Health Policy 123 (2019) 888–900

Contents lists available at ScienceDirect

Health Policy

journal homepage: www.elsevier.com/locate/healthpol

Health records for migrants and refugees: A systematic review☆

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ARTICLE INFO

Article history:
Received 14 December 2018
Received in revised form 2 July 2019
Accepted 23 July 2019

Keywords:
Health record
Migrants
Refuges
Asylum seekers
Undocumented migrants
Systematic review

ABSTRACT

Introduction: One of the challenges facing migrants and refugees is access to medical records. The aim of this study was to identify Health Records (HRs) developed specifically for migrants and refugees, describe their characteristics, and discuss their reported strengths and weaknesses.
Materials and methods: A systematic review of articles focusing on HRs implemented exclusively for migrants and refugees was undertaken. Publications were identified by searching the scientific databases Embase, Medline, Scopus and Cochrane, the grey literature and by checking the reference lists of articles.
Results: The literature search yielded an initial list of 1432 records, with 58 articles remaining after screening of title and abstract. Following full-text screening, 33 articles were retained. Among the 33 articles reviewed, 20 different HRs were identified.
Discussion: Our findings suggest that HRs, especially electronic ones, might be efficient and effective tools for registering, monitoring and improving the health of migrants and refugees. However, some of the evidence base is narrative or institutional and needs to be backed up by scientific studies.
Conclusions: Health records, implemented specifically for migrants and refugees, seem to have the potential to address some of the challenges that they face in accessing health care, in particular in strategic hotspots, cross-border settings and for migrants on the move.

1. Introduction

Although the core principle of the 2030 Agenda for Sustainable Development is to "leave no one behind" and migration has been recognized to contribute to the Sustainable Development Goals, migrants and refugees continue to face barriers in accessing health services. These barriers differ between countries and during the stages of the migration process, while each migration phase can worsen their health status [1]. Especially in the destination country, cumulative health effects of prior migration stages can emerge.

One of the challenges is access to medical records [1]. Information on patients' history, their test results, vaccinations, diagnoses and medications are often dispersed across health care providers and health information systems in different countries, leading to duplication and poor quality and continuity of care [2]. This fragmentation also results in the lack of reliable and timely data to inform policy-makers and improve health service provision. For migrants and refugees, the use of Health Records (HRs) could help to provide continuous and efficient health care of high quality and decrease medical costs, if they contain medical information from origin to destination countries and from all levels of health care [3].

For the general population, the European Commission has invested in the development of electronic health records in order to improve interoperability of different health systems in the European Union (EU), as the electronic transmission of medical information offers opportunities for improving continuity of care in cross-border settings. The World Health Organization (WHO) [4] has conducted a global survey on patient record initiatives that specifically use mobile devices to create or access electronic health records (EHRs) or electronic medical records (EMRs) of patients at the point of care. It found that the level of adoption of mobile patient records in the general population was moderate across all WHO regions and World Bank income groups, with the highest levels of activity in Europe and America [4]. In particular between countries (but sometimes even within), electronic data-sharing remains

☆ Open Access for this article is made possible by a collaboration between Health Policy and The European Observatory on Health Systems and Policies.

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https://doi.org/10.1016/j.healthpol.2019.07.018

a challenge, due to concerns about confidentiality, as well as technical and legal issues [5].

One of the barriers that impede the development of electronic patient records is the lack of clear definitions [6]. Multiple terms are being used, with overlapping and confusing definitions even within the same country. EMRs can be understood as a digital version of the paper records in health care institutions. An EMR contains the medical and treatment history of patients. Patient access to their EMR may be available via a provider's portal. In contrast, EHRs contain information from all health workers involved in a patient's care, with entries from multiple sites where care is provided. All authorized health workers, including pharmacists and specialists, can access the information to provide appropriate care to the patient [6]. Finally, a Personal Health Record (PHR) can be defined as follows: it "i) contains all personal health information belonging to an individual; ii) is entered and accessed electronically by healthcare workers over the person's lifetime and iii) extends beyond acute inpatient situations including all ambulatory care settings at which the patient receives care" [7]. The PHR includes the same type of information as the EHR (diagnoses, medications, immunizations, family medical histories, and provider contact information), but is designed to be set up, accessed, and managed by patients [6]. It is important to point out that this last point differentiates PHRs from other type of records. PHRs can be: electronic records, non-electronic records (held or paper records), or a mix of electronic and non-electronic records.

Health information Technology and exchange have great potential to transform health care – such as: electronic medical records, electronic health records, personal health records, telemedicine, telehealth, clinical physician order entry systems, e-prescribing - to improve health care quality in under-resourced settings and to reduce health care disparities, but it is only at the beginning to be considered and explored [8]. Despite this - the role of health Information Technology in under-resourced settings and among underserved populations - according to M.C. Gibbons et al., in terms utility and impact in 2010 have not been adequately evaluated [8]. Moreover, a systematic review [2] – published in 2009 – has been conducted in order to investigate the potential benefits of a patient-held record for undocumented immigrants, but no studies were found at that time on undocumented immigrants and Health Records.

The aim of our study was to identify which Health Records have been developed so far specifically for migrants and refugees, describe their characteristics, and discuss their potential strengths and weaknesses.

2. Materials and methods

2.1. Data sources

We conducted a systematic review of articles focusing on Health Records implemented specifically for migrants and refugees, following the Prepared Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [9]. As suggested by UNCHR with refugees and migrants we refer to groups of people travelling in mixed movements, who may have multiple, overlapping reasons for moving. In accordance with IOM's definition [10] we use the term "migrant" to indicate any person who moves across an international border away from his/her habitual place of residence, regardless of the person's legal status: authorized migrants for purposes such as work, family and study as well as unauthorized entrants; asylum seekers and irregular/undocumented migrants. The term "refugee" refers both to those people who obtained the refugee status or the humanitarian protection, and those who are fleeing persecution or organized violence.

Prior to data extraction, a protocol of the review was registered on the PROSPERO register of systematic reviews (registration number: CRD42018102359) [11].

Relevant publications were identified in March 2018 by searching the scientific and grey literature. We searched the scientific databases Embase, Medline, Scopus and the Cochrane Database, after consulting a librarian who reviewed our search strategy (detailed search strategies are given in Online Appendix 1).

The search of the grey literature covered the websites of the following organizations: the International Red Cross, Doctors of the World, Doctors without Borders, Caritas International, Oxfam, the United Nations (the United Nations High Commissioner for Refugees, the World Health Organization, the World Health Organization Regional Office for Europe, the International Organization for Migration), the European Parliament, the European Commission, the European Council, and major NGOs and networks working in the field of health and migration (including SOPHIE, MIPEX and PHAME). A search was also performed on Google and Google Scholar, and of the abstract books of recent European Public Health Conferences (Granada 2014, Milano 2015, Oslo 2016 and Stockholm 2017). We also checked the reference lists of articles that met the inclusion criteria.

2.2. Study selection

Inclusion and exclusion criteria for study selection were defined a priori, after piloting them on a sample of 50 articles. Articles or reports were included if they were published in English, French, German, Italian or Spanish and focused specifically on HRs implemented for migrants and refugees; studies describing HRs in which migrants and refugees only represented one subcategory among many were excluded. There was no limitation set on date of publication, study design and type, and the country of study implementation. We also did not exclude studies or reports by method or risk of bias. Identified studies were reviewed independently for eligibility by three authors (V.C., B.R and A.C.) in a two-step process: a first screen was performed on title and abstract (performed by V.C., B.R and A.C.), followed by the screening of full texts (performed by V.C. and A.C.). At both stages, disagreements between reviewers were resolved by discussion.

2.3. Data extraction

Data were extracted by the lead author (V.C.), with support from the two co-authors (B.R and A.C.), using a standardized data extraction spreadsheet that was developed iteratively to capture all relevant information. Data extraction included:

i. Year of publication;
ii. Complete reference with authors' names;
iii. Study design and type;
iv. Study period;
v. Country and city of study's implementation;
vi. Sample size (study sample included in the study/article);
vii. Country of origin;
viii. Phase of the migration process (arrival, transit, destination);
ix. Study population included/described in the articles (e.g. migrants, health workers);
x. Category of migrants or health workers (e.g. migrants in general, refugees, asylum-seekers, cultural mediators, medical doctors, nurses);
xi. Specific group of migrants (e.g. children, men, women, older people, adolescents);
xii. Specific clinical condition (e.g. pregnancy, chronic disease, infectious disease, mental illness, victims of violence);

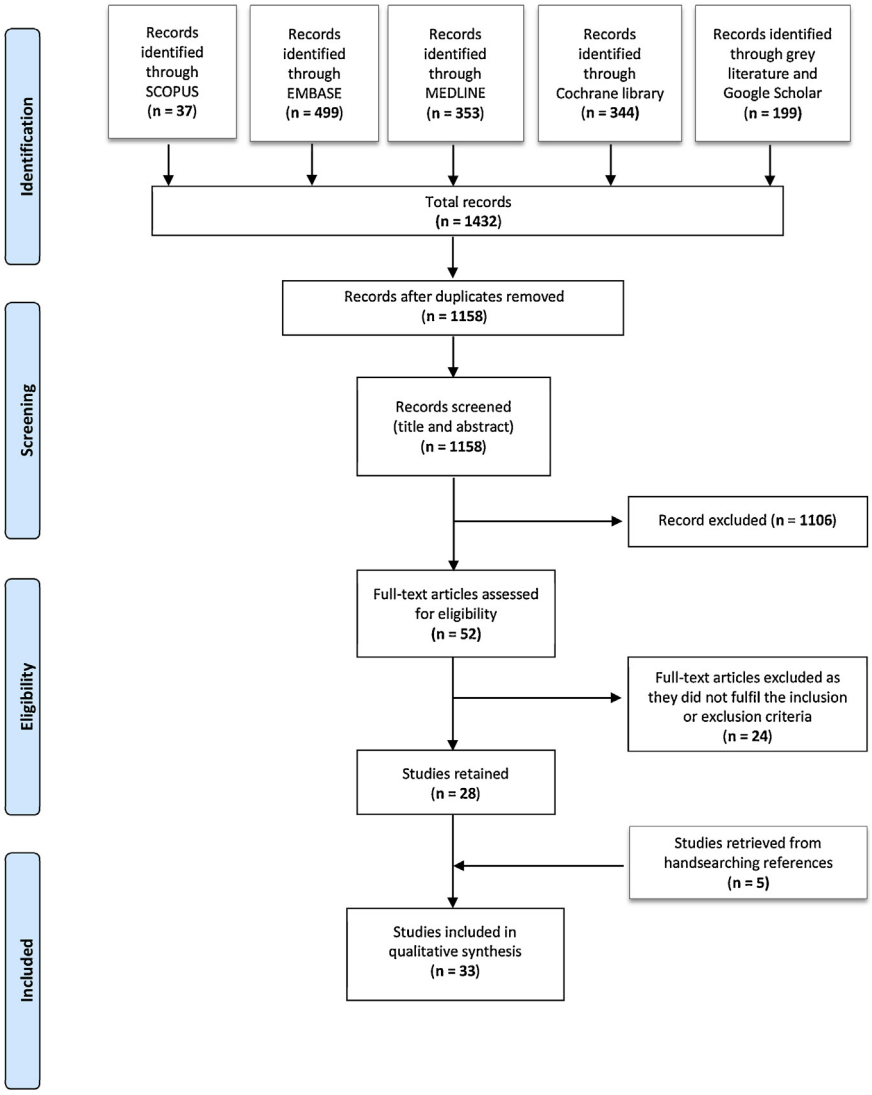

Fig. 1. PRISMA Flowchart.

xiii. Type of HR: i) Personal Health Record (electronic records - including mobile applications-, non-electronic records), ii) Electronic Medical Records, and iii) records with mixed components: Electronic Medical Records or Electronic Personal Health Records plus Personal Held Records;
xiv. HRs beneficiary (it describes to whom the HR is intended, e.g.: refugees, asylum-seekers, newly-arrived migrants, migrants in general);
xv. Use of HR (e.g. for data analysis, epidemiological evaluation, economic evaluation, research on health service access, reporting);
xvi. HR level of implementation: (e.g. in the whole country, only in some parts of the country, cross-border);
xvii. Linkage of the HR system with other spots or strategic points (e.g. local, national or international level) and with other databases;
xviii. Name of the HR;
xix. Name of the organization that implemented the HR (e.g. International Organization for Migration), type of data collected in the HR (e.g. immunization);
xx. Type of health care setting and health services in which the HR has been implemented;
xxi. Data on HR feasibility and limitations;
xxii. Information related to the type of staff that can access and manage the HR;
xxiii. Information related to staff training on HR utilization.

The results of the systematic review are presented below in the form of a narrative synthesis. Because of the heterogeneity of included studies, no meta-analysis could be undertaken.

3. Results

The literature search yielded an initial list of 1432 records that provided 58 relevant articles or reports after the first screening of title and abstract. Articles or reports were screened and selected as illustrated in Fig. 1. After the second screening based on full text, 33 records were retained [12–44].

3.1. General description of the selected articles or reports

The articles or reports included in the review are shown in Table 1. Most articles (76%) were published between 2011 and 2018. The most common type of studies were cohort studies (30% of studies), followed by cross-sectional studies (27% of studies), while the most common study period was from one to three years (41% of

Table 1
Articles included in the Systematic Review.

Year of publication	Author/s	Title	Name of the Health Record	Study type and design	Sample size (n)	Study Population	Training on the use of Health Record	Level of Health Record Implementation	Link of Health Record system with other centres	Integration of Health Record with other database	Funding for Health Record implementation
Organization/s involved: Central Agency for the Reception of asylum seekers (COA) and Community Health Services for Asylum Seekers (MOA)											
2014	Goosen S., et al.	High diabetes risk among asylum seekers in The Netherlands.	MOA a nationwide electronic medical records database from the community health services for asylum seekers	Observational - cohort	1227	Migrants	Na	Nationally	Yes, at the national level	Yes, with demographic and reception data	Na
2015	Goosen S., et al.	High HIV Prevalence among Asylum Seekers Who Gave Birth in the Netherlands: A Nationwide Study Based on Antenatal HIV Tests.		Observational - cohort	4854	Migrants	Na	Nationally	Yes, at the national level	Yes, with demographic and reception data	Na
2015	Goosen S., et al.	Frequent relocations between asylum-seeker centres are associated with mental distress in asylum-seeking children: a longitudinal medical record study.		Observational - cohort	8047	Migrants	Na	Nationally	Yes, at the national level	Yes, with demographic and reception data	Na
Organization/s involved: European Commission, Consortium of the Common Approach for Refuges and other migrants' health (CARE) project											
2016	European Commssion	Common Approach for Refugee and other migrants' health. HEALTH TRACKING AND MONITORING SYSTEM - User manual.	No specific name	User manual	Na	Na	Yes	Some Spots	Yes	Yes	Yes
Organization/s involved: US Department of Education (ED), with direction from Congress											
Na	US Department of Education	Migrant Student Record Exchange Initiative.	Migrant Records Exchange Initiative	Document	Na	Migrants	Yes	Internationally	Yes	Na	Yes
Organization/s involved: UK Department of Health											
2007	Department of Health	Personal Health Record for Asylum Applicants and Refugees.	Personal health record for asylum applicants and refugees	Document	Na	Migrants	Na	Nationally	Na	Na	Na
Organization/s involved: Health Authorities and the National Asylum Support Service (NASS)											
2002	Blackwell D., et al.	An interim report of health needs assessment of asylum seekers in Sunderland and North Tyneside.	No specific name	Observational - cross sectional	397	Migrants	Na	Locally	No	No	Na
Organization/s involved: International Rescue Committee (IRC), NetHope Solutions, UNHCR											
2017	Seth O.	Webinar recap: Electronic medical solutions in low-resource settings.	CliniPAK Suite form Vecna cares	Web page	Na	Migrants	Yes	Locally	Na	Yes	Yes
Organization/s involved: Commissariat for Refugees and Migration											
2015	WHO Regional Office for Europe	Serbia: assessing health-system capacity to manage sudden large influxes of migrants.	No specific name	Report	Na	Health Providers	Na	Locally	Na	Yes, with the electronic database of all asylum-centre beds in the country and the database of the police	Na
Organization/s involved: International Organization for Migration with the support from the European Commission and the contribution from the European Centre for Disease Prevention and Control											
2015	International Organization for Migration, European Commission	Handbook for Health professionals. Health assessment of refugees and migrants in the EU/EEA.	Re-HEALTH	User Manual	Na	Health Providers	Yes	Internationally	Na	Yes	Yes
2015	International Organization for Migration, European Commission	Personal Health Record.		Document	Na	Migrants	Yes	Internationally	Na	Yes	Yes

Table 1 (*Continued*)

2017	International Organization for Migration	Launch of the 'Re-HEALTH2, Implementation of the Personal Health Record as a tool for integration of refugees in EU health systems project.	Re-HEALTH2	Web page	Na	Na	Yes, Via Face-To-Face And Online Training.	Internationally	Yes	Yes	Yes
2018	International Organization for Migration	Re-Health2. Migration's Health–A Multisectoral Challenge.		Web page	Na	Migrants	Yes, Via Face-To-Face And Online Training.	Internationally	Yes	Yes	Yes
2018	International Organization for Migration	Re-Health2. Electronic Personal Health Record Proves its Efficiency.		Web page	Na	Migrants	Yes, Via Face-To-Face And Online Training.	Internationally	Yes	Yes	Yes
Na	International Organization for Migration	International Organization for Migration (IOM). Re Health 2. Contributing to the integration of newly-arrived migrants and refugees in the EU Member States' health systems.		Web page	Na	Na	Yes, Via Face-To-Face And Online Training.	Internationally	Yes	Yes	Yes
Organization/s involved: Bosina Ministry of Health, United Nations and NGOs											
1996	McMaster P., et al.	Personal child health record and advice booklet programme in Tuzla, Bosnia Herzegovina.	Personal child health record and advice booklet	Observational - cross sectional	571	Migrants	Na	Locally	Na	Na	Na
Organization/s involved: UK National Health System											
2010	Campion P., et al.	After Wilberforce: an independent enquiry into the health and social needs of asylum seekers and refugees in Hull.	Sheffield model of the Personal Health Record	Observational - cross sectional	Na	Migrants	Na	Locally	Na	Na	Na
Organization/s involved: Refugee Health Initiative (RHI)											
2015	Martel N., et al.	The refugee health passport: A portable medical history tool that facilitates communication for newly arrived refugees in interpretation-limited, acute care settings.	Refugee Health Passport (RHP)	Observational - cross sectional	Na	Migrants	Yes (Students)	Locally	Na	Na	Na
Organization/s involved: St. Joseph's Vineyard Worker Services, and the Community Health Resource and Development Center, the Rural Community Assistance Corporation and the California Endowment											
2017	Solomon C.	Internet Medical Records for Migrant Workers.	MiVIA/VIA: visitantes informatioń acceso (access to visitors' information). VIA is a customization of FollowMe,	Opinion paper	Na	Migrants	Yes	Internationally	Yes	Yes	Yes
Organization/s involved: The Kosovar Refugee Medical Surveillance Group											
1999	Letizia T.	Setting up and managing the Safe Haven Health Information Services. A health information manager's experience. Health Inf Manag.	Safe Haven Health Information Services	Opinion paper	Na	Migrants	Na	Locally	Yes	Yes, with: maternal-child, mental health, radiology, and pathology services and Hospital's in-house computer system and the staff from the Victorian Foundation for Survivors of Torture.	Na
2000	Bennett C., et al.	Operation Safe Haven: an evaluation of health surveillance and monitoring in an acute setting.		Observational - cross sectional	3920	Migrants	Na	Locally	Yes	Yes, the database linked personal information (name, date of birth and sex) with the 'CampID' number. The tuberculosis data were entered in a separate database.	Na

Organization/s involved: The United Nations Relief and Works Agency for Palestine Refugees in the Near East UNRWA											
2012	Khader A., et al.	Cohort monitoring of persons with diabetes mellitus in a primary healthcare clinic for Palestine refugees in Jordan.	UNRWA Electronic Medical Record system	Observational - cohort	2851	Migrants	Na	Internationally	Na	Yes, with the pharmacy and the laboratory, and these are connected to a central server that stores the data.	Na
2012	Khader A., et al.	Cohort monitoring of persons with hypertension: an illustrated example from a primary healthcare clinic for Palestine refugees in Jordan.		Observational - cohort	4130	Migrants	Na	Internationally	Na		Na
2014	Khader A., et al.	Treatment outcomes in a cohort of Palestine refugees with diabetes mellitus followed through use of EHealth over 3 years in Jordan.		Observational - cohort	119	Migrants	Na	Internationally	Na		Na
2015	Shahin Y., et al.	Diabetes care in refugee camps: the experience of UNRWA.		Observational - cohort	Na	Migrants	Na	Internationally	Na		Na
2015	Department of health	Department of health annual report 2014. United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA).		Report	Na	Migrants	Na	Internationally	Yes	Na	Yes
2017	Ballout G., et al.	Development and Deployment of an e-Health System in UNRWA Healthcare Centers (HCs): The Experience and Evidence.		Observational - cohort	Na	Migrants	Na	Internationally	Na	Yes	Na
No specific organization involved or mentioned by the authors											
2018	Giambi C., et al.	National immunization strategies targeting migrants in six European countries.	No specific name	Observational - cross sectional	Six public health experts	Health Providers	Na	Na	Depends on the country		Na
2017	Giambi C., et al.	Immunization Strategies Targeting Newly Arrived Migrants in Non-EU Countries of the Mediterranean Basin and Black Sea.	No specific name	Observational - cross sectional	Fifteen national experts on vaccinations	Health Providers	Na	Na	Na	Na	Na
2017	Borsari L	An Innovative Mobile Health System to Improve and Standardize Antenatal Care Among Underserved Communities: A Feasibility Study in an Italian Hosting Center for Asylum Seekers.	The Pregnancy and New-born Diagnostic Assessment (PANDA)	Observational - cross sectional	Hundred and fifty pregnant women	Migrants	Yes	Locally	Na	Yes, with the referral hospital for follow-up	Yes
2017	Doocy S., et al.	Pilot Testing and Implementation of a mHealth tool for Non-communicable Diseases in a Humanitarian Setting.	No specific name	Observational - cohort	793	Migrants	Yes	Locally	Na	Na	Na
2017	Doocy S., et al.	Guidelines and mHealth to Improve Quality of Hypertension and Type 2 Diabetes Care for Vulnerable Populations in Lebanon: Longitudinal Cohort Study.	No specific name	Observational - cohort	793	Migrants	Yes	Locally	Na	Na	Na
2011	Schoevers MA.	"Hiding and seeking": health problems and problems in accessing health care of undocumented female immigrants in the Netherlands.	No specific name	Observational - cross sectional	100	Migrants	Na	Locally	No	No	Na

Note: Na: Not available

studies). Based on our search of the grey literature, we also included a number of relevant webpages as well as institutional reports (such as from the European Commission or IOM) that provided information on Health Records for migrants and refugees, although often with only narrative evidence on their strengths and weaknesses.

Most of the studies or reports (55% of studies) came from the WHO European Region, followed by the WHO Eastern Mediterranean Region (24%), while the WHO African Region was the least represented (3%). Most of the publications (90%) focused specifically on migrants, while articles focusing on health workers were scant (10%). The migrant population samples used in the different studies varied from only 100 to as much as 8047 migrants. On the contrary, samples were very small in studies exploring health workers' perspectives [21,31,32].

3.2. Characteristics of the Health Records identified

Among the 33 articles reviewed, 20 different types of HRs were identified. Some publications refer to the same HR, as it was implemented by the same organization/s and/or in the same country. In addition, 2 multicentric studies by Giambi et al. [31,32] in which several HRs were carried out across different countries were included. Table 2 shows the characteristics of the studies addressing HRs included in the review.

Types of Health Records

The different types of HRs (Table 2) identified include the following:

1. Personal Health Record–PHR ($n = 12$):
   a) Non-electronic Personal Health Record ($n = 7$), which are usually defined as Patient Held Personal Records. These are paper records;
   b) Electronic Personal Health Records – e-PHR ($n = 5$), including 2 PHRs with mobile applications [27,29,30].
2. Electronic Medical Records – EMR ($n = 3$).
3. Mixed components HRs ($n = 3$): electronic component (Electronic Medical Record or Electronic Personal Health Record) plus non-electronic component (held/paper record) [21,25,39,45].
4. Other HRs ($n = 2$): these include two multicentre studies by Giambi et al. that could not be classified under a single HR as they describe national immunization strategies implemented across different countries [31,32].

Countries covered

HRs were mostly realized in Italy ($n = 4$) [14–17,20,27,31], the United Kingdom (UK) [22,26,28], Serbia [14–17] and Greece [14–17,20,31] (3 HRs each) (Table 2). It is important to point out that HRs realized in the UK [22,26,28] were exclusively Patient Held Records, while in Italy, Greece and Serbia both Patient Held Records and Electronic Personal Health Records were realized. The HRs used in Jordan, Lebanon, Syria, the West Bank and the Gaza Strip by the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) [19,24,36–38,44] and those in Greece, Italy, Croatia, Slovenia, Cyprus, Romania and Serbia by the International Organization for Migration (IOM) [12–17] were implemented internationally. The Migrant Student Record Exchange Initiative [23] and the Internet Medical Records for Migrant Workers are realized and available across the United States [45]. In contrast, some HRs identified in the UK [22] and the Netherlands [33–35] were implemented only nationally and other HRs were performed only in strategic spots [20] or locally.

Functions of HRs

With regard to their main functions, all HRs covered by this review had the aim to improve access to and utilization of health services. In addition, they were mainly used for data collection, monitoring and reporting ($n = 15$; 75%) [12–17,19–21,23,25,27,29–34,36–39,43,44], initial health assessments ($n = 7$; 35%) [12–17,20–22,25,33–35,39] and the surveillance of communicable diseases ($n = 6$; 30%) [14–17,19,21,24,25,31,32,36–39,44].

Content of HRs

HRs have been introduced in the United States for seasonal migrant workers [3,45] and migrant students [23], and in Canada in form of the Refugee Health Passport [40], a portable medical history tool for newly arrived refugees in acute care settings. The Refugee Health Passport "is a held booklet, that includes: 1) a streamlined medical history relevant to acute care situations; 2) space for medical professionals to add new information and 3) a basic medical translation tool, for the language of the passport holder" [40]. The UNRWA started, in 2009, to develop an electronic records system (e-Health) in order to provide primary health care for 5 million Palestine refugees in Jordan, Syria, Lebanon, the West Bank and Gaza through its 143 health centres [24,46].

The IOM, with funding from the European Commission, implemented in several strategic EU spots, in 2015, a Personal Health Record (PHR) as part of the *Re-Health* action aimed at improving the capacity of EU member states under particular migratory pressure [15]. The PHR [12] includes in a single document health data and information to help health professionals get a comprehensive view of their patients. In addition, the project resulted in an accompanying Handbook for Health Professionals to evaluate the health status and needs of refugees and migrants [13]. Within this project, an electronic Personal Health Record (e-PHR) and an electronic platform were developed and piloted in four EU member states: Greece, Italy, Croatia and Slovenia. In 2016, after the initial piloting phase within the *Re-Health* project, the *Re-Health*^{2} action – *Implementation of the Personal Health Record as a tool for integration of refugees in EU health systems* was launched, covering three additional countries (Cyprus, Romania and Serbia). In 2018, after the first two months since the introduction of the e-system in Serbia, the e-PHR tool was reported on the IOM website to have proved its efficiency [17]; more than 400 electronic e-PHRs were collected in the Asylum Centre Krnjaca (Belgrade), including some migrants with e-PHRs initiated in Greece, and over 300 return visits and follow-up notifications were recorded [16,17], although it is unclear how efficiency was measured. Other examples include the e-PHR realized for the 4000 Kosovar refugees in Australia for temporary sanctuary in the operation "Safe Haven" [25,39]. In this project, an e-PHR was provided to each refugee who attended the Haven Health Centre, which was then shared between maternal and child health services, the mental health team and staff from the Victorian Foundation for Survivors of Torture to achieve continuity of patient care.

Building on IOM's PHR, which was initially provided in a patient-held paper format [12], the CARE project [20] entailed the development of an integrated e-PHR. In addition, a portable device was given to migrants and refugees, containing their personal medical history, as well as information on any treatment provided. This Personal Health Record has been introduced in the hotspots of Lampedusa and Trapani (Sicily, Italy) and Koss and Leros (Greece) in order to monitor and track migrants' and refugees' health status, with the aims of ensuring continuity of care, avoiding duplications in health treatment, reduce costs, and establish mechanisms of cooperation between countries of origin, transit and destination.

Process and protocol of Health Records

Overall, the HRs identified in this review collected data on medical history, with the exception of the articles by Giambi et al. [31,32] which were mostly focused on vaccinations and the ver-

Table 2
Characteristics of the identified Health Records for migrants and refugees.

NAME ORGANISATION/S INVOLVED AUTHOR/S	COUNTRY/IES	HEALTH-CARE SETTING	HEALTH RECORD BENEFICIARY	DATA COLLECTED IN THE HEALTH RECORD																				
				Medical History	Clinical Examination	Vaccinations	Communicable Diseases	NCD	Allergies	Clinical measurements	Sexual Health	Child and obstetric Care	Referrals	Oral Health	Mental Health	Other Specialists	Medications	Tests	Clinical Recommendation	Follow-Up	Daily Living Activities	Lifestyle - Health Education	Different Languages/Translation Tool
1. PERSONAL HEALTH RECORDS																								
a) NON-ELECTRONIC PERSONAL HEALTH RECORDS/ PATIENT HELD PERSONAL RECORDS																								
Health Authorities and the National Asylum Support Service (NASS) Blackwell D, 2002 [1]	UK	Multiple settings	Asylum seekers with: - multiple health conditions	•		•			•	•							•					•		
Exploratory study to assess the use and acceptability of a PHR (no specific name) Schoevers MA, 2011 [2]	The Netherlands	primary care center/s and GPs	Undocumented women with: -psychosocial and gynaecological problems	•			•	•	•		•	•			•		•	•						
Personal child health record and advice booklet - Ministry of Health, United Nations, and NGOs McMaster P, 1996 [3]	Bosnia	Multiple settings	Displaced children with: - multiple health conditions	•				•		•		•												
Personal health record for asylum applicants and r(A)efugees - National Health System Department of Health, 2007 [5]	UK	Multiple settings: primary care, Centres for Asylum Seekers and dental clinics	Asylum seekers and refugees with: - multiple health conditions	•		•	•		•		•	•	•		•		•				•	•	•	
Refugee [illegible]ment (RHP) - Refugee Health Initiative (RHI) Martel N, 2015 [6]	Canada	Acute care settings	Newly Arrived Migrants with: - acute encounters	•		•	•										•							•
Re-HEALTH IOM, European Commission and the contribution from the ECDC [7,8]	EU/EEA	Multiple: hotspots, reception or registration centres, hospitals or primary care centres.	Newly-arrived migrants and refugees with: -multiple health conditions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
Sheffield model of the Personal Health Record - National Health System Campion P, 2010 [4]	UK	Dedicated service for asylum seekers	Asylum seekers with: - multiple health conditions	•		•	•		•		•	•	•		•		•				•	•	•	
b) ELECTRONIC PERSONAL HEALTH RECORDS																								
mHealth tool for NCDs - International Organization for Migration or the International Medical Corps - Record with mobile application Doocy S, 2017 [9,10]	Lebanon	10 primary care center/s	Refugees with: - Hypertension and/or DM type 2	•	•			•		•								•				•		
The Pregnancy and Newborn Diagnostic Assessment (PANDA) - Record with mobile application Borsari L, 2017 [12]	Italy	Centre for Asylum Seekers	Migrants: - during pregnancy	•						•		•										•		
HEALTH TRACKING AND MONITORING SYSTEM - Consortium of the Common Approach for Refuges and other migrants' health (CARE) project - The record is stored into the USB device CARE. Users manual, 2017 [11]	Italy and Greece	Hotspots	Migrants with: - multiple health conditions	•	•	•	•					•			•				•					
Migrant Records Exchange Initiative - Department of Education (ED), with direction from Congress Migrant Student Record Exchange Initiative [13]	USA	Multiple settings	Migrant students with: - multiple health conditions	•		•																		
Re-HEALTH2 IOM, European Commission and the contribution from the ECDC [14,15]	Greece, Italy, Croatia, Slovenia, Cyprus, Romania and (14-17)	Multiple: hotspots, reception or registration centres, hospitals or primary care centres	Newly-arrived migrants and refugees with: - multiple health conditions	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

2. ELECTRONIC MEDICAL RECORDS																								
NAME ORGANISATION/S INVOLVED AUTHOR/S	COUNTRY/IES	HEALTH-CARE SETTING	HEALTH RECORD BENEFICIARY	DATA COLLECTED IN THE HEALTH RECORD																				
				Medical History	Clinical Examination	Vaccinations	Communicable Diseases	NCD	Allergies	Clinical measurements	Sexual Health	Child and obstetric Care	Referrals	Oral Health	Mental Health	Other Specialists	Medications	Tests	Clinical Recommendation	Follow-Up	Daily Living Activities	Lifestyle - Health Education	Different Languages/Translation Tool
CliniPAK Suite form Vecna cares - International Rescue Committee (IRC), NetHope Solutions, UNHCR Seth O, 2017 [16]	Kenya	Multiple settings: refugee camp with two in-patient hospitals, four clinics, and several pharmacies	Refugees with: - multiple health conditions	•													•	•						
MOA nationwide electronic medical records database - the community health services for asylum seekers Goosen S, 2015 [18] Goosen S,2014 [20] Goosen S, 2013 [21]	The Netherlands	Centres for Asylum Seekers	Asylum seekers with: - HIV during pregnancy Asylum seekers with: - DM type 1 - DM type 2 Asylum-seeking children with: -mental health distress	•			•	•			•	•			•		•	•						
UNRWA - Electronic Medical Record system Khader A, 2012 [22,23] Khader A, 2014 [24] Shahin Y, 2015 [25] UNRWA, 2015 [26] Ballout G, 2017 [27]	Jordan, Lebanon, Syria, West Bank and the Gaza Strip	primary care center/s	Refugees with: - DM type 1 - DM type 2 - DM type 2 and hypertension	•			•	•				•	•	•	•	•	•	•		•				
3. MIXED COMPONENT RECORDS																								
Safe Haven - The Kosovar Refugee Medical Surveillance Group Electronic medical record plus paper record Bennett C, 2000 [28] Letizia T, 1999 [29]	Australia	Multiple setting: a reception centre and 8 haven centres in five states	Refugees with: - multiple health conditions	•	•	•	•	•				•	•	•	•	•	•	•		•				•
Commissariat for Refugees and Migration Electronic medical record plus paper record WHO Regional Office for Europe, 2015 [30]	Serbia	Centres for Asylum Seekers	Asylum seekers with: - multiple health conditions	•	•	•	•	•				•	•					•						
MIVA/VIA: visitantes informatorin accesso (access to visitors' information) - St. Joseph's, Vineyard Worker Services, and the Community Health Resource and Development Center Electronic Personal Health Record and emergency photo-ID card with current medical conditions and primary care provider Solomon C, 2017 [31]	USA, California	Multiple settings: health clinics, the St. Joseph Health System's mobile medical units, and hospital emergency rooms	Migrant farmworkers and their families with: - multiple health conditions	•					•								•	•	•					
4. OTHER HEALTH RECORDS																								
National immunization strategies in Non-European Countries - National Health Systems Giambi C, 2017 [32]	Albania, Algeria, Armenia, Bosnia & Herzegovina, Egypt, Georgia, Israel, Jordan, Kosovo, Moldavia, Palestine, Republic of Macedonia-FYROM, Serbia, Tunisia, and Ukraine	Multiple settings	Newly Arrived Migrants: - Immunisation status and vaccinations			•																		
National immunization strategies in European Countries - National Health Systems Giambi C, 2018 [33]	Croatia, Greece,, Malta, Portugal and Slovenia	Multiple settings	Irregular migrants, refugees and asylum seekers: - Immunisation status and vaccinations			•																		

ification of previous immunisations through a specific anamnesis or verification of immunization cards. Other data frequently collected in HRs encompassed: vaccination uptake and immunization status (65%, $n = 13$), child and obstetric care ($n = 12$, 60%) and medications ($n = 12$, 60%). In contrast, data related to follow-up, daily living activities, oral health and specialists were rarely collected.

More than half of HRs (55%) were implemented in multiple settings, including hotspots, reception or registration centres, hospitals and primary care centres. The HRs were also implemented specifically in primary care centres ($n = 3$, 15%) [19,29,42] and in centres for asylum-seekers ($n = 3$, 15%) [21,29,33–35], while dedicated services for asylum-seekers [28], hotspots [20] and acute care settings [40] were only mentioned in one HR each.

Health Records were targeted at refugees ($n = 4$), asylum-seekers ($n = 4$), newly-arrived migrants and refugees ($n = 4$), and migrants in general ($n = 4$), with the latter including one HR dedicated to migrant farmworkers and one dedicated to migrant students.

Who accesses and manages Health Records?

Importantly, Health Records classified as "Personal Health Records" are accessed and managed by patients. In contrast, an Electronic Medical Record (EMR) is typically controlled by a medical

facility or health worker, and not by the patient, while Patient-Held Personal Records (or paper records) are accessed by the patients; health workers can access them upon patients' consent. Among the 5 e-PHRs identified, in only 3 e-PHRs it is clearly stated by the authors that they can be controlled or accessed by patients [23,29,30]. The health care providers allowed to access and manage the HRs include medical doctors and, in some cases, community health workers, cultural mediators [27], pharmacists or lab technicians [43], nurses and clerks [36–38,44].

In the e-PHR implemented by IOM [14–17] health workers are granted different levels of permission (i.e. registration, signing medical services, and completing medical forms). Information related to the training of health workers, e.g. through face-to-face and online training, on the use of HRs was given with regard to 7 HRs [12–17,20,23,27,29,30,43,45], including medical students [40].

The MiVIA/VIA [MiVIA stands for "my way" in Spanish, VIA stands for "*visitantes informatioń acceso*", access to visitors' information] system [45] implemented in California for migrant farmworkers since 2003 is a mixed component record, including an Electronic Personal Health Record and an emergency photo-ID card with information on current medical conditions. Migrant workers are enrolled in the MiVIA/VIA system together with trained health promoters [*promotores de salúd*], community members who bridge language and culture gaps to provide health information and access to services. In particular, health promoters enter the migrant workers' medical history and inform them about their health care rights [45]. The migrant farmworkers are then given the emergency photo-ID cards, login and password information, and trained in how to access their records. Health care providers access the medical records via the Internet when migrants utilize services, after having been given login and password details by the migrant workers.

With regard to Personal Held Records, in a study conducted in the Netherlands [42], undocumented female migrants received instructions on how to use these records from research assistants. The women were asked to present their Personal Held Records to health care providers when needed and a letter was sent to every patient's GP, outlining the aim of the record and asking for their collaboration [42].

Data-sharing with other facilities, centres or spots and integration with other databases

Information on data-sharing with other facilities, centres or spots where the same HR was implemented was provided with regard to 7 HRs [14–17,19,20,23,25,33–35,39,45].

Information on the integration with other databases was identified in 10 HRs, in particular with regard to demographic data [25,33–35], reception data [33–35], referral hospital/s [27,39], maternal and child health services, mental health services, radiology databases [39], electronic databases of all asylum-centres and police databases [21].

Ownership and funding of Health Records

Only in seven HRs [12–17,19,20,23,27,43,45] information on sources of funding was given, including the "Common Approach for Refugees and other Migrants' Health" [20] which has received funding from the European Union's Health Programme (2014–2020).

The RE-Health and RE-Health 2 actions [12–17] implemented by IOM received funds from the European Commission, the HR implemented by UNRWA in Jordan, Lebanon, Syria, the West Bank and the Gaza Strip received financial support from the United States of more than 1.8 million US$ [19], and the "Mobile Health System to Improve and Standardize Antenatal Care Among Underserved Communities" [27] implemented in Italy was funded by European Regional Development Fund (ERDF).

3.3. Reported strengths and weaknesses of Health Records

Table 3 provides an overview of the reported strengths and weaknesses associated with each type of HR. Electronic records, including Electronic Personal Health Records and Electronic Medical Records, were reported to have numerous benefits compared to paper records. However, the types of evidence on which these assessments were made differed across studies and reports, with some using cohort or cross-sectional designs and others being based on narrative or institutional evidence (see Table 1).

Electronic Personal Health Records

Advantages of Electronic Personal Health Records reported in scientific articles included improved quality and continuity of care; health literacy, with records being accessed and managed by patients (including health education tools using facilitating graphic interfaces) [27]; health outcomes for patients [27,29,30]; adherence to guidelines [27,30] and improved patient satisfaction [27].

Advantages of Electronic Personal Health Records reported in narrative and institutional reports included improved referrals to primary, speciality and tertiary care [45]; standardization of health assessments [12–17] and culturally competent health-care [17,20,45]. Electronic Personal Health Records were also considered in narrative and institutional reports to be efficient tools for registering, tracking and monitoring migrant health [12–17,20,45] and health professionals were reported to view them positively [45].

Electronic Medical Records

Both scientific and narrative or institutional reports noted advantages of Electronic Medical Records. Scientific studies reported improved access and quality of care [36–38]; and time-savings through reduced workload of health staff [38]; the number of consultations per doctor [24]; and the time needed to collect prescribed medication [24]. In addition, EMRs were reported to improve the accuracy and reliability of statistical information, allowing for evidence-based planning and management [24,36,37,44]; medication appropriateness [24]; health worker performance and satisfaction [24]. EMRs were also reported to reduce costs [24,36–38,44].

Similarly, narrative or institutional reports noted improved access and quality of care [19,43]; as well as time-savings through reduced: paper work [19,43]; workload of health staff [19,38]; patient waiting time [19]; the number of consultations per doctor [19,24]; and the time needed to collect prescribed medication [19,24]. In addition, EMRs were reported to improve the accuracy and reliability of statistical information, allowing for evidence-based planning and management [19,24,36,37,43,44]; health worker performance and satisfaction [19,24] and access to data and reports [43]. EMRs were also reported to allow for the decentralized working of health centres [19] and to reduce costs [19,24,36–38,43,44].

HRs with mixed components, including non-electronic and electronic components, were reported in both scientific and narrative reports to improve data linkage, and the timely searching, sorting and collating of data.

Patient Held Personal Records

In contrast, Patient Held Personal Records were reported in both scientific studies and narrative or institutional reports to have several weaknesses. Scientific studies reported a lack of data-sharing between countries [32] and within the same country [25].

Narrative or institutional reports pointed to the lack of time for prescribing diagnostic or therapeutic interventions and for follow-up, in cases in which migrants only stay for a short period of time [21]. Health authorities underlined that Patient Held Personal

Table 3
Benefits and weakness reported by type of Health Record.

Type of Health Record	Benefits reported	Weakness reported
1. PERSONAL HEALTH RECORDS		
a) NON-ELECTRONIC PERSONAL HEALTH RECORDS/ PATIENT HELD PERSONAL RECORDS	▪ It is described as good practice and its implementation is recommended[4] ▪ Improved of health staff satisfaction[3] ▪ Provided health education material[3] ▪ Provided cultural competence health-care[6]	▪ Asylum seekers do hold Patient Held Personal Record, but they were seldom used[4] and reasons for not taking the HR to the health professional included the following[2]: - it is not needed because data were already in the computer; - Loss of the Patient Held Personal Record; - Forgot the Patient Held Personal Record; - Lack of understanding of the purpose; - the health professionals were not interested. ▪ Professionals expressed that the additional time investment was a problem[2] ▪ Non-attendance of approximately half of the patients due in particular to Illiteracy [3]
b) ELECTRONIC PERSONAL HEALTH RECORDS	▪ Improved quality and continuity of care, health literacy (with: Health education tools through facilitated graphic interface [11], and health outcomes for patients[9-11] ▪ Improved adherence to guidelines[10, 11] ▪ Improved patient satisfaction [11] ▪ Efficient tool for registering, tracking and monitoring migrants' health, with improved quality and continuity of care [7, 8, 12, 14-17, 31] ▪ Improved standardization of health assessment[7, 8, 14-17] ▪ Provided cultural competence health-care[12, 17, 31] ▪ Professionals considered the e-PHR positively and have made constructive suggestions for improving the software[31] ▪ Improved referrals to primary, speciality and tertiary care[31] ▪ Patient education and advocacy tools[31] ▪ Shared data between providers and family members[31]	▪ Low provider uptake of the application: *mHealth* application was used in a minority of consultations[9] ▪ Frustration among users when the app did not perform as expected, requiring frequent software updates, which reduced provider enthusiasm[10]
2. ELECTRONIC MEDICAL RECORDS		
	▪ Improved access and quality of care[18, 22-24, 26] including: - patient-level data for clinical decision-making in real-time; [18] - clinical decision support for diagnosis and treatment; [18] - standardization of the patient care and referrals; [18] - Increased the doctor's-patients contact time.[26] ▪ Time saving[18] including: - Reduced paper work;[18, 26] - Reduced the workload on health staff; [23, 26] - Decreased the patient's waiting time;[26] - Managing the crowds in a timely manner and with fairness;[27] - Reduced the number of the daily medical consultations per doctor; [26, 27] - Reduced the time needed to collect prescribed medication. [26, 27] ▪ Improved the accuracy and reliability of statistical information, thereby the quality of evidence-based planning and management [18, 22, 24-27] ▪ Improved drugs appropriateness (e.g.: Antibiotics)[27] ▪ Improved of health staff performance [26] and health staff satisfaction[27] ▪ Strengthen the decentralization of health centres[26] ▪ Reduced costs[18, 22-27] ▪ Improved timely access to data and reports[18] ▪ Increased engagement in data use[18]	▪ Initial problems with incomplete recording practices[24] ▪ Operational challenges in increasing losses to follow-up[25]
3. MIXED COMPONENT RECORDS		
	▪ Improved data linkage, timely searching, sorting and collating of data with the computerized health databases [28]	▪ Health authorities underlined that Individual cards are possibly lost during the long journey or destroyed on purpose to eliminate any document that could allow the migrant's identification for the fear of legal consequence[30] ▪ Lack of data sharing among different countries[32] and within the same country[28] ▪ Many migrants come over the weekend and stay only a short while, so there is not enough time to organize medical checks, laboratory investigations and X-rays[30] ore migrants are gone by the time the results become available[30] ▪ Lack of resources to maintaining the health surveillance system for the entire period of evacuee intake[28]

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Records are possibly lost during the long journey or destroyed on purpose to eliminate any document that could allow the migrant's identification for fear of legal consequences [21,32]. In addition, Patient Held Personal Records were reported to be rarely used by migrants [28]. Reasons for not taking Patient Held Personal Records when utilizing health care include the loss of documents, as well as lacking understanding of their purpose [41]. In some cases health professionals were reported to have found the additional time investment to be a problem [42] or were reportedly not interested in the use of Patient Held Personal Records [41].

Discussion

To our knowledge, this is the first systematic review on HRs focusing specifically on migrants and refugees, identifying 20 different HRs described in 33 articles or other sources. In 2009 Schoevers et al. attempted to conduct a systematic review on Personal Held Records for undocumented immigrants [2] but could retrieve no studies, and the authors decided to perform a broader search about the use of HRs for the general population. Most articles (76%) included in our systematic review were published later (between 2011 and 2018), indicating increasing interest in the topic.

Some countries (the United States, Australia and several EU member states) implemented a nationwide Electronic Personal Health Record for the general population as a single record and readily available, encompassing all the care given to an individual by different health workers and health care settings, obtained through the registration of data at the time and place where health care is being provided (both in inpatient and outpatient care) [7,47–49].

Considering that in many countries a national electronic health record has not yet been implemented, the Electronic Personal Health Record, available at any time in any place for all health professionals, might be a feasible and appropriate solution for migrants and refugees that often move to other cities, regions or countries, and consult different health care settings and health-care workers.

Migrants often experience difficulties in navigating health systems, and may face gaps in continuity of care, barriers to communication with health professionals, frequent changes in address, and duplication of diagnostic and therapeutic interventions (e.g. vaccinations, blood tests, and screening for infectious diseases). HRs offer the potential to address some of these challenges and may increase the willingness of migrants to access the health services available to them [2].

Despite this, HRs – especially those related to vaccinations and infectious diseases – are in some countries an instrument to decide on the admission of migrants and not necessary for improving the health services available to them.

Our systematic review suggests that electronic HRs offer numerous potential benefits compared to Patient-Held Records. However, a qualitative study published after our literature search and conducted in six asylum-seeker reception centres in five cities in Germany [50] concluded that patient-held records can be a feasible solution if three main requirements are met: persistent use by all health workers involved in health service delivery to asylum-seekers in reception centres, patient adherence, and guidelines for local implementation" [50]. In contrast, within the PRICARE project in Germany, an electronic HR for asylum-seekers in reception centres was developed and gradually implemented in 13 reception centres in three federal states [51].

Electronic HRs encompass Electronic Personal Health Records and Electronic Medical Records; the first can be accessed and managed by migrants and refugees themselves. Among Electronic Medical Records, the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) began to implement its first EMR in primary healthcare clinics in Jordan for Palestine refugees [37,38]. Since the use of E-Health and cohort reporting was considered to be a valuable monitoring tool for managing diabetes and hypertension, the UNRWA decided to expand its cohort analysis to the other primary healthcare clinics in Jordan that already had adopted E-Health and to expand E-Health to all primary healthcare clinics in Jordan and other countries or territories in which UNRWA operates, namely the West Bank, the Gaza Strip, Lebanon and Syria [19,24,36–38,44,46]. Concerning Electronic Personal Health Records, the IOM Migration Health Division argued that health systems across the EU can use the e-PHR IOM developed for an initial health assessment, as it enables healthcare providers to access medical records of migrants from the reception to the destination country, an informed consent is given to patients and firewalls are created to ensure that health records are not used for purposes other than the provision of health care [17]. Overall, our findings suggest that electronic HRs for migrants (Table 3), especially if implemented in strategic spots, such as cross-border settings [7], could [12–17,19,20,24,25,27,29,30,36–38,43–45]:

i) improve the continuity and thus quality of care as a result of having health information readily available;
ii) improve the accuracy and quality of data recorded in a health record and collect health care information more easily (including with regard to a person's allergies, immunization status, test results, prescribing history, diagnoses, treatment and medication);
iii) provide access to health information at anytime and anywhere, provided by different health care workers in different health care settings; and

Table 3 (*Continued*)

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iv) increase the efficiency of health care delivery and contain costs by eliminating the duplication of diagnostic and therapeutic interventions.

Nevertheless, the introduction of electronic HRs can face challenges in some cases which may need to be addressed. Lack of funding, as well as lack of technology, technical expertise, technical support and computer skills of staff and patients, could be major issues to be addressed before implementation [7]. Furthermore, the resistance by some health-care workers and migrants and refugees to the adoption of HRs may need to be overcome [21,25,29,30,36,44].

Finally, migrants and refugees should be ensured the confidentiality of their data, but the diversity of health systems' quality and safety policies - especially on data protection - and the interoperability of databases pose challenges for the adoption of electronic health records, particularly in cross-border settings [5].

Our systematic review has several strengths and limitations. Strengths include that the search was conducted systematically, following the advice of an expert librarian. A protocol was registered at PROSPERO to reduce opportunity for reporting bias. We followed the PRISMA guidelines to ensure transparency and rigour of our systematic review. In addition, we did not set any limitation on the date of publication, study design and type, and the country of study implementation, in order to capture all relevant studies. However, our study has also some limitations. In order to retrieve specific findings on HRs for migrants and refugees, we excluded studies describing HRs in which migrants and refugees represented only one subcategory. Furthermore, the definitions and use of the terms PHRs, EMRs and EHRs are very heterogeneous and the literature in this field is still very limited, provided the focus is specifically on migrants and refugees. Given the small number of relevant articles or sources, we did not exclude studies by method or risk of bias, and the information on methods in some of them is very limited, making it difficult to assess their quality and the robustness of evidence on which they are based. This should be borne in mind when considering reported potential strengths and weakness of HRs.

Conclusion

The HRs identified in this review, especially the electronic ones, were reported to be efficient and effective tools for registering, monitoring and improving the health of migrants and refugees. This applies particularly to strategic spots and cross-border settings for migrants and refugees on the move and when accompanied by training of health professionals. However, the evidence on HRs for migrants and refugees is still very limited [8], methods are often poorly described, and more research is needed to better understand the advantages and disadvantages of HRs, their cost-effectiveness, and their acceptability to migrants and refugees as well as health workers.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.healthpol.2019.07.018.

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