concentrate on the treating physician's explanations. A caregiver from Iraq appreciated that the staff directly addressed the 8-year-old daughter and therefore respected the child's opinion. A further caregiver appreciated that the staff adapted to the individual reactions of the children.

> What I liked: my children had two different behaviors. One cried and refused to cooperate. The nurse helped us. […] We helped each other. By the end both children received what they needed. (2; 11:10)

Building trust through relationship

A trustful relationship to healthcare providers was central to all caregivers when evaluating the quality of healthcare. Two caregivers of children with chronic diseases visited the hospital frequently and described a family-like relationship with the hospital staff.

> If I go [to the Children's hospital] I don't see it like a hospital. The nurses, the doctors and everything, they are like my family. (4; 2:90)

As verbal communication was frequently limited, non-verbal communication was important for building a trustful relationship. Two caregivers explicitly highlighted how they appreciated when the medical staff was smiling.

> If somebody smiles at me, a beautiful smile, that makes me really happy. Then I get a very beautiful feeling. And the doctor was nothing but happy and friendly and smiled all the time at me. (9; 14:52)

A trustful caregiver–provider relationship allowed caregivers to accept unfamiliar health concepts. For example, one caregiver was upset about not receiving a prescription for her child, but she explained how this changed after a medical consultation at the emergency department.

> I thought she would get a lot of medication, as she had fever. But no: they only gave this suppository to her. […] They said: don't be frightened, your daughter will be fine. She just needs time to recover. And that was the right way. I went back, and that was right. So that is an ideal doctor to me: Who knows exactly what happens, without giving too many drugs. (10; 7:40)

Another caregiver had the concept that she should never leave her infant alone in hospital. Her daughter was admitted with a chronic disease and the medical staff recommended that she go home to rest while her infant remained admitted.

> It was a shock. We […] don't have this in our culture that mum leaves the baby. But later, I said it's very helpful to go out, really because the nurses were […] very, very good. Then I understood that: If I'm good, she will be good. […] […] We have to know that. That the doctor works for us, not against us. (12; 9:27)

DISCUSSION

To our knowledge, this is the first study investigating the perspective of asylum-seeking and refugee caregivers on the quality of healthcare provided to their children in Europe.

The detailed analysis of the interviews displayed a range of challenges for asylum-seeking and refugee caregivers and their sick children. However, despite including a diverse group some universal challenges were noted. This included the development of a trusting relationship, communication including interpreter services and coordination between the healthcare and the asylum systems. These findings confirm results from a recent systematic review which identified communication, continuity of care and confidence as the three main factors influencing healthcare provision to migrants.[29] However, our study also highlights important additional aspects for this group of patients specifically regarding confidence and continuity of care.

First, confidence was the key factor contributing to satisfaction of the study participants. Confidence was achieved through a trustful caregiver–provider relationship. This finding is also supported by other studies, for example, investigating mental healthcare delivery to migrants.[17 26] In some instances confidence has been described as being an integral part of the treatment.[41] It is remarkable that small actions such as a smile by the treating physician, being helpful to undress and interacting in a playful way with the sick child were helpful in the process of trust building. This highlights that simple and easy measures may have important benefits for the health of asylum-seeking and refugee children and such

knowledge needs to be included in transcultural training of healthcare workers.

Second, caregivers explained that challenges regarding the continuity of care were occurring at the intersection of the medical and the asylum-seeking systems. Challenges included the asylum process itself, transport and access to money. Our study identified that for a positive perception of healthcare delivery, these areas required optimal coordination. This result is also echoed in a recent publication describing healthcare delivery models for refugees, which suggested including specialised case managers as one option to improve cooperation between services.[42] Connecting services may be facilitated by other interventions such as involvement of social workers and predefined referral pathways and specialised migrant health teams.

Third, communication is important in all healthcare encounters and has been identified as a key barrier or facilitator in this study. Numerous earlier studies have investigated the negative influence of language barriers on patient experience, health literacy and patient–provider relationship.[43] Communication was also described as essential for the adoption of new health concepts, for example, the rational use of antibiotics.[44] Although the requirement of interpreters is not debated, most healthcare systems in Europe do not have established payment policies for interpreter services. This results in frequent use of ad hoc non-professional interpreters, which is associated with considerable risk of translation errors leading to clinical consequences.[45] It is therefore important that coverage for interpreter services is included in healthcare insurance plans, which is currently advocated by a position paper published by the Swiss Hospital for Equity network (https://www.hospitals4equity.ch/).

Generally, the caregivers expressed very positive feelings about the medical care their children had received. Nearly all caregivers expressed their gratitude by giving detailed examples of individual support, fast and adequate medical care and a respectful and trustworthy approach by healthcare providers. A recently published study explored expressions of gratitude in women with migrant background whose health needs were not or only partially met and raised questions in how far this speaks to current normative expectations and attempts to restrict welfare. Gratitude might thus be expressed in order to 'avoid being identified as excessively needy, undeserving newcomers.'[46] It is important to take such logics and power relations into account, yet, in our study, none of the participants perceived a failure of the specific hospital or healthcare system. In one case, a person expressed gratitude regarding the overall care, even though she was not satisfied with one of the consultations. This could be part of the general expectations and discourse of gratitude, yet, we also interpret it as a differentiated picture of judging different parts of the same healthcare facility differently.

There is a possibility that through selection bias only satisfied caregivers had agreed to participate in this study. However, only one caregiver meeting the inclusion criteria refused to take part in the study. The approached caregivers were keen to be interviewed and appreciated the opportunity to express their opinion. In contrast, the hospital's earlier efforts to assess patient's satisfaction in asylum-seeking and refugee families using translated satisfaction questionnaires had a low response rate. This suggests that patient satisfaction inquiries using interviews instead of questionnaires are more acceptable to asylum-seeking and refugee caregivers.

A potential limitation of the study is the small number of interviews performed. However, the interviews were rich in content and included a diverse study population regarding cultural and social background, years of residence in Switzerland and reasons for seeking care. The information gathered started to repeat after 11 interviews, signalling saturation regarding the major themes. Nevertheless, we acknowledge that minor aspects might not have been sufficiently covered, or that other participants from different contexts may have differing views. The strengths of this study are the inclusion of a cross-language concept, a solid theoretic background, a thoroughly validated interview guide and the rigorous analysis, supported by an interdisciplinary research team. Therefore, we believe that our findings are relevant to health services in many host countries caring for asylum-seeking and refugee families from various backgrounds.

CONCLUSION

A mismatch of personal competencies and external challenges importantly influences the caregiver–provider relationship. To overcome this mismatch establishment of confidence was identified as a key factor. This can be achieved by availability of interpreter services, sufficient consultation time and transcultural trainings for healthcare workers. Coordination between the family, the asylum and the medical system is additionally required to facilitate this process.

Acknowledgements We thank the participating families for taking part in the study and providing feedback. We thank the team at the asylum reception centre in Basel, including Edna Baumgartner-Guggisberg, Patricia Drai and Ulrike Leutwyler and the coaches Maggie Daems and Sharon Cheva for their cooperation. We thank Doris Herter and the team of HEKS interpreters for an excellent service. We thank Verena Riedo for reviewing the interview guideline. We thank the administration of the outpatient clinic and the emergency department for their support in the recruitment. We thank Kristine Onarheim and Emma Preston for providing feedback on the manuscript.

Contributors JB and NR were involved in study conception. JB was involved in data acquisition. JB, KS, CDL and NR were involved in data analysis. JB wrote the first draft. JB, KS, CDL, FNJ, BP and NR revised the manuscript. All authors had access to the data and gave intellectual input. JB and NR affirmed that this manuscript is an honest, accurate and transparent report of the results and that no important aspects have been omitted.

Funding This work was supported by the UKBB Foundation. JB was funded by the Botnar Foundation.

Disclaimer The content is solely the responsibility of the authors and does not represent the official views of the funding bodies, which had no role in the design and conduct of the study; the collection, management, analysis and interpretation of the data; or the preparation, review or approval of the manuscript.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval As quality control project, this research project does not fall under the remit of the cantonal or federal law of the Human Research Act (HRA). The Ethikkommission Nordwest- und Zentralschweiz (EKNZ) has reviewed the submitted documents and confirms that the research project fulfils the general ethical and scientific standards for research with humans (see Art 51 Abs 2 HRA).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No additional data are available.

REFERENCES

1. UNHCR. *global trends - forced displacement in 2017*. 72. UNHCR, 2017.
2. UNICEF. Latest statistics and graphics on refugee and migrant children. secondary latest statistics and graphics on refugee and migrant children 26 December 2017, 2018. Available: https://www.unicef.org/eca/what-we-do/emergencies/latest-statistics-and-graphics-refugee-and-migrant-children
3. UNICEF. Refugee and migrant crisis in Europe. humanitarian situation report # 29. secondary refugee and migrant crisis in Europe. humanitarian situation report # 29, 2018. Available: https://www.unicef.org/eca/sites/unicef.org.eca/files/2018-10/Refugee%20and%20Migrant%20Crisis%20in%20Europe%20Situation%20Report%20No.%2029%20July%20-%20Sep%202018_0.pdf
4. Migration SSo. Asylstatistik 2017. secondary Asylstatistik 2017, 2017. Available: https://www.sem.admin.ch/dam/data/sem/publiservice/statistik/asylstatistik/2017/stat-jahr-2017-kommentar-d.pdf
5. Eurostat. Asylum statistics secondary asylum statistics, 2018. Available: https://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_statistics#Age_and_gender_of_first-time_applicants
6. Malmusi D. Immigrants' health and health inequality by type of integration policies in European countries. *Eur J Public Health* 2015;25:293–9.
7. Marquardt L, Krämer A, Fischer F, *et al*. Health status and disease burden of unaccompanied asylum-seeking adolescents in Bielefeld, Germany: cross-sectional pilot study. *Trop Med Int Health* 2016;21:210–8.
8. Ritz N, Brinkmann F, Garcia BS, *et al*. Tuberculosis in young refugees. *The Lancet* 2015;386:2475–6.
9. Pohl C, Mack I, Schmitz T, *et al*. The spectrum of care for pediatric refugees and asylum seekers at a tertiary health care facility in Switzerland in 2015. *Eur J Pediatr* 2017;176:1681–7.
10. The Lancet. Migrant and refugee children need our actions now. *The Lancet* 2016;388.
11. Baauw A, Ritz N. Towards better healthcare for migrant and refugee children in Europe. *Eur J Pediatr* 2018;177:161–2.
12. Koller TS. *Beyond the barriers*. WHO, 2017.
13. Jaeger FN, Hossain M, Kiss L, *et al*. The health of migrant children in Switzerland. *Int J Public Health* 2012;57:659–71.
14. MacFarlane A, Ryan S. Do we all agree what "good health care" looks like? Views from those who are "seldom heard" in health research, policy and service improvement. *Int J Equity Health* 2017;20:878–85.
15. Madden H, Harris J, Blickem C, *et al*. “Always paracetamol, they give them paracetamol for everything”: a qualitative study examining Eastern European migrants’ experiences of the UK health service. *BMC Health Serv Res* 2017;17:604.
16. Robertshaw L, Dhesi S, Jones LL. Challenges and facilitators for health professionals providing primary healthcare for refugees and asylum seekers in high-income countries: a systematic review and thematic synthesis of qualitative research. *BMJ Open* 2017;7:e015981.
17. Blignault I, Ponzio V, Rong Y, *et al*. A qualitative study of barriers to mental health services utilisation among migrants from mainland China in south-east Sydney. *Int J Soc Psychiatry* 2008;54:180–90.
18. Chen YYB, Li AT-W, Fung KP-L, *et al*. Improving access to mental health services for Racialized immigrants, refugees, and Non-Status people living with HIV/AIDS. *J Health Care Poor Underserved* 2015;26:505–18.
19. Deeb-Sossa N, Díaz Olavarrieta C, Juárez-Ramírez C, *et al*. [Experiences of undocumented Mexican migrant women when accessing sexual and reproductive health services in California, USA: a case study]. *Cad Saude Publica* 2013;29:981–91.
20. Espinoza R, Martínez I, Levin M, *et al*. Cultural perceptions and negotiations surrounding sexual and reproductive health among migrant and non-migrant Indigenous Mexican women from Yucatán, Mexico. *J Immigr Minor Health* 2014;16:356–64.
21. Fazel M, Garcia J, Stein A. The right location? experiences of refugee adolescents seen by school-based mental health services. *Clin Child Psychol Psychiatry* 2016;21:368–80.
22. Nadeau L, Jaimes A, Johnson-Lafleur J, *et al*. Perspectives of migrant youth, parents and clinicians on community-based mental health services: negotiating safe pathways. *J Child Fam Stud* 2017;26:1936–48.
23. Newton AM. The health beliefs of migrant Farmworker parents: an ethnographic exploration. *J Immigr Minor Health* 2016;18:582–8.
24. Riggs E, Davis E, Gibbs L, *et al*. Accessing maternal and child health services in Melbourne, Australia: reflections from refugee families and service providers. *BMC Health Serv Res* 2012;12.
25. Valibhoy MC, Kaplan I, Szwarc J. "It comes down to just how human someone can be": A qualitative study with young people from refugee backgrounds about their experiences of Australian mental health services. *Transcult Psychiatry* 2017;54:23–45.
26. Van Son CR, Gileff TY. Relying on what they know: older Slavic emigres managing chronic health conditions. *Qual Health Res* 2013;23:1660–71.
27. Worabo HJ, Hsueh K-H, Yakimo R, *et al*. Understanding Refugees’ Perceptions of Health Care in the United States. *The Journal for Nurse Practitioners* 2016;12:487–94.
28. Yelland J, Riggs E, Wahidi S, *et al*. How do Australian maternity and early childhood health services identify and respond to the settlement experience and social context of refugee background families? *BMC Pregnancy Childbirth* 2014;14.
29. Brandenberger J, Tylleskär T, Sontag K, *et al*. A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model. *BMC Public Health* 2019;19:755.
30. Condon LJ, McClean S. Maintaining pre-school children's health and wellbeing in the UK: a qualitative study of the views of migrant parents. *J Public Health* 2017;39:455–63.
31. State Secretary of Migration. Empfangs und Verfahrenszentren. secondary Empfangs und Verfahrenszentren 01.07.2017, 2017. Available: https://www.sem.admin.ch/sem/de/home/asyl/asylverfahren/empfang/uebersicht_evz.html
32. Sarah Elsie baker MurE, NCRM, University of Southampton. How many qualitative interviews is enough?. 26.03. National center for research methods, 2012. Available: http://eprints.ncrm.ac.uk/2273/
33. Saunders B, Sim J, Kingstone T, *et al*. Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant* 2018;52:1893–907.
34. Agee J. Developing qualitative research questions: a reflective process. *International Journal of Qualitative Studies in Education* 2009;22:431–47.
35. Squires A. Methodological challenges in cross-language qualitative research: a research review. *Int J Nurs Stud* 2009;46:277–87.
36. Wallin A-M, Ahlström G. Cross-Cultural interview studies using interpreters: systematic literature review. *J Adv Nurs* 2006;55:723–35.
37. Al-Amer R, Ramjan L, Glew P, *et al*. Language translation challenges with Arabic speakers participating in qualitative research studies. *Int J Nurs Stud* 2016;54:150–7.
38. G. L. Dolmetscher/inneneinsatz in der qualitativen Sozialforschung. Zu Anforderungen und Auswirkungen in gedolmetschten Interviews. Forum: qualitative Sozialforschung - social research; 2014.
39. Mayring P. *Qualitative content analysis: theoretical foundation, basic procedures and software solution*. Klagenfurt: Social Science Oppen Access Repository, 2014.
40. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19:349–57.
41. Benson J, Haris TA, Saaid B. The meaning and the story: reflecting on a refugee's experiences of mental health services in Australia. *Ment Health Fam Med* 2010;7:3–8.
42. Joshi C, Russell G, Cheng I-H, *et al*. A narrative synthesis of the impact of primary health care delivery models for refugees in resettlement countries on access, quality and coordination. *Int J Equity Health* 2013;12:88.

43. Yeheskel A, Rawal S. Exploring the 'Patient Experience' of Individuals with Limited English Proficiency: A Scoping Review. *J Immigr Minor Health* 2018.
44. Lindenmeyer A, Redwood S, Griffith L, *et al*. Recent migrants' perspectives on antibiotic use and prescribing in primary care: a qualitative study. *Br J Gen Pract* 2016;66:e802–9.
45. Flores G, Laws MB, Mayo SJ, *et al*. Errors in medical interpretation and their potential clinical consequences in pediatric encounters. *Pediatrics* 2003;111:6–14.
46. Bradby H, Humphris R, Padilla B. Universalism, diversity and norms: gratitude, healthcare and welfare chauvinism. *Crit Public Health* 2018;11:1–13.

Annex III

Asylum-seeking children with medical complexity and rare diseases in a tertiary hospital in Switzerland

S Buser[1*], J Brandenberger[1*], M Gmünder[1], C Pohl[2], N Ritz[1,3,4]

[1] University of Basel Children's Hospital, Migrant Health Service, Basel, Switzerland

[2] Neonatal Intensive Care Unit, Perth Children's and King Edward Memorial Hospitals, Perth, Australia

[3] University of Basel Children's Hospital, Paediatric Infectious Disease and Vaccinology, Basel, Switzerland

[4] Department of Paediatrics, Royal Children's Hospital Melbourne, University of Melbourne, Australia

*shared authorship

Running head: Rare diseases of asylum-seeking children

Corresponding author:

Dr Nicole Ritz,

University Children`s Hospital Basel, Basel, Switzerland

Spitalstrasse 33, 4031 Basel, Switzerland

Phone: +41 – 61 – 704 12 12

E-mail: nicole.ritz@ukbb.ch

Conflict of interest and funding: The authors declare that they have no conflict of interest. This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Acknowledgements: We want to kindly thank Yanick Schraner (generation of graphs), Matthias Tschudin (application and services) Robert Kopf (controlling) and Angelika Fix (accounting) for their support during the study.

Background: The aim of this study was to assess the characteristics of asylum-seeking children with medical complexity visiting a tertiary care hospital in Switzerland, detailing their underlying medical conditions and management.

Methods: Asylum-seeking patients with frequent visits between January 2016 and December 2017 were identified using administrative and electronic health records.

Results: Of 462 patients, 19(4%) fulfilled the inclusion criteria with 811(45%) visits. The age of the 19 patients ranged from 0 to 16.7 years (median of 7 years) with two main age groups identified: < 2 years and > 12 years. Nine (47%) patients originated from Syria. A total of 34/811(4%) visits were hospital admissions, 66/811(8%) emergency department visits and 320/811(39%) outpatient department visits. In children < years genetic diseases (5/8; 63%) and nutritional problems (6/8; 75%) were most common; in adolescents, orthopedic diseases (4/8; 50%) and mental health problems (4/8; 50%).

Conclusion: Asylum-seeking children with medical complexity represent a small but important group of patients requiring frequent medical consultations. The high proportion of young patients with genetic diseases and severe nutritional problems suggests that new strategies are required in the management of this specific group of asylum-seeking children. This could be achieved by improved co-ordination between hospital and non-hospital care exploring options for integrated care.

***Keywords**:* chronic diseases, Europe, genetics, migrant health, refugee minors

Background

At the end of 2016 an estimated 65.6 million people were forcibly displaced worldwide, half of whom were children (1). In the European Union 1.3 million people applied for asylum in 2016. One third of these asylum applicants were minor refugees below 18 years of age (2). In Switzerland, an estimated 45,300 asylum applications were received in 2016 and 2017 accounting for 2% of all applications in Europe. Of those an estimated 20,000 asylum applications were from children, including 2,700 unaccompanied minor refugees (3). Refugees may face specific health problems and challenges accessing health care in their place of origin, during the journey, and at their final destination (4). There is an increasing concern about the health of refugees resulting in strategies and action plans for refugee and migrant health in Europe. According to the World Health Organization (WHO), host countries need to adapt their national health systems by taking into consideration the challenges that refugees may face. This includes the improvement of collection of health-related data from asylum seekers to identify specific health needs (5).

Several studies have investigated the health status and health needs of asylum-seeking children visiting tertiary care hospitals (6-8). These studies generally focus on prevalence of communicable diseases and common problems and neglect to highlight the existence of asylum-seeking children with rare diseases needing complex care. A study from our institution describing the overall epidemiology and use of health care of asylum-seeking children showed that a small proportion of patients was responsible for nearly half of the total amount of visits (8). A case-series from Germany including six asylum-seeking children with inborn metabolic diseases suggests that there is a need to be aware of genetic and complex chronic diseases in asylum-seeking children (9).

In recent years, research on children with special health care needs, a term defined by Maternal and Child Health Bureau in 1998 (10), has gained attention. One important subgroup are children with medical complexity defined as children with complex chronic

conditions in need of frequent health care visits. This includes all children and adolescents with serious chronic conditions, substantial functional limitations, increased health and other service needs and increased health care costs (11, 12).

So far, no study has specifically investigated asylum-seeking children with medical complexity in need of frequent health care visits. The aim of this study was to perform a detailed analysis of the asylum-seeking children with frequent visits, detailing their underlying medical conditions and analyzing patterns of care provided.

Methods

Study design, setting and study population

This study is a retrospective cross-sectional study including patients from January 1, 2016 until December 31, 2017. Patients with previous presentations at our institution before January 2015 were excluded from the analysis. Patients were identified using administrative electronic records. Asylum seeking status has been systematically recorded at our institution since January 2016 using the following criteria: i) referral from one of the reception and processing centres run by the State Secretariat for Migration ii) presentation with a referral sheet declaring the patient as asylum-seeking individual or iii) presentation with an asylum-seeking identity card (8). For this part of the study we only further analysed patients with frequent visits. There are no standard definitions for frequent visits of health care institutions, as a guidance we therefore used similar criteria most commonly used for visits of emergency departments per year (13).

In our study period we therefore defined frequent visits as > 10 visits in 24 months. Because some children had only recently arrived, the criteria of ≥ 1.5 visits per month with at least 5 visits or 7 cumulative days of hospital admission was also included (**Figure 1**).

Data collection and analysis

Data was extracted from administrative and electronic health records. The following variables were extracted: nationality, age, gender, admission and discharge date, country of birth, escape route, family structure, parental consanguinity, social situation, primary care physician, main diagnoses, vaccination status, and other screenings. Deidentified data was entered in a database (REDCap, Vanderbilt University, 6.9.4). The single data entry was manually reviewed before analysis, REDCap quality control tests were performed, and the records were locked. Matplotlib Python (version 3.0.0, Matplotlib development team) was used for generation of the graphs.

Definitions

The visiting period was defined as the number of months from the date of the first visit or January 1, 2016 until December 31, 2017. One visit was defined as one consultation from registration to discharge. Consultations by different departments during one hospital admission were therefore not counted as separate visits since the patient was not discharged in between. If a patient was admitted through the emergency department, this was recorded as an additional emergency department visit but not as an additional total visit to ensure that emergency department visits were not lost. Four types of visits were defined: i) hospital admission, ii) emergency department visit, iii) non-physician visit including exercise therapy, occupational therapy, speech therapy and nutritional counseling, iv) outpatient visit including 15 different outpatient departments.

Ethics

Ethics approval (EKNZ 2017-01585) for this study was granted in October 2017 by the local Ethics committee.

Results

A total of 462 asylum-seeking patients with 1,916 visits were identified in the two-year time period. Of those, 19 patients were identified as requiring frequent care, resulting in 811 visits included in the final analysis (**Figure 1**).

Baseline characteristics of the study population

The age range was 0 to 16.7 years with a median of 7 years (IQR 0.4-13.8). Two main age groups were identified: children < 2 years and adolescents > 12 years of age with 8/19 (42%) patients in each group. The patients' nationalities were Syrian 9/19 (47%), Eritrean 3/19 (16%), Afghani 2/19 (11%), Armenian 2/19 (11%), and Somalian, Algerian and Russian each 1/19 (5%). In eight cases, the country of birth differed from the patient's nationality and three patients were born in Switzerland. Most patients had prolonged escape routes through several countries (**Figure 2**). A total of 10/19 (53%) were accompanied by both parents, 12/19 (63%) by at least one parent, and 3/19 (16%) were unaccompanied minors. The median time between arrival and first consultation at our institution was three days. A total of 9/19 (47%) patients visited the hospital within one day after arrival in Switzerland. For four families originating from Syria, Algeria, Russia, and Armenia the reason to leave their home country was the medical condition of their child. At six months after their first visit, 16/19 (84%) of the patients had a primary care pediatrician named in their health record (**Table 1**).

Main health problems

The main health problems and diagnoses are depicted according to age in **Figure 3.** Specifically, in infants 5/8 (63%) had a genetic disease including Noonan-like syndrome (P1), Laron-syndrome (P3), mitochondriopathy (SLC19A3 mutation) (P5), Turner-syndrome (P8), and arthrogryposis (P14). In addition, several associated and non-associated diseases were found including thalassemia minor in one infant (P14). Furthermore 6/8 (75%) had severe malnutrition and feeding problems. Of these, three infants required long-term gastric tube

feeding, two infants had percutaneous endoscopic gastrostomy tubes inserted, and two had oral high caloric diet prescribed.

In the adolescent group, 4/8 (50%) had an orthopedic condition or a disease requiring multiple surgical interventions including osteochondrosis (P10), osteomyelitis (P15), severe scoliosis (P17), or chronic wound infection (P9). The main diagnoses in the remaining adolescents were B-cell acute lymphoblastic leukemia (P19), type 1 diabetes (P16), chronic cystic pneumopathy of unknown origin (P13), and depression with attempted suicide (P2). In a further 3/8 (38%) of the adolescent patients (P15, P16, P19) a pathological psychological condition was documented including post-traumatic stress disorder and depression. One 15-year-old unaccompanied minor (P13) arrived with severe malnutrition (body mass index of 13 kg/m2) and had a percutaneous endoscopic gastrostomy tube inserted. In addition, two of the adolescent patients had latent or active tuberculosis diagnosed as secondary diagnosis. Three children aged between 2 and 12 years had the following main diagnoses: mitochondriopathy (SLC19A3 mutation) (P 4), ependymoma (P11) and complex congenital heart diseases (P 18) (**Table 1**).

Visits by departments

In total 413/811 (51%) of the visits were non-physician and 420/811 (52%) were physician visits including ED visits leading to hospital admission. The maximum number of visits per patient were 179 (P14) and 123 (P5 and P19). These three patients accounted for 425/811 (52%) of the total visits (**Figure 4**).

Of the physician visits 320/420 (76%) were outpatient visits including the following departments: 123/320 (76%) haemato-oncology by five patients; 47/320 (15%) orthopedics by seven patients, 30/320 (9%) neurology by five patients, and 9/320 (3%) cardiology by five patients. The median number of outpatient visits was 10 (range 0 – 119). A total of 119/320 (37%) outpatient visits were by P19, a patient with leukemia, visiting the haemato-oncology outpatient department 108 times. Of the physician visits, 66/420 (16%) were at the

emergency department. The median number of emergency department visits was 3 (range 0 – 19) with 3/19 (16%) patients (P2, P10, P17) never requiring a visit.

Admissions accounted for 34/811 (4%) of all visits. The accumulated duration of admission was 350 days with a median duration of 11 (range 0 - 67) days. Patients had up to four admissions and 10/19 (53%) were admitted more than once.

Non-physician visits accounted for 413/811(51%) of the total visits. These included exercise therapy visits 197/413 (48%) by 6 patients, occupational therapy visits 135/413 (33%) by 6 patients, nutritional counselling visits 46/413 (11%) by 6 patients, and speech therapy visits 35/413 (8%) by 4 patients. Two patients with congenital diseases (P5, P14) were responsible for 243/413 (59%) of all non-physician visits and 7/19 (37%) patients never required a non-physician visit.

Infants showed a higher number of total visits (444/811 vs. 267/811), non-physician visits (308/413 vs. 51/413), emergency department visits (38/66 vs. 16/66), a longer duration of hospital admission days (165/ 350 vs. 81/350), and a lower number of outpatient visits (91/320 vs. 196 /320) compared to adolescents.

Infections and immunization status

Screening for methicillin-resistant *Staphylococcus aureus* was done in 9/19 (47%) with two test results being positive (P4, P9). In 9/19 (47%) stool samples were analyzed for infections, of which 5/9 (56%) had a positive result (two each for norovirus and *Hymenolepsis nana* and one each for *Entameoba coli*, *Blastocystis hominis,* and scabies). A total of 5/19 (26%) patients had routine HIV testing without positive results. Screening for tuberculosis was done in two patients, one had a positive result (P13).

An incomplete vaccination status was recorded in 8/19 (42%) patients. In 4/19 (21%) the immunization status was not documented. A total of 3/19 (16%) had been vaccinated according to the schedule of their home country.

Discussion

General introduction

So far, most studies about the health of asylum-seeking children and adolescents have focused on infectious diseases, vaccine preventable diseases, or mental health problems (6, 14, 15). This the first study analyzing asylum-seeking children with medical complexity in need of frequent health care visits. We found genetic diseases and severe nutritional deficiencies as main reasons for the frequent need of health care. Importantly, in this group, infectious diseases were rarely the reason for admission and commonly screened infections in migrant children (16) were only detected in a few patients. Many asylum-seeking children with medical complexity had limited or disrupted access to health care in their countries of origin which negatively impacted the health of the child. For many families, this was an important factor in their decision to escape (9, 17).

Isolated neurodevelopmental disabilities, which are reported to be a major reason for health care visits in children with medical complexity (11), were not seen in our setting investigating the asylum-seeking children with medical complexity. This may be explained by the Swiss health care structure, in which children with neurodevelopmental disabilities, including autism spectrum disorders, are generally cared for in non-hospital based facilities (18). Alternatively, asylum-seeking families may be less likely to access health care for isolated neurodevelopmental disabilities.

Prevalence of diseases

The main diagnoses in the infant group were genetic diseases including rare diseases such as Laron syndrome, a growth hormone insensitivity condition with a prevalence of 1/1,000,000. The occurrence of rare and complex diseases in asylum-seeking children has only recently been recognized. For example, a case series from Germany found six asylum-seeking children with untreated inborn errors of metabolism including phenylketonuria, biotinidase deficiency, HMG-CoA lyase deficiency and mucopolysaccharidoses (9).

Four children in our study originating from Syria had third degree consanguineous parents, amongst them two siblings with mitochondriopathy and one child with Laron syndrome. Autosomal recessive disorders such as inborn errors of metabolism and other genetic diseases are more prevalent in asylum-seeking families from the Middle East, where first-cousin marriages are more common (19). Whether our findings are applicable for other countries with high number of refugee arrivals is determined by the prevalence of genetic disease in home countries and therefore on the distribution of countries of origin in the respective refugee population.

In our study nutritional problems were frequent amongst the group of infants but also present to a severe extent in the adolescent group. A study investigating the nutritional status of refugee children in the US detected a 20% higher prevalence of malnutrition and anemia compared to U.S. children (20). In a large prospective study analyzing 1,026 asylum-seeking children at a tertiary care hospital in Australia, nutritional deficiencies were the most common reason for referral (7). Specific nutritional treatment programs in refugee camps and an active screening for malnutrition of infants are highly recommended (21).

In our study adolescents frequently presented with orthopedic problems and of those who did all needed a surgical procedure. The University Medical Center Mainz described an increase of refugee children being treated for pediatric surgical issues: 12% were in need of medical care due to trauma and 7% due to burns and scalds incurred since their arrival in the host country (21). In our study population adolescents suffered from chronic orthopedic or surgical problems such as idiopathic scoliosis, osteochondrosis with chronic pain, osteomyelitis, or chronic infection of a laceration.

The results of our study also show that psychological assessments were not done routinely and were only performed when there was a suspicion of a mental disorder. It is therefore possible that psychiatric diseases were underdiagnosed as being a migrant is known to be a

risk factor for pediatric and adolescent mental health disorders (22). Several studies highlight the importance of mental health problems among unaccompanied minor refugees (23-25). More than 25% of minor refugees develop post-traumatic stress disorder, but only a small proportion of these are diagnosed and treated. The number of suicide attempts among minor asylum-seekers in Europe is higher than in the resident population of the host countries (26). One 13-year old Syrian girl in our study was admitted due to complications after a suicide attempt. This demonstrates the need for mental health screening to be included in routine daily medical practice, particularly for unaccompanied minor refugees (25, 27). Psychosocial and therapeutic treatments should be adapted to the needs of asylum-seeking adolescents in order to be accessible and culturally acceptable (28).

There were only few asylum-seeking children with medical complexity aged between 2 and 12 years in our study. This might be due to chance as the study population was limited. Alternatively, it may also be a true finding as infants and children with genetic diseases require frequent hospital admissions in the first few years (29) but once they survive this critical period, less hospital-based visits are required. Furthermore, selection bias might explain the biphasic age distribution. Children with medical complexity below the age of 12 years are unlikely to survive long and exhausting escapes and have a very limited life expectancy particularly in low-income settings (30). Therefore, those making it to host countries might be the healthier ones among the children with medical complexity, a selection bias, known in the general migrant population as the healthy migrant effect (31). In addition, the sickest children with medical complexity might have been identified and prioritized by the UNHCR resettlement program according to the current resettlement criteria.

Frequency of visits and departments

The most frequent diagnoses amongst asylum-seeking patients in Germany and Switzerland are respiratory infections (6, 32). Several studies suggest that asylum-seekers had higher rates of emergency room presentation compared to the resident population (6, 33). Our study

in contrast showed that asylum-seeking children with medical complexity had relatively low emergency department presentation rates and some never required an emergency department visit. A possible explanation might be the close follow up provided by sub-specialized departments to children with medical complexity in Switzerland.

A meta-analysis and a qualitative study on health needs of asylum-seekers from our institution emphasizes the important role of confidence between asylum-seeking families and health care providers, demonstrating that it is more likely that families will seek care from a specialist they already know and trust (34). Furthermore, evidence suggests a lack of continuity of care as a major problem for asylum-seeking-families (35). Therefore, coordination between different institutions across countries and across levels of care is crucial (11, 36). In contrast, most patients in our study had a primary care pediatrician within six months after arrival. This suggests a rapid integration into local health care systems of children with medical complexity in our setting and may offer the possibility of improved integrated care including telemedicine (37).

Immunization, screening, and prevention

In our study a considerable number of patients had an incomplete, or incompletely documented, vaccination status on arrival. Switzerland belongs to one of the countries of the WHO European Region that does not provide free health care to asylum-seeking children and that does not generally include refugees in their national immunization program (4). Per WHO guidance, asylum-seekers should be vaccinated without delay according to the immunization schedules of their host countries if they stay there more than seven days (38). Unfortunately, less than one third of the countries within the WHO European Region focus on the immunization of migrants in their national immunization policies (4, 39).

Limitations

One potential limitation of the study may be the few patients included in the final analysis. However, since the study covered all visits of asylum-seeking patients over two years and aimed to identify patients with frequent visits only, we were not able to influence the sample size. In addition, the limited number of children allowed for the in-depth analysis of over 800 visits. The retrospective study design limited the extent of the data analysis due to missing data. Despite this, there were no missing values for most of the variables used in this study, indicating good data quality. Data on cost of care provided was not collected for this analysis, as a health economics analysis was beyond the scope of the current study. Data and information collected from the patients' primary care physicians or outside hospitals remain outside the scope of this study. Future research might identify these areas as valuable and additional sources of information on health utilization and the burden of patient disease.

Conclusion

Asylum-seeking children with medical complexity represent a small but important group of patients requiring frequent medical consultations. The high proportion of young patients with genetic diseases and severe nutritional problems suggests that new strategies are required in the management of this specific group of asylum-seeking children. This could be achieved by exploring options for more integrated peadiatric care via improved coordination between hospital and non-hospital care.

Abbreviations

B-cell ALL	B-cell acute lymphoblastic leukemia
HIV	Human immunodeficiency virus
UKBB	University Children's Hospital Basel
UMR	Unaccompanied minor refugee
UNHCR	United Nations High Commissioner for Human Refugees
WHO	World Health Organization

References

1. UNHCR. Statistiken 2017 [cited 2018 31 August]. Available from: http://www.unhcr.org/dach/ch-de/publikationen/statistiken.
2. Eurostat. Statistiken über Asyl 2017 [cited 2018 31 July]. Available from: http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Asylum_statistics/de.
3. SEM. Statistik UMA 2017 [cited 2018 30 December]. Available from: https://www.sem.admin.ch/dam/data/sem/publiservice/statistik/asylstatistik/statistiken_uma/uma-2017-d.pdf.
4. WHO. Report on the health of refugees and migrants in the WHO European Region: no public health without refugee and migrant health 2018 [cited 2019 20 February]. Available from: http://www.euro.who.int.
5. EUROPE WROF. Strategy and action plan for refugee and migrant health in the WHO European Region 2016 [cited 2018 22 October]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0004/314725/66wd08e_MigrantHealthStrategyActionPlan_160424.pdf?ua=1.
6. Pohl C, Mack I, Schmitz T, Ritz N. The spectrum of care for pediatric refugees and asylum seekers at a tertiary health care facility in Switzerland in 2015. Eur J Pediatr. 2017;176(12):1681-7.
7. Mutch RC, Cherian S, Nemba K, Geddes JS, Rutherford DM, Chaney GM, et al. Tertiary paediatric refugee health clinic in Western Australia: analysis of the first 1026 children. J Paediatr Child Health. 2012;48(7):582-7.
8. Brandenberger J. Health care provided to asylum-seeking and non-asylum-seeking paediatric patients at a Swiss tertiary hospital. mauscript under review. 2019.
9. Schiergens KA, Staudigl M, Borggraefe I, Maier EM. Neurological Sequelae due to Inborn Metabolic Diseases in Pediatric Refugees: Challenges in Treating the Untreated. Neuropediatrics. 2018.
10. McPherson M, Arango P, Fox H, Lauver C, McManus M, Newacheck PW, et al. A new definition of children with special health care needs. Pediatrics. 1998;102(1 Pt 1):137-40.
11. Cohen E, Kuo DZ, Agrawal R, Berry JG, Bhagat SK, Simon TD, et al. Children with medical complexity: an emerging population for clinical and research initiatives. Pediatrics. 2011;127(3):529-38.
12. Cohen E, Berry JG, Sanders L, Schor EL, Wise PH. Status Complexicus? The Emergence of Pediatric Complex Care. Pediatrics. 2018;141(Suppl 3):S202-S11.
13. LaCalle E, Rabin E. Frequent users of emergency departments: the myths, the data, and the policy implications. Ann Emerg Med. 2010;56(1):42-8.

14. Gibson J, Evennett J. The health needs of asylum-seeking children. Br J Gen Pract. 2018;68(670):238.
15. Müller LRF, Büter KP, Rosner R, Unterhitzenberger J. Mental health and associated stress factors in accompanied and unaccompanied refugee minors resettled in Germany: a cross-sectional study. Child Adolesc Psychiatry Ment Health. 2019;13:8.
16. Schrier L, Wyder C, Del Torso S, Stiris T, von Both U, Brandenberger J, et al. Medical care for migrant children in Europe: a practical recommendation for first and follow-up appointments. European journal of pediatrics. 2019;178(9):1449-67.
17. Catchpole M, Coulombier D. Refugee crisis demands European Union-wide surveillance! Euro Surveill. 2015;20(45).
18. FIAS-Therapiezentrum. FIAS-Therapiezentrum Basel [cited 2020 26 March]. Available from: http://www.autismus-fias.ch/sites/wer.html.
19. Kanaan ZM, Mahfouz R, Tamim H. The prevalence of consanguineous marriages in an underserved area in Lebanon and its association with congenital anomalies. Genetic testing. 2008;12(3):367-72.
20. Shah AY, Suchdev PS, Mitchell T, Shetty S, Warner C, Oladele A, et al. Nutritional status of refugee children entering DeKalb County, Georgia. J Immigr Minor Health. 2014;16(5):959-67.
21. Loucas M, Loucas R, Muensterer OJ. Surgical Health Needs of Minor Refugees in Germany: A Cross-Sectional Study. European journal of pediatric surgery : official journal of Austrian Association of Pediatric Surgery [et al] = Zeitschrift fur Kinderchirurgie. 2018;28(1):60-6.
22. Belhadj Kouider E, Koglin U, Petermann F. Emotional and behavioral problems in migrant children and adolescents in Europe: a systematic review. Eur Child Adolesc Psychiatry. 2014;23(6):373-91.
23. Norredam M, Nellums L, Nielsen RS, Byberg S, Petersen JH. Incidence of psychiatric disorders among accompanied and unaccompanied asylum-seeking children in Denmark: a nation-wide register-based cohort study. Eur Child Adolesc Psychiatry. 2018;27(4):439-46.
24. Reavell J, Fazil Q. The epidemiology of PTSD and depression in refugee minors who have resettled in developed countries. J Ment Health. 2017;26(1):74-83.
25. Horlings A, Hein I. Psychiatric screening and interventions for minor refugees in Europe: an overview of approaches and tools. Eur J Pediatr. 2018;177(2):163-9.
26. McMahon EM, Corcoran P, Keeley H, Cannon M, Carli V, Wasserman C, et al. Mental health difficulties and suicidal behaviours among young migrants: multicentre study of European adolescents. BJPsych Open. 2017;3(6):291-9.

27. Gadeberg AK, Montgomery E, Frederiksen HW, Norredam M. Assessing trauma and mental health in refugee children and youth: a systematic review of validated screening and measurement tools. Eur J Public Health. 2017;27(3):439-46.
28. Valibhoy MC, Kaplan I, Szwarc J. "It comes down to just how human someone can be": A qualitative study with young people from refugee backgrounds about their experiences of Australian mental health services. Transcultural psychiatry. 2017;54(1):23-45.
29. Gonzaludo N, Belmont JW, Gainullin VG, Taft RJ. Estimating the burden and economic impact of pediatric genetic disease. Genet Med. 2019;21(8):1781-9.
30. Piel FB, Steinberg MH, Rees DC. Sickle Cell Disease. N Engl J Med. 2017;377(3):305.
31. Giannoni M, Franzini L, Masiero G. Migrant integration policies and health inequalities in Europe. BMC Public Health. 2016;16:463.
32. Goodman LF, Jensen GW, Galante JM, Farmer DL, Taché S. A cross-sectional investigation of the health needs of asylum seekers in a refugee clinic in Germany. BMC Fam Pract. 2018;19(1):64.
33. Lichtl C, Lutz T, Szecsenyi J, Bozorgmehr K. Differences in the prevalence of hospitalizations and utilization of emergency outpatient services for ambulatory care sensitive conditions between asylum-seeking children and children of the general population: a cross-sectional medical records study (2015). BMC Health Serv Res. 2017;17(1):731.
34. Brandenberger J, Tylleskar T, Sontag K, Peterhans B, Ritz N. A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model. BMC Public Health. 2019;19(1):755.
35. van Loenen T, van den Muijsenbergh M, Hofmeester M, Dowrick C, van Ginneken N, Mechili EA, et al. Primary care for refugees and newly arrived migrants in Europe: a qualitative study on health needs, barriers and wishes. Eur J Public Health. 2018;28(1):82-7.
36. Bernadette K, Esperanza D. Migrant Health: A primary Care Perspective. 1 ed. E D, editor: CRC Press; 2019.
37. Loomis AM, Berthold SM, Buckley T, Wagner J, Kuoch T. Integrated Health Care and mHealth: A Model of Care for Refugees with Complex Health Conditions. Soc Work Public Health. 2019;34(2):189-200.
38. WHO. WHO-UNHCR-UNICEF joint technical guidance: general principles of vacctination of refugees, asylum-seekers and migrants in the WHO European Region 2015 [cited 2019 06 February]. Available from: http://www.euro.who.int/en/health-topics/communicable-diseases/influenza/news/news/2015/11/who,-unicef-and-unhcr-call-for-equitable-access-to-vaccines-for-refugees-and-migrants/who-unhcr-unicef-joint-technical-guidance-general-principles-of-vaccination-of-refugees,-asylum-seekers-and-migrants-in-the-who-european-region.

39. WHO. New HEN report reveals gaps in protection of refugees and migrants from vaccine-preventable diseases 2017 [cited 2018 31 August]. Available from: http://www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/news/news/2017/11/new-hen-report-reveals-gaps-in-protection-of-refugees-and-migrants-from-vaccine-preventable-diseases.

Table 1: Baseline characteristics of 19 asylum-seeking patients. Age, nationality and country of birth are not displayed to protect patient's identity.
* denotes the three patients with the highest number of recorded visits

	P1	P2	P3	P4	P5 *	P6	P7	P8	P9	P10	P11	P12	P13	P14 *	P15	P16	P17	P18	P19 *
Gender	f	f	m	m	f	m	m	f	m	m	m	m	m	f	m	m	m	f	m
Time between arrival and first visit (days)	0	153	0	0	1	1	89	0	3	178	3	61	0	0	13	22	366	1	5
Humanitarian visa	-	no	-	yes	yes	yes	ns	yes	ns	no	ns	ns	no	-	no	no	no	no	no
Child accompanied by	-	op	-	bp	bp	bp	bp	bp	-	bp	bp	bp	UMR	-	UMR	op	UMR	bp	bp
Distance from last documented address to hospital (km)	1.5	64	16	1.7	1.7	3.7	5.5	1.5	3.7	15	4	18	2.3	0.8	2.4	34	67	4.4	3.5
Total n. of addresses documented	1	1	1	4	4	2	1	3	2	1	1	2	2	2	2	2	2	3	3
Family present in host country	bp	bp	bp	bp	bp	bp	bp	bp	ns	bp	bp	bp	UMR	bp	UMR	bp	UMR	bp	bp
Number of siblings	1	1	3	2	2	1	2	0	ns	2	1	ns	>5	1	3	>5	ns	ns	1
Siblings in treatment	yes	no	yes	yes	yes	no	yes	no	no	yes	no	no	no	yes	no	no	no	no	yes
Primary care physician	Ped	GP	Ped	Ped	Ped	Ped	Ped	Ped	Ped	Ped	none	Ped	GP	Ped	GP	GP	GP	Ped	none
Hospital social worker documented	yes	yes	yes	yes	yes	yes	no	yes	no	no	yes	no	yes	yes	yes	yes	no	yes	yes
Main diagnosis	Noonan-like syndrome	Depression with attempted suicide	Laron-Sydrome	Mitochondriopathy	Mitochondriopathy	Marasmus	Failure to thrive of unknown origin	Turner syndrome	Chronic wound infection	Osteochondrosis with chronic pain	Ependymoma	Scalding	Cystic pneumpopathy of uknown origin	Arthrogryposis	Osteomyelitis foot with superinfection	Type 1 diabetes	Severe scoliosis	Complex congenital heart disease	B-cell ALL
ICD-10 of main diagnosis	Q87.1	F32	E34.3	G31.81	G31.81	E41	R62.8	Q96.1	T79.3	M92.5	C72	X19.9	J98.4	Q74.3	M86	E10.1	M41.15	Q21.8	C91.01
Country of first main diagnose	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	CH	IT	CH	CH	SA	CH	RU	AM

ns = not specified; op = one parent; bp = both parents; UMR= unaccompanied minor refugee; PED= paediatrician; GP= general practitioner;
CH= Switzerland; IT= Italy; SA=Saudi Arabia; RU= Russia; AM= Armenia

Supplementary table 1: Number of visits of 19 asylum-seeking patients per type of visit and department. * denotes the three patients with the highest number of recorded visits

	P1	P2	P3	P4	P5 *	P6	P7	P8	P9	P10	P11	P12	P13	P14 *	P15	P16	P17	P18	P19*	Total
Total no. of visits	5	15	19	60	123	16	19	67	27	40	28	16	14	179	7	29	12	12	123	811
Total duration of admission (d)	67	11	32	53	5	13	0	6	4	0	32	1	22	41	16	9	10	19	9	350
Total no. emergency department visits[1]	4	0	2	5	4	2	1	19	1	0	2	3	5	3	2	5	0	5	3	66
Total no. of admissions	4	2	2	3	1	1	0	2	2	0	1	1	2	4	1	2	1	4	1	34
Surgical ward	0	0	0	0	0	0	0	1	2	0	1	1	0	1	0	0	0	0	0	6
General paediatric ward	2	1	1	3	1	1	0	1	0	0	0	0	2	2	1	2	0	3	0	20
Haematooncological ward	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Orthopaedic ward	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	3
Psychiatric ward	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intensive care unit	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Neonatology	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total no. of non-physician visits	0	0	11	34	100	14	9	28	9	34	20	3	0	143	0	8	0	0	0	413
Exercise therapy	0	0	0	13	48	14	0	0	0	34	11	0	0	77	0	0	0	0	0	197
Occupational therapy	0	0	0	13	35	0	0	0	9	0	9	3	0	66	0	0	0	0	0	135
Speech therapy	0	0	5	4	11	0	0	15	0	0	0	0	0	0	0	0	0	0	0	35
Nutritional counselling	0	0	6	4	6	0	9	13	0	0	0	0	0	0	0	8	0	0	0	46
Total no. of outpatient visits	1	13	4	20	18	0	9	18	17	6	6	10	9	31	5	16	11	7	119	320
Infectiology	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	4
Gastroenteroloy	0	0	1	2	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	8
Dermatology	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Pneumology	0	2	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	0	0	9
Cardiology	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	9
Endocrinology	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	7
Diabetes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	14
Migrant health	0	0	0	0	0	0	0	3	0	1	0	0	0	0	2	0	0	0	0	6
Haemato-oncology	0	5	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	2	108	123
Surgery	0	0	0	0	0	0	0	0	17	0	0	10	0	0	3	2	0	0	0	32
Orthopaedic surgery	0	0	0	1	3	0	0	0	0	5	1	0	0	25	0	0	6	0	6	47
Paediatrics	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	8
Neuropaediatrics	0	3	0	14	10	0	0	1	0	0	0	0	0	2	0	0	0	0	0	30
Day Clinic	0	0	0	1	4	0	0	2	0	0	0	0	0	0	0	0	0	0	0	7
Radiology	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	9
Other	0	0	1	2	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	6

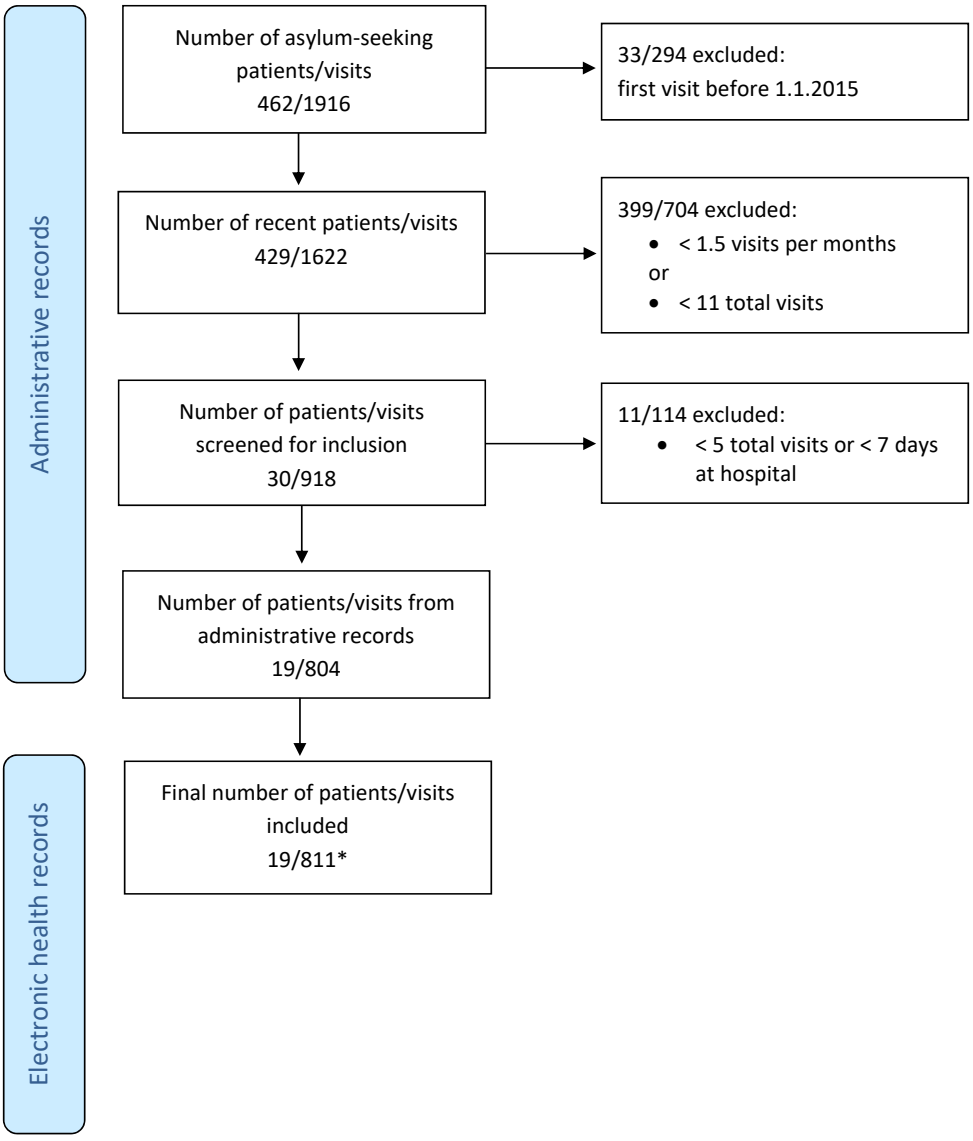
[1]visits leading to hospital admission are included

Supplementary table 2: Implementation and results of screenings, clinical examinations and immunization status of 19 asylum-seeking patients.
* denotes the three patients with the highest number of recorded visits

	P1	P2	P3	P4	P5 *	P6	P7	P8	P9	P10	P11	P12	P13	P14*	P15	P16	P17	P18	P19*
Vaccination status at arrival	1	4	1	3	3	3	4	3	3	2	2	1	3	1	3	2	4	3	4
Pychological assessment	no	yes	no	no	no	no	no	yes	no	no	no	no	no	no	yes	yes	no	no	yes
Neurodevelopmental screening	yes	yes	yes	yes	yes	no	no	yes	no	no	yes	no	no	yes	no	no	no	no	yes
Dental status	yes	no	yes	yes	yes	yes	no	yes	no	no	no	no	no	yes	no	no	yes	yes	yes
Laboratory																			
HIV-Testing	no	no	no	no	no	yes	no	no	no	no	no	no	yes	no	yes	no	yes	no	yes
Result	-	-	-	-	-	neg	-	-	-	-	-	-	neg	-	neg	-	neg	-	neg
Hepatitis B serology	no	no	no	no	no	yes	no	no	no	no	no	no	yes	no	yes	no	yes	no	yes
Result	-	-	-	-	-	neg	-	-	-	-	-	-	pos	-	neg	-	neg	-	neg
Hepatitis C serology	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
Result	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	neg
Tb-screening	no	no	no	no	no	no	no	no	no	no	no	no	yes	no	no	no	yes	no	no
Result	-	-	-	-	-	-	-	-	-	-	-	-	pos	-	-	-	neg	-	-
MRSA-screening	yes	no	yes	yes	no	no	no	yes	yes	no	no	no	yes	no	yes	no	yes	no	yes
Result	neg	-	neg	pos	-	-	-	neg	pos	-	-	-	neg	-	neg	-	neg	-	neg
Microbiology																			
Stool sample	yes	no	yes	no	no	no	yes	yes	no	no	no	no	yes	no	yes	no	yes	yes	yes
Detected pathogen	Norovirus	-	Norovirus	-	-	-	none	none	-	-	-	-	Blastocystis hominis, Scabies	-	Hymenolepis nana	-	Hymenolepis nana,Entamoeba coli	none	none

1 = Vaccination schedule according to CH; 2 = Vaccination schedule according to home country; 3 = Incomplete vaccination schedule; 4= Immunization not documented

Figure 1: Flowchart depicting the process of inclusion of the study population.



* 7 additional visits included as elective admissions were not counted as visits in administrative records

Figure 2: Escape routes (lines) and country of birth (grey) of 16 of the 19 asylum-seeking patients (numbers according to those used in Table 1). Note the route of three patients was not documented. * denotes the three patients with the highest number of recorded visits

Figure 3: Age distribution (in years) of 19 asylum-seeking patients according to health problems. Note black dots mark patients with health problems not fitting the following categories: orthopedic/surgical disease, genetic disease, psychiatric disorder, nutritional problem. * denotes the three patients with the highest number of recorded visits

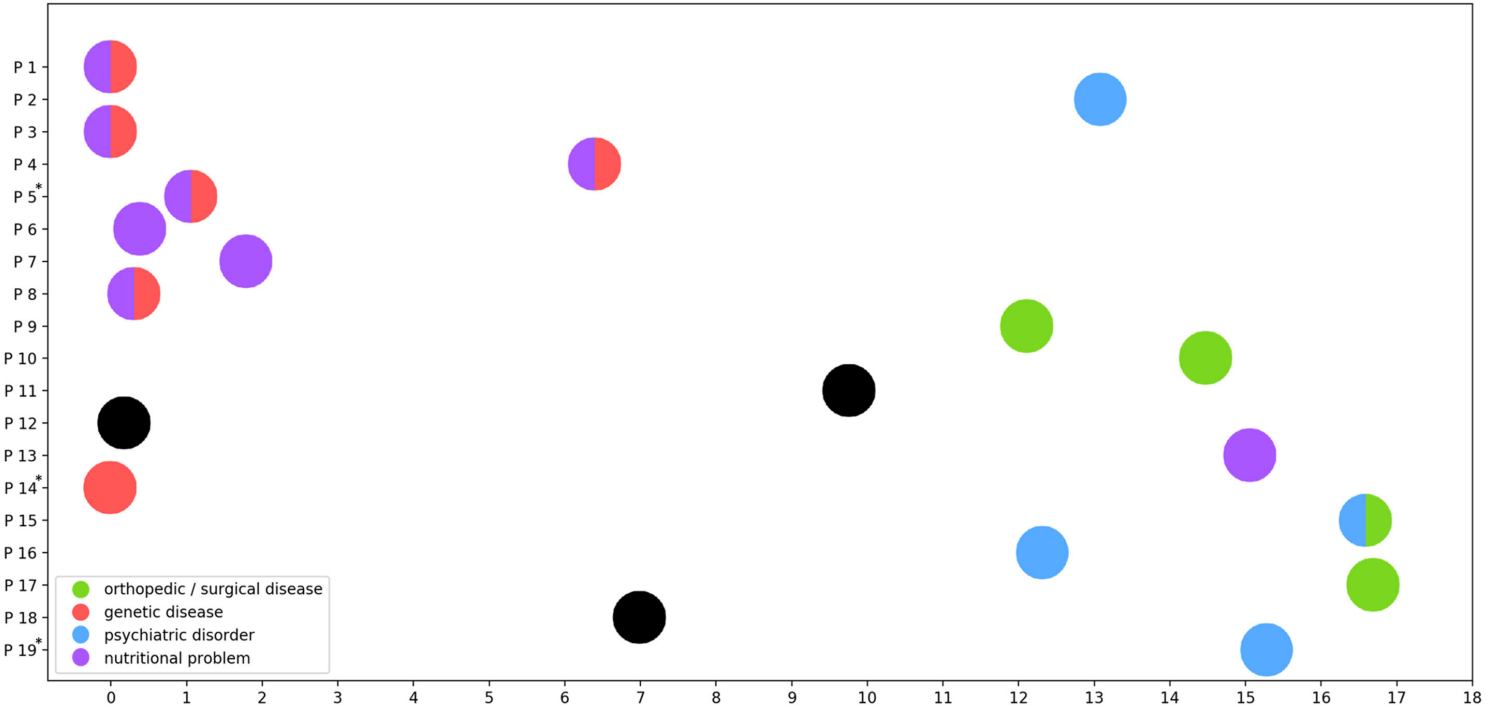
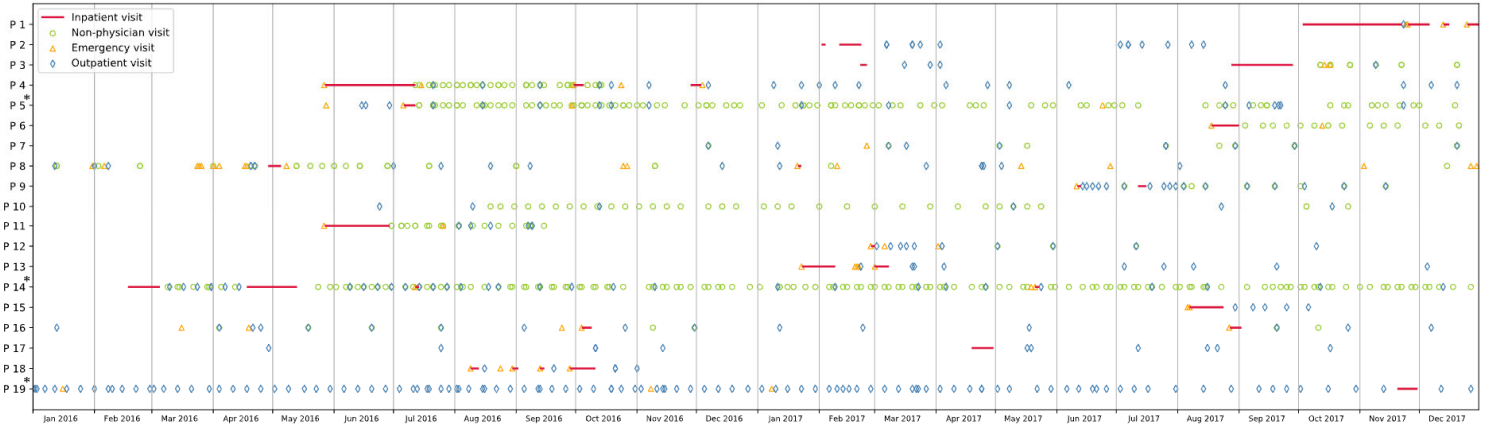


Figure 4: Distribtuion over time of visits of 19 asylum-seeking patients categorised by the four main types of visits: hospital admission, non-physician visit, emergency department visit and outpatient visit. * denotes the three patients with the highest number of recorded visits



Graphic design: Communication Division, UiB / Print: Skipnes Kommunikasjon AS

uib.no

ISBN: 9788230863916 (print)
9788230840887 (PDF)