

Review

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Optimizing people's movement across the health system: a scoping review of referral systems within a primary health care approach

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Abstract

Functional referral systems are critical to primary health care and universal health coverage. Referral and counter-referral are key relational mechanisms to link communities to the care they need and primary care to secondary and multi-sectoral services. Many referral systems are fragmented, leading to inefficiencies, coverage gaps, and compromised continuity and quality of care. In June 2024, we conducted a scoping review of PubMed, Global Index Medicus and WHO publication databases to identify referral coordination and process initiatives at national, subnational, and local levels.

We classified reports from 181 papers into non-exclusive categories based on referral system design, operational elements, service delivery platform, and/or user group. Initiatives targeting referral system design included modelling, organization and assessment methodologies. Initiatives focusing on operational elements included networks and linkages, pathways and algorithms, e-referral systems and platforms, digital processes and tools, and facility-level processes and tools.

When classified by service delivery platform, community-level initiatives emphasized improved recognition, screening, diagnosis, and communication by community health workers and use of SMS text messaging or mHealth apps. At initiating facilities, reports focused on standardizing referral criteria and protocols and optimizing communication with referral facilities, including for real-time clinical decision-making to improve timely referral and to reduce under- and over-referral. Structured algorithms and pathways were key to minimize the time between referral, diagnosis, and treatment for time-sensitive conditions. At receiving facilities, actions included supporting initiating facility clinical decision-making prior to referral, prioritizing urgent cases, and consistent counter-referral and/or onward referral.

Findings are informing WHO guidance on two-way referral systems.

Introduction

Health care referral is the explicit direction of a person seeking care from one site, provider or platform of care to another. Referral is often targeted to address specific health needs. Within this general definition, the term "counter-referral" usually characterizes the direction of a person towards primary care for continued care after the delivery of care at a higher level. Counter-referral may include, for example, a referral back to primary care for monitoring after surgery or initiation of a new long-term medication by a specialist; a scheduled primary care follow-up after an emergency unit visit or other self-presentation to secondary care; or the continuation of care at a first-level hospital closer to home after an intervention at a high-level or specialized facility.

Broadly speaking, a **referral system** is a framework that guides referral coordination, communication and processes. A referral system may include macro-level components, such as referral policy and regulation, as well as operational parameters, such as defining the boundaries within which referral can occur (e.g. provider networks), conditions of access and payment (e.g. defining capitation or out-of-pocket payments), or protocols that specify clinical criteria or mechanisms for communication and transportation among sites.

Effective referral systems optimize movement across the health system and are vital to reach the United Nations' Sustainable Development Goal 3, to ensure healthy lives and promote well-being for all ages, including achieving universal health coverage. Indeed, well-designed and well-implemented referral and counter-referral systems are a key mechanism to operationalize a primary health care (PHC) approach (World Health Assembly, 2016; World Health Organization and United Nations Children's Fund, 2020). PHC-oriented models of care are designed so that primary care is the first and regular point of contact and the center of all

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integrated health services, while robust referral and counter-referral systems with strong primary care coordination help ensure continuous, comprehensive, coordinated and people-centred care (World Health Organization and United Nations Children's Fund, 2020). Many global guidance documents have emphasized the importance of referral systems (Every Woman Every Child, 2015; World Health Assembly, 2016; World Health Organization, 2019; World Health Organization and United Nations Children's Fund, 2020). Despite this, intentional design and implementation of referral systems has been inconsistent (World Health Organization Regional Office for Europe, 2014; World Health Organization Regional Office for South-East Asia, 2019; World Health Organization Regional Office for Europe, 2023). Many referral systems have developed informally and/or in fragmented ways, leading to inefficiencies, gaps in coverage, and compromised quality of care (McCord *et al.*, 2015; Kruk *et al.*, 2018; Roder-DeWan *et al.*, 2020; Pittalis *et al.*, 2021; Rathnayake and Clarke, 2021).

The design of a referral system must account for multiple factors, including population size, density, and distribution, as well as geography, health system capacity and context, and pattern and burden of disease (Rathnayake and Clarke, 2021; Seyed-Nezhad *et al.*, 2021; Mirza *et al.*, 2024). The availability of specialized personnel, training capacity, diagnostic equipment and supplies, financial and organizational arrangements and cultural, political and geographic context all affect the implementation and evolution of referral systems (Pittalis *et al.*, 2019). For example, limited knowledge among health workers about conditions requiring referral or about available referral resources may limit the effectiveness of referral systems, even when they are well-designed (Harahap *et al.*, 2019; Pittalis *et al.*, 2021; Avoka *et al.*, 2022). Material constraints, such as lack of resources for diagnosis or limited availability of referral services, may also limit health workers' ability to make or execute decisions about referral (Rathnayake and Clarke, 2021; Avoka *et al.*, 2022; Napierala *et al.*, 2022). Even when a referral system is well designed and an appropriate referral has been made, users' trust in the health system and their ability to seek, access and pay for referral care can all influence referral in practice (Harahap *et al.*, 2019). Limited and costly transportation to or from a referral site, or opportunity costs such as missing work, may impede patients' ability and willingness to seek referral care (McCord *et al.*, 2015; Harahap *et al.*, 2019).

Under-referral and over-referral are common problems that can negatively impact costs, waiting times and clinical outcomes (Kane *et al.*, 2017; Kruk *et al.*, 2018; Pittalis *et al.*, 2019). Under-referral occurs when appropriate cases are not identified and referred. Under-referral can result in negative health outcomes for people with conditions that are entirely treatable within available system resources. Over-referral is the direction of people to secondary care for conditions that are optimally managed in primary care, contributing to hospital congestion. Over-referral occurs for many reasons, including patient request and lack of resources to deliver services at primary level. Inadequate access to outpatient diagnostic services, for example, commonly contributes to avoidable hospital referral and admissions in some health systems. Notably, gaps in health worker training, capacity, competence or confidence can contribute to both under- and over-referral.

Many referral systems still require that clinical data (e.g. reason for referral, signs and symptoms, prescriptions, lab results and discharge summaries) be shared in a linear transfer of

information from one provider to another, such as via fax, paper mail, electronic mail or sent with the patient (Harahap *et al.*, 2019; Nakayuki *et al.*, 2021). These processes can be slow and inefficient, and - when information transfer fails - create the potential for delayed care, adverse health outcomes, and duplication of services, such as diagnostic studies that are repeated because results are not available or interventions that are repeated because a referral provider is unaware of prior management (World Health Organization and International Telecommunication Union, 2012; Harahap *et al.*, 2019; Nakayuki *et al.*, 2021).

Digital, networked platforms that can store clinical data centrally and are accessible by primary and referral providers have the potential to improve referral efficiency, reliability and communication across levels and types of care (Orton *et al.*, 2018; Seyed-Nezhad *et al.*, 2021). They also have the potential to improve access to specialty care and overall quality and continuity of clinical care (Orton *et al.*, 2018). Digitally-supported referral systems depend on sound planning, infrastructure, regulation, management and monitoring, including a high level of standardization. Digital interoperability requires coordinated system design and dedicated governance (Orton *et al.*, 2018). While digital technologies show promise in improving referral, challenges can include limited affordability, software availability and upkeep; insufficient training of providers to use digital resources; inadequate access to them in rural and remote areas; and difficulties ensuring data protection and data compatibility (Orton *et al.*, 2018; Harahap *et al.*, 2019).

Within a broader referral system, standardized approaches to referral will vary based on many factors, including type of condition, urgency of referral, and available technology and resources, resulting in a range of context-relevant referral pathways and mechanisms (Orton *et al.*, 2018; World Health Organization Regional Office for South-East Asia, 2019; Roder-DeWan *et al.*, 2020; World Health Organization Regional Office for Europe, 2023). For example, immediate referral, which is referral for care that is urgently needed during the current health care encounter, usually involves the direct transfer of an individual to an appropriate facility or specialist for urgent care. Immediate referral often includes emergency transfer to higher levels of care, unlike scheduled referral, which is the scheduled direction of an individual to an appropriate facility or specialist to address non-immediate health needs (World Health Organization, 2018).

The rationale for the scoping review is that, in order to achieve more integrated, people-centered health services, more information is needed on referral systems. We undertook a scoping review because of the vast and heterogeneous nature of referral coordination and processes globally, but the dearth of systematic reviews on this topic to date. A scoping review enables exploration of the extent (size), range (variety) and nature (characteristics) of literature on this topic (Tricco *et al.*, 2018; Munn *et al.*, 2022). To better understand existing referral systems and identify promising approaches to support referral system design, we chose an inductive, thematic approach to analysis to allow themes to emerge from the data. The review examined referral coordination and processes at different levels, including national, large sub-national (e.g. province, state), small sub-national (e.g. district, municipality) and local (e.g. community) levels.

Methodology

Objectives

The scoping review had two objectives related to referral coordination and processes:

- **Referral coordination:** The review aimed to identify initiatives that enhanced referral coordination (e.g. referral systems, operational frameworks, strategies, and guidelines).
- **Referral processes:** The review sought to identify initiatives that improved referral processes, (e.g. referral tools, forms, protocols, approaches, procedures and interventions).

Design

The scoping review followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis Extension for Scoping Reviews (PRISMA-ScR) approach (Tricco et al., 2018). Supplementary Material 1 provides the scoping review protocol, which was drafted in advance of the study.

Eligibility criteria

Criteria for a paper's inclusion within the scoping review related to publication type, language, and topic. There were no date restrictions. Specific inclusion criteria were:

1. Any type of original peer-reviewed journal article or WHO global or regional publication.
2. Publications with an English abstract and a full-text in English, French, German, Portuguese or Spanish.
3. Focus on initiatives related to referral coordination (e.g. systems, operational frameworks, strategies, guidelines) or referral processes (e.g. tools, forms, protocols, approaches, procedures, interventions).

Abstracts were excluded if they were not in English or did not mention a referral initiative in accordance with the inclusion criteria above. Full-text papers were excluded if they: were not in English, French, German, Portuguese, or Spanish; had been replaced by another selected (updated or corrected) full-text paper; did not describe or recommend a referral coordination or process initiative; or the referral initiative was highly specialized, e.g. for complex screening and diagnostics.

Search strategy and selection

In June 2024, one researcher (MP) conducted a literature search of three databases focused on peer-reviewed journal articles and WHO global and regional documents addressing referral coordination and processes: PubMed, Global Index Medicus and the WHO IRIS database.

Within databases:

1. **Titles of all papers** were searched for the term “referral” in combination with a referral initiative term, i.e. system, strategy, framework, guideline, approach, intervention, protocol, procedure, tool or form. For example, any paper with “referral system” in its title.
2. **Titles and abstracts of review papers** were searched for the term “referral” and also one of the following terms: care coordination; care pathway; care plan; case management; continuity of care; care continuity; continuum of care; care continuum; delivery plan; design of services; service design;

managed care; management of services; management of care; model of care; models of care; care model; organization of services; organization of care; patient journey; patient navigation; or transitional care. For example, review papers with “referral” and “care coordination” in its abstract and/or title.

An example of the electronic search strategy is provided in Supplementary Material 1.

Data extraction

Abstracts were screened according to the eligibility criteria above. Eligible full-text publications were then sought and reviewed. Data were extracted and categorized using a standardised instrument in Microsoft Excel that included: author; year of publication; title; source; type of paper (e.g. review, original paper, guidance); geographic scope (e.g. country, region, global); World Bank country income category (e.g. low-, lower-middle-, upper-middle-, and high-income country); health condition or specialty (e.g. general, non-communicable diseases, paediatrics); highest level at which referral initiative functions (e.g. national, subnational, local); type and description of referral initiative or recommendation; whether it addresses counter-referral, immediate referral or digitally-supported referral; and key primary sources cited.

During the review of included papers, additional, targeted literature search and review was conducted to supplement the content of included papers. For example, some included reviews were superficial in their description of a referral initiative but cited a primary source with more information. In those instances, full-text primary papers were also retrieved and reviewed and their supplementary information was summarized. In another example, if an included paper described a planned referral intervention trial, then outcome evaluation papers were sought and their findings were extracted as supplementary information where available.

Data analysis

One researcher (MP) conducted thematic analysis to identify, analyze and report patterns or themes related to referral coordination and process initiatives that were described in the included papers (Pope et al., 2000; Ahmed et al., 2025). Inductive, thematic coding began during abstract screening and full-text data extraction. The next stage of analysis involved repeated review of the included papers and extraction dataset to identify, test and refine emergent domains and categories. Broadly grouped under referral system and health facility domains, eight categories of literature were identified. Many papers addressed referral initiatives relevant to more than one domain or category. To focus the main analysis of domains and categories, each paper was grouped once at the highest level at which its referral initiative functions (i.e. domain) and, within that domain, once based on the nature of the primary referral resource described (i.e. category). For more detailed analysis of specific topics (e.g. counter-referral, immediate referral and digitally-supported referral), all papers that addressed those topics were considered.

Results

Process outcomes

Figure 1 provides a Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews

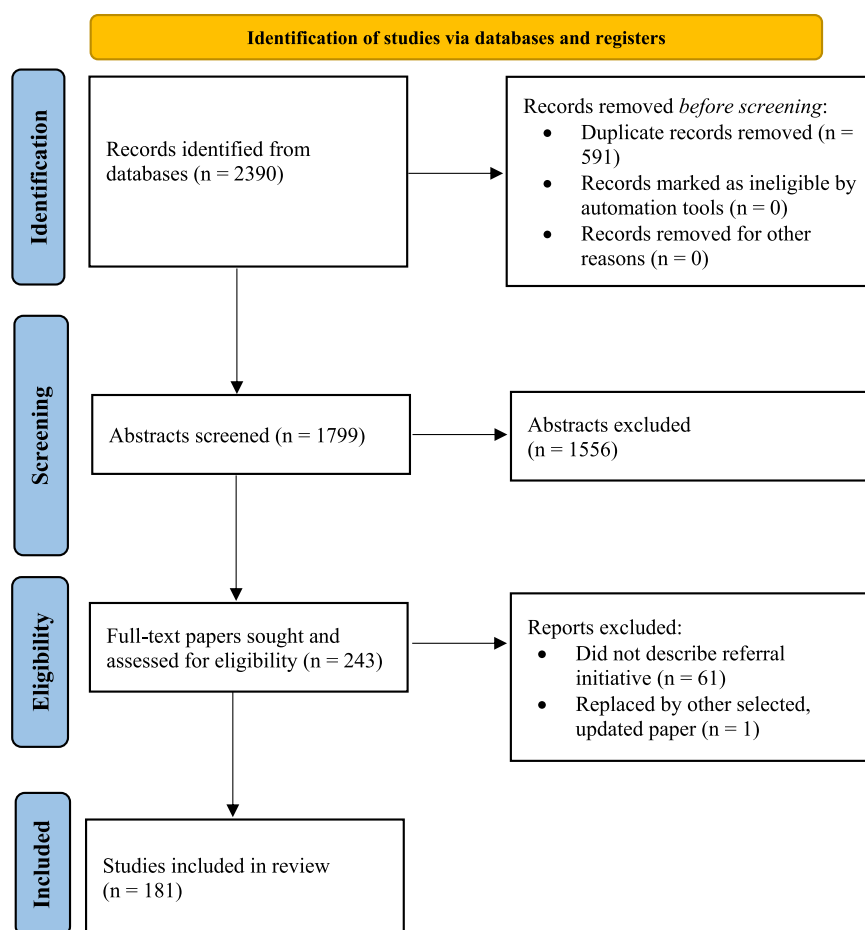


Figure 1. PRISMA diagram of identification, screening and inclusion steps of the referral scoping review.

(PRISMA-ScR) flowchart that shows the process and results of the record search, abstract screening and full-text review for eligibility and inclusion. Supplementary Material 2 provides a completed PRISMA-ScR checklist. In total, 1,799 records were identified during the search, after duplicates were removed. Screening of 1,799 abstracts identified 243 papers that were eligible for full-text review because the abstract addressed referral initiatives according to the inclusion criteria. 243 full-text publications were reviewed. Papers were excluded because the full-text did not describe referral initiatives according to the inclusion criteria ($n = 61$), or it had been replaced by another included, updated paper ($n = 1$).

Characteristics of included papers

One hundred and eighty-one papers were included in the scoping review, 58 (32%) of which were reviews and 64 (35%) of which were global in scope, although the global reviews tended to focus on research in high-income countries. Supplementary Material 3 describes the basic characteristics of each of the 181 included papers, i.e. first author, year, type of paper/review, geographical scope, highest level at which referral initiative functions; condition/specialty; type of referral initiative or recommendation; and whether it addresses counter-referral, immediate or scheduled referral and digitally-supported referral.

There were few duplicates among the papers identified from the three sources. The final pool of included papers reflects a global pool of very diverse settings. For the 103 country-specific papers, the breakdown by country income group roughly reflects the

proportion of countries in these income groups. The 111 regionally-focused papers span all regions.

General findings on referral coordination and processes

Generally, the scoping review's included papers sought to improve referral coordination and/or processes by reducing unnecessary referrals or direct presentations to secondary or specialist care (targeting over-referral) and/or improving the identification and processing of needed referrals (targeting under-referral). Included papers were classified within two broad domains: referral system (61%, 111/181) and health facility/community service delivery (39%, 70/181) (Table 1). Importantly, the domains and categories identify broad patterns and are not necessarily mutually exclusive. Many papers address referral initiatives relevant to more than one domain or category. To focus the analysis of domains and categories, Table 1 groups each paper once, at the highest level at which its referral initiative functions (i.e. domain) and the nature of the primary resources described (category).

Under the "referral system" domain, there were five categories: referral system design, reform and management (14%, 25/181); referral system assessment methodologies (6%, 10/181); referral networks and linkages (15%, 28/181); referral pathways and algorithms (10%, 19/181); and electronic referral (e-referral) systems and platforms (16%, 29/181) (Table 1). The 29 papers that primarily focus on national or subnational e-referral systems mostly describe vertical e-referral systems for specific conditions. Only 14% (4/29) of these papers address more comprehensive

Table 1. Overview of findings domains and categories, with examples

Findings domains, categories and examples	Number of papers, with citation information
REFERRAL SYSTEM	
Referral system design, reform and management: <i>E.g. Referral system design, organization and modelling</i>	25 (World Health Organization Regional Office for Europe, 2014; Lei et al., 2015; Senitan et al., 2017; Behzadifar et al., 2018; de Almeida et al., 2018; Kawatsu et al., 2018; Kruk et al., 2018; Naseriasl et al., 2018; World Health Organization, 2018; World Health Organization Regional Office for South-East Asia, 2019; Abdullah et al., 2020; Gwynne-Jones et al., 2020; World Health Organization Regional Office for South-East Asia, 2020; Espiritu and San Jose, 2021; Farrag et al., 2021; Idrees et al., 2021; Seyed-Nezhad et al., 2021; Bai et al., 2022; Bordbar et al., 2022; Chukwu et al., 2022; Huang et al., 2022; Luo et al., 2022; Heidarzadeh et al., 2023; World Health Organization Regional Office for Europe, 2023; Mirza et al., 2024)
Referral system assessment methodologies: <i>E.g. Referral system rapid assessment methodologies; referral indicators, including travel time and patient acceptance; geographic information systems for network mapping; network and complexity theory analyses</i>	10 (Cervantes et al., 2003; Chowdhury et al., 2018; Handayani et al., 2018; Agarwal et al., 2019; Mercer et al., 2019; Islam et al., 2020; Nuti et al., 2020; Ithantamalala et al., 2021; Pittalis et al., 2021; Thakkar et al., 2022)
Referral networks and linkages: <i>E.g. Network coordination, protocols, communication and relationships; community-level expansion; transportation</i>	28 (World Health Organization, 2007; Munitis et al., 2013; Smith Paintain et al., 2014; Brondani et al., 2016; Lydon et al., 2016; Perry et al., 2017a; World Health Organization, 2018; World Health Organization, 2018; Prasad et al., 2019; World Health Organization Regional Office for Europe, 2019; Bhatta et al., 2020; Carmone et al., 2020; Cordier et al., 2020; D'Mello et al., 2020; Fasawe et al., 2020; Kim et al., 2020; Sahito et al., 2020; Vergara et al., 2020; Duffy et al., 2021; Kalaris et al., 2022; Kamanga et al., 2022; World Health Organization, 2023; World Health Organization, 2023; World Health Organization and United Nations Children's Fund, 2023; Rajan et al., 2024; World Health Organization, 2024; World Health Organization, 2024; World Health Organization, No date)
Referral pathways and algorithms: <i>E.g. Standardised patient referral pathways and provider referral algorithms between types and/or levels of care; use of machine learning to improve pathways and algorithms</i>	19 (Mehrotra et al., 2011; Hui and Bruera, 2015; Kane et al., 2017; Kapoor et al., 2017; Kernick et al., 2018; Lim et al., 2018; Ribas et al., 2018; Salamanca et al., 2018; Button et al., 2019; Devi et al., 2019; Fitzpatrick et al., 2020; World Health Organization Regional Office for the Western Pacific, 2020; Constantine et al., 2021; Oduro-Mensah et al., 2021; Okoli et al., 2021; Knitza et al., 2022; Shrestha et al., 2023; World Health Organization, 2023; Fudickar et al., 2024)
e-referral systems and platforms: <i>E.g. Digital, networked platforms that store clinical data centrally, accessible by primary and referral providers</i>	29 (Häyrynen et al., 2008; Diaz et al., 2011; World Health Organization and International Telecommunication Union, 2012; Maghsoud-Lou et al., 2017; British Dental Journal, 2018; Olayiwola et al., 2018; Orton et al., 2018; Patel et al., 2018; Ramelson et al., 2018; World Health Organization, 2018; Bashar et al., 2019; Hermida et al., 2019; Kevat et al., 2019; Lo et al., 2019; World Health Organization, 2019; Fernández-Méndez et al., 2020; Jastaniah et al., 2020; Patel et al., 2020; Rea et al., 2020; Tavakoli et al., 2020; Woodward et al., 2020; Gadenz et al., 2021; Kwon et al., 2021; Alabbasi et al., 2022; Ferri et al., 2022; Montellier et al., 2022; Pachito et al., 2022; World Health Organization, 2022; Algerian et al., 2024)
HEALTH FACILITY & COMMUNITY SERVICE DELIVERY	
Digitally-supported referral processes and tools: <i>E.g. mHealth referral; e-referral to or from social or community services; auto-generation of referrals based on electronic health records; provider-to-provider e-consultation</i>	13 (Brody et al., 2016; Hardy et al., 2017; Lai et al., 2018; Lindau et al., 2019; Vega et al., 2019; Berry et al., 2020; Bhardwaj et al., 2020; Cartier et al., 2020; Indriani et al., 2020; McIntyre et al., 2020; Tung et al., 2020; Drewry et al., 2023; Reynolds et al., 2023)
Other referral processes, tools and resources: <i>E.g. Referral training; provider-to-provider consultation</i>	35 (Grace et al., 2011; World Health Organization, 2011; World Health Organization, 2011; Nelson et al., 2012; Walsh et al., 2013; Corrêa and Dói, 2014; Kirolos et al., 2014; Mogere and Kaseje, 2014; Blank et al., 2015; Cucciare et al., 2015; Hui et al., 2016; Muni et al., 2016; Singh et al., 2016; Finn et al., 2017; Silva and Gottems, 2017; Lee-Tauler et al., 2018; Savoy et al., 2019; Afungchwi et al., 2020; Blane et al., 2020; Coates et al., 2020; Iyengar et al., 2020; Russell et al., 2020; Azhar et al., 2021; Eksteen et al., 2021; Rathnayake and Clarke, 2021; Avoka et al., 2022; Hankerson et al., 2022; Razzaq et al., 2022; World Health Organization Regional Office for South-East Asia, 2022; Rutherford et al., 2023; Laing et al., 2024; Mutatiri et al., 2024; World Health Organization, 2024; World Health Organization, 2024)

(Continued)

Table 1. (Continued)

Findings domains, categories and examples	Number of papers, with citation information
Interventions to optimize patient experience of referral: <i>E.g. Referral education and communication; referral navigation; care coordination</i>	22 (Kerber <i>et al.</i> , 2007; Govindasamy <i>et al.</i> , 2014; Mukhopadhyay <i>et al.</i> , 2014; Carter <i>et al.</i> , 2016; World Health Organization, 2016; Accorsi <i>et al.</i> , 2017; Amoah and Phillips, 2017; Perry <i>et al.</i> , 2017b; Possemato <i>et al.</i> , 2018; Huchko <i>et al.</i> , 2019; Taleghani <i>et al.</i> , 2019; Berning <i>et al.</i> , 2020; Hsu <i>et al.</i> , 2020; Mohammed <i>et al.</i> , 2020; Roder-DeWan <i>et al.</i> , 2020; Anderson <i>et al.</i> , 2021; Bruxvoort <i>et al.</i> , 2021; Cunningham <i>et al.</i> , 2022; Dominico <i>et al.</i> , 2022; Hansmann <i>et al.</i> , 2022; Napierala <i>et al.</i> , 2022; Patra <i>et al.</i> , 2024)

Many of the 181 included papers address referral initiatives relevant to more than one domain or category. In this table, each paper is grouped once only at the highest level at which its referral initiative functions (i.e. domain) and, within that domain, once based on the nature of the primary referral resource described (i.e. category).

electronic health record (EHR) systems with embedded referral mechanisms or communication, while 10% (3/29) specified that the e-referral systems were accessible by patients.

Under the “health facility/community service delivery” domain, there were three categories: digitally-supported referral processes and tools (7%, 13/181); other referral processes, tools and resources (19%, 35/181); and interventions to optimize patient experience of referral (12%, 22/181) (Table 1).

Nineteen percent (35/181) of papers primarily address higher level **system design** issues, including reform, management and assessment. Examples include referral system modelling, organization, prioritization, and assessment methodologies (Table 1). Eighty-one percent (146/181) of papers primarily focus on **operational elements**, such as: explicitly-defined referral networks and linkages; referral pathways and algorithms; e-referral systems and platforms; e-referral processes and tools; and referral processes for providers or patients (Table 1). Specific examples include:

- EHR systems with referral mechanisms;
- e-referral systems for specific conditions;
- network protocols and relational elements;
- referral network expansion at the community level;
- e-referral processes and tools, including mHealth apps (i.e. mobile and wireless device applications designed to support health objectives) and short message service (SMS) text messaging;
- provider clinical decision-making, referral criteria, training and communication, including provider-to-provider consultation; and
- patient education, communication, care coordination and transportation.

Supplementary Material 4 provides an overview of included papers that address national and large subnational referral systems, organized by general or specialized approach, region and country.

From the perspective of the **service delivery platform**, referral initiatives at the **community level** included improved screening, diagnosis and referral communication by community health workers or traditional medicine practitioners within new health care roles or expanded pre-existing roles. Some papers also described use of accessible technology at the local level, particularly mHealth apps or SMS text messaging. At **initiating facilities**, referral improvements focused on standardizing referral criteria and protocols and optimizing communication with referral facilities, including sometimes specialist consultation during clinical decision-making to reduce under- and over-referral and expedite urgent referrals. At this level, standardised referrals algorithms and pathways were a key strategy to minimize the time between referral, diagnosis and treatment for time-sensitive

conditions. At **receiving facilities**, referral improvements often focused on supporting initiating facility clinical decision-making prior to referral, systemic prioritization of the urgency of cases once received, and consistent counter-referral and/or onward referral, including beyond the health sector (e.g. to nutrition or social services) to improve continuity of care.

Figure 2 synthesizes recommended referral actions identified in the scoping review, organized by referral system and initiating or receiving facility.

The findings summarized in Figure 2 are broadly relevant to different kinds of referral, including scheduled and immediate referral, initiating facility referral and receiving facility counter-referral, as well as traditional, paper-based referral and digital referral. The following sections expand upon these broad findings to focus on recommended actions in included papers that address counter-referral, immediate referral and digitally-supported referral.

Findings on counter-referral

The 20% (36/181) of included papers that at least briefly address counter-referral are shown in Supplementary Material 3. Forty-five percent (13/29) of the included WHO publications at least briefly address counter-referral. In contrast, only 15% (23/152) of other included papers specifically address counter-referral; among these, 43% (10/23) focus on counter-referral in Central or South America and 22% (5/23) are reviews.

The main recommended counter-referral actions identified in the scoping review were:

- develop and train staff in the use of counter-referral guidelines, networks, protocols and tools;
- optimize digital counter-referral mechanisms, especially through EHR networks;
- ensure counter-referral from emergency units to primary care, even if the emergency unit was the first point of contact for a particular condition; and
- measure and monitor counter-referral indicators.

Table 2 synthesizes the actions recommended for counter-referral that were identified in the papers that address counter-referral. Each action is illustrated by a non-exhaustive set of examples, prioritizing examples from low- or middle-income countries. The main conditions and types of care addressed in papers on counter-referral were chronic noncommunicable diseases and maternal, newborn, and child health conditions.

Findings on immediate referral

Ninety-four percent (170/181) of the papers included in the scoping review address scheduled referral, while 42% (76/181) at

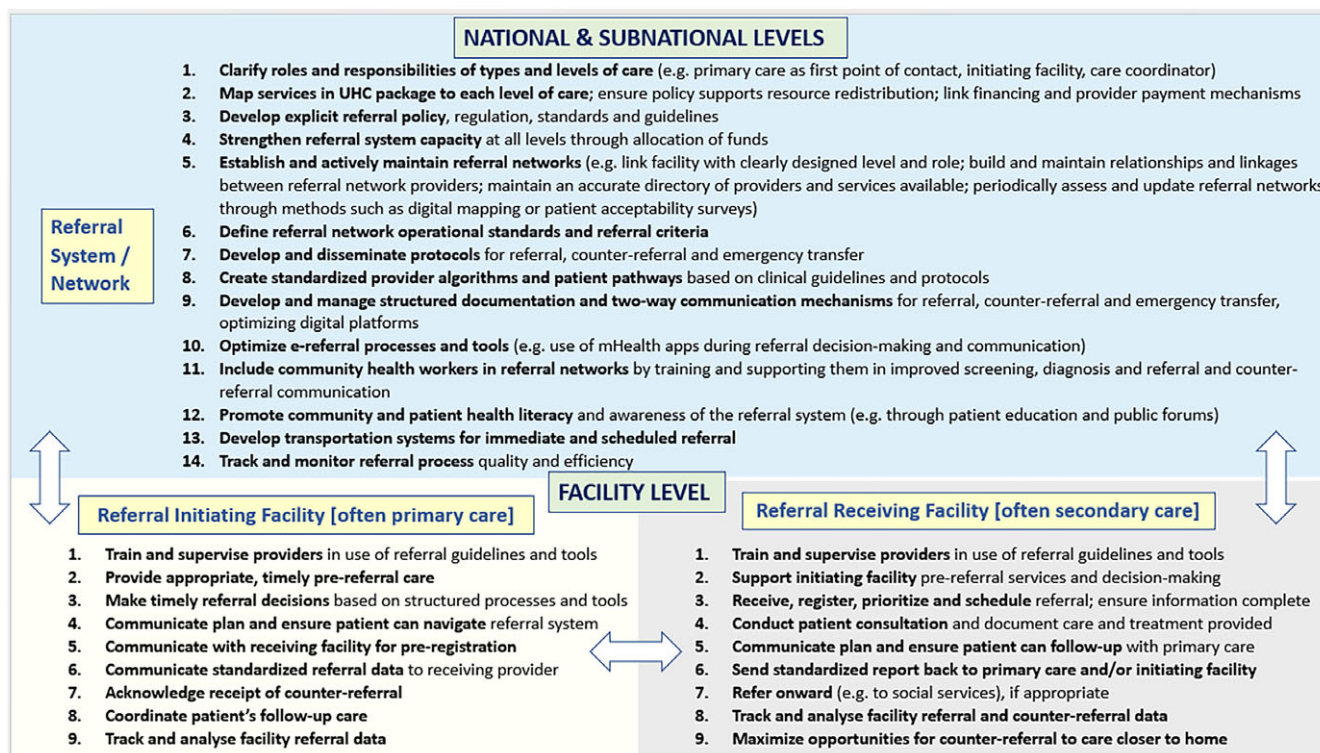


Figure 2. Synthesis of recommended referral actions in included papers, organized by referral system and initiating or receiving facility.

least briefly address immediate referral, as shown in Supplementary Material 3. The main actions related to immediate referral identified in the scoping review were:

- optimize networks between initiating and receiving facilities;
- establish standard operating procedures and standardized referral pathways;
- support and building the capacity for triage at the initiating facility;
- improve communication between initiating and receiving facilities;
- establish effective emergency transportation systems, particularly in remote areas;
- improve triage at the receiving facility; and
- ensure emergency unit care coordination and discharge planning, including counter-referral to primary care, even if the emergency unit was the first point of contact for a particular condition.

Table 3 synthesizes the actions recommended for immediate referral that were identified in the papers that address immediate referral. Each action is illustrated by a non-exhaustive set of examples, prioritizing examples from low- or middle-income countries. The main conditions addressed in papers on immediate referral were obstetrical and neonatal emergencies, but other conditions included severe malaria, cholera, severe childhood illness, orthopaedic trauma, neurotrauma, stroke and surgical need, as well as general emergency care.

Findings on digitally-supported referral

The 33% (60/181) of included papers that at least briefly address digitally-supported referral are shown in Supplementary Material 3.

Sixty-eight percent (41/60) of the papers on digitally-supported referral are based on work in high-income countries (28/60) or on global reviews (13/60), which tend to be dominated by high-income country examples. An additional 5% (3/60) are reviews by region (i.e. Europe or Sub-Saharan Africa) or by country income status (i.e. low- and middle-income countries). Twenty-seven percent (16/60) of included papers focus on work in specific low- or middle-income countries.

The main recommended digitally-supported referral actions identified in the scoping review were:

- employ a digital health referral coordination system (e.g. EHR networks with integrated referral communication; e-referral systems with or without EHR access);
- apply digital referral network mapping and modelling technology;
- explore the potential of artificial intelligence (e.g. machine learning) to improve referral;
- use digital clinical decision support methods (e.g. mHealth apps; e-consultation) to strengthen referral, particularly in remote areas; and
- implement digitally-supported referral from facilities to community or social services.

Table 4 synthesizes the actions recommended for digitally-supported referral that were identified in the papers that address digitally-supported referral. Each action is illustrated by a non-exhaustive set of examples, prioritizing examples from low- or middle-income countries. In addition to general care, the main conditions and types of care addressed in papers on digitally-supported referral were paediatrics, the social determinants of health and NCDs, including spinal conditions, liver disease, cancer, neurology, mental health problems and oral health problems.

Table 2. Synthesis of recommended actions for counter-referral, with examples

Actions for Counter-referrals	Examples
Develop and train staff in the use of counter-referral guidelines, networks, protocols and tools	1. MNCH referral and counter-referral forms, registers and communication and transportation protocols based on a national referral and counter-referral manual (Haiti) (Lydon <i>et al.</i>, 2016). 2. Criteria and standardized form for admitting, counter-referring and discharging paediatric patients (Argentina) (Munitis <i>et al.</i>, 2013). 3. Community health worker training in community-based MNCH referral and counter-referral system and tools (Kenya) (Mogere and Kaseje, 2014). 4. Formal MNCH communication mechanisms between different levels of providers, especially for counter-referral (Brazil) (Corrêa and Dóí, 2014).
Optimize digital counter-referral mechanisms, especially through EHR networks	1. Digital network for referral and counter-referral between initiating and receiving facilities (Chile) (de Almeida <i>et al.</i>, 2018). 2. Paediatric patient care counter-referral and health status follow-up after hospital discharge through EHR (Argentina) (Díaz <i>et al.</i>, 2011). 3. mHealth MNCH referral system that includes hospital counter-referral back to primary care (Indonesia) (Indriani <i>et al.</i>, 2020). 4. Text-messaging for mental health referral and counter-referral between trained, trusted community members in remote areas and mental-health-trained, facility-based health workers (Nepal) (Bhardwaj <i>et al.</i>, 2020).
Ensure counter-referral from emergency units to primary care, even if emergency unit was first point of contact	1. Shared EHR network to promote counter-referral from emergency units back to primary care facilities (Brazil) (Hermida <i>et al.</i>, 2019). 2. Counter-referral algorithm, map, register of primary care facilities and nurse liaison for counter-referral and follow-up of patients with chronic NCDs after discharge from hospitals and emergency units (Brazil) (Ribas <i>et al.</i>, 2018). 3. Standardised paediatric emergency referral and counter-referral algorithms, communication tools and training modules for primary care, emergency transport, emergency unit and hospital staff (Guatemala) (Kapoor <i>et al.</i>, 2017).
Measure and monitor counter-referral indicators	1. Provider counter-referral rate measurement as part of rapid assessment of referral systems for severe childhood illness (global review) (Cervantes <i>et al.</i>, 2003). 2. Monitoring of counter-referral to community health workers as a health system performance output when continuity of care is recommended, as in the care of chronic diseases, ideally facilitated by digital systems that link facility records back to the community (global review) (Agarwal <i>et al.</i>, 2019). 3. Investigation of processes of referral and counter-referral of chronic NCDs as a management tool (Brazil) (Brondani <i>et al.</i>, 2016). 4. Improvement of standard reporting formats to assess referral as a health performance indicator, including measuring completion of counter-referral and outcome for the patient (global review) (Orton <i>et al.</i>, 2018).

This table synthesizes the actions recommended for counter-referral that were identified in the 20% (36/181) of included papers that address counter-referral. Each action is illustrated by examples from relevant papers, prioritizing those that focused on low- or middle-income countries. The list of examples is not exhaustive; the 36 papers that address counter-referral can be found in Supplementary Material 3.

Key: EHR = electronic health record; MNCH = maternal, neonatal and child health; NCD = noncommunicable disease.

Discussion

This scoping review was vast in scope, in that it encompassed referral coordination and processes from the cross-national to the local level, with an emphasis on the 60% (131/217) of all countries globally that are low- or middle-income (World Bank, 2025). National, subnational, and facility-level stakeholders can consider the recommended referral actions identified in included papers when assessing and improving existing referral coordination and processes (Figure 2). At the national level, for example, stakeholders can draw on the scoping review findings to assess and consider ways to improve referral systems, policy, capacity, coordination and communications, as well as standardization, inter-operability, regulating, and monitoring. At the subnational level, stakeholders can assess and improve operational elements of referral systems, such as network linkages, protocols, provider algorithms, patient pathways and emergency transportation. At the facility level, stakeholders can assess and improve provider referral and counter-referral training, decision-making and communication. At all of these levels, this review provides insights into ways to optimize referral through digital systems and tools. The detailed findings and recommendations will also support

WHO's ongoing development of practical guidance to help countries establish two-way referral systems that ensure seamless referral across service delivery platforms.

An important finding of this review is the potential role of digital technology in improving the efficiency and effectiveness of referral systems at all levels. However, as promising as these findings are, it is critical to note that digital systems and tools require sound planning, infrastructure, management, training of providers and monitoring. As stated in the WHO (2021) "Global Strategy on Digital Health 2020-2025", the appropriate use of information and communication technology should take into account safety, ethical use, cost-effectiveness and affordability and also be people-centred, evidence-based, effective, efficient, sustainable, inclusive, equitable and contextualized (World Health Organization, 2021). This standard can be difficult to fully achieve in practice. As the WHO and International Telecommunication Union (2012) "National eHealth Strategy Toolkit" highlights, countries are at different phases of general eHealth development, from experimentation and early adoption, to development and build up, to scale up and mainstreaming (World Health Organization and International Telecommunication Union, 2012). Such development

Table 3. Synthesis of recommended actions for immediate referral, with examples

Actions for Immediate Referral	Examples
Optimize networks between initiating and receiving facilities	1. Networks among primary care providers and stroke-ready hospitals (Philippines) (Espiritu and San Jose, 2021). 2. Model network for routine, urgent and emergency MNCH referral (Haiti) (Lydon et al., 2016). 3. Network facility mapping to inform directories, MNCH referral pathways and emergency contact details for all health facilities and emergency transport drivers (Nigeria) (Fasawe et al., 2020). 4. Local health system redesign based on geographic accessibility modelling to reduce time to emergency care (Madagascar) (Ihantamalala et al., 2021).
Establish standard operating procedures and standardized referral pathways	1. Standardized algorithm and training module for paediatric emergency referral (Guatemala) (Kapoor et al., 2017). 2. Standard operating procedures for emergency MNCH referral (Philippines) (Vergara et al., 2020). 3. Standard unified procedures for emergency surgical referrals, including in relation to transfers, logistics and presence and duties of escorts (Malawi) (Pittalis et al., 2019). 4. Referral registers with training at community and facility levels to improve referral for severe malaria (Sierra Leone) (Smith Paintain et al., 2014).
Support and build capacity for triage at the initiating facility	1. Helpline for provider-to-provider teleconsultation at lower-level facilities to stabilize patients and determine emergency MNCH referral (Nepal) (Bhatta et al., 2020). 2. Community case management mHealth app to assess children aged under 5 years for immediate referral (Malawi) (Hardy et al., 2017). 3. Building health worker capacity to identify, manage, and refer MNCH emergencies (Zambia) (Kamanga et al., 2022). 4. m-Health system based on Integrated Management of Childhood Illness guidelines to provide early warning of severe childhood illness and referral for emergency care (Ghana) (Mohammed et al., 2020). 5. Telemedicine consultation at secondary facilities for effective triage of neurotrauma to determine emergency referral to tertiary facility (India) (Devi et al., 2019).
Improve communication between initiating and receiving facilities	1. Mobile application system to identify and communicate with nearest available hospitals for emergency MNCH referral (Indonesia) (Indriani et al., 2020). 2. Mobile phone network and social media channels/groups for MNCH emergency consultation and referral (United Republic of Tanzania) (D'Mello et al., 2020). 3. mHealth methods of emergency MNCH referral for systematic interaction between the district hospital and peripheral units (global review) (Muni et al., 2016). 4. Call center to coordinate expert advice and emergency MNCH referrals (Ghana) (Odoro-Mensah et al., 2021).
Establish effective emergency transportation systems, particularly in remote areas	1. Dedicated ambulance system for emergency MNCH referral in remote areas (Ethiopia) (Accorsi et al., 2017). 2. Geographic-Information-System-designed emergency transport system for MNCH (Bangladesh) (Chowdhury et al., 2018). 3. Emergency boat transport for cholera in riverine environment (Bangladesh) (Perry et al., 2017a). 4. Helicopter transport for emergency transport in mountainous terrain inaccessible by road (Nepal) (Bhatta et al., 2020).
Improve triage at the receiving facility	1. Virtual fracture clinic to better triage orthopaedic trauma patients in emergency care (Ireland) (McIntyre et al., 2020). 2. Electronic system to rapidly identify and respond to urgent paediatric oncology cases upon receipt of referral (Saudi Arabia) (Jastaniah et al., 2020). 3. Screening tools to better identify type of care needed by patients (Netherlands & U.K.) (Razaq et al., 2022; Fudickar et al., 2024).
Ensure emergency unit care coordination and discharge planning, including counter-referral to primary care	1. EHR network, communication strategies and interpersonal relationships to optimize emergency unit counter-referral to primary care (Brazil) (Hermida et al., 2019). 2. Standardized algorithm and training module for counter-referral in paediatric emergency care (Guatemala) (Kapoor et al., 2017). 3. Emergency department care coordination with discharge planning and counter-referral for older adults to primary care (United States of America) (Berning et al., 2020). 4. Mechanisms for feedback of patient status and follow-up care planning after emergency referral (global review) (Carmone et al., 2020).

This table synthesizes the actions recommended for immediate referral that were identified in the 42% (76/181) of included papers that address immediate referral. Each action is illustrated by examples from relevant papers, prioritizing those that focused on low- or middle-income countries. The list of examples is not exhaustive; the 76 papers that address immediate referral can be found in Supplementary Material 3.

Key: EHR = electronic health record; MNCH = maternal, neonatal and child health.

Table 4. Synthesis of recommended actions for digitally-supported referral, with examples

Actions for Digitally-supported Referral	Examples
Employ digital health referral coordination systems	1. Wide variety of digital health referral coordination systems that demonstrate major potential to improve the quality and comprehensiveness of care received by patients, although they require an expanded scope of health worker engagement and standardization to prepare for scale (global review) (Orton <i>et al.</i>, 2018).
Digital referral coordination option #1: Develop electronic health record (EHR) networks with integrated referral communication	1. EHR networks that include emergency units, for more effective emergency care, record-sharing and counter-referral back to primary care (Brazil) (Hermida <i>et al.</i>, 2019). 2. Referral system with shared EHRs to provide decision support, knowledge management and communication infrastructure, including sharing of clinical visit documentation, prescription writing, lab ordering and review, workflow, coding and billing (Islamic Republic of Iran) (Tavakoli <i>et al.</i>, 2020). 3. NCD electronic case record system to consolidate and track patient information and referrals across the publicly-funded health care system (India) (Patel <i>et al.</i>, 2020).
Digital referral coordination option #2: Design e-referral systems, possibly with electronic health record access	1. e-referral platform linking each primary care facility to an assigned hospital, used to transfer and process patient referral data from primary/secondary care to secondary/tertiary care (Saudi Arabia) (Alabbasi <i>et al.</i>, 2022; Aljerian <i>et al.</i>, 2024). 2. Web-based system to manage paediatric consultations and referrals between primary/secondary care and secondary/tertiary care, including partial EHR sharing (Argentina) (Diaz <i>et al.</i>, 2011). 3. Spinal problem e-referral system with a web-based user interface that includes patient assessment, protocol-based decision support and referral generation (Canada) (Maghsoud-Lou <i>et al.</i>, 2017). 4. Improvement of an existing e-referral system between primary care and secondary care to ensure that all practices have access to each other's information and provide timely and appropriate feedback (United States of America) (Ramelson <i>et al.</i>, 2018).
Apply digital referral network mapping and modelling technology	1. Application of geospatial techniques to map and improve an emergency MNCH transport network for remote referrals (Bangladesh) (Chowdhury <i>et al.</i>, 2018). 2. Geo-referenced database and online tool that displays health facility data visually and permits their manipulation for better MNCH referral and care planning and decision-making (Bangladesh) (Islam <i>et al.</i>, 2020). 3. Geographic accessibility modelling to map and improve a general health care referral network based on shortest route algorithms (Madagascar) (Ihantamalala <i>et al.</i>, 2021). 4. Social network analysis techniques to characterize hypertension referral patterns and identify weaknesses in the network to improve upon them (Kenya) (Mercer <i>et al.</i>, 2019; Thakkar <i>et al.</i>, 2022).
Explore potential of artificial intelligence (e.g. machine learning) to improve referral	1. Improve decision support system accuracy through natural language processing of EHRs & referral letters for triage (Netherlands) (Fudickar <i>et al.</i>, 2024). 2. Use registry data and laboratory parameters to improve the accuracy of online referral system (Germany) (Knitza <i>et al.</i>, 2022).
Use digital clinical decision support methods (e.g. mHealth apps; e-consultation) to strengthen referral, particularly in remote areas	1. Mobile clinical decision support systems integrated within a EHR system to facilitate long-term care and support the appropriate referral of clients at different levels of the health system (global review) (Orton <i>et al.</i>, 2018). 2. Electronic clinical decision support system to assist clinicians to provide tailored, guideline-based NCD care and referral (India) (Patel <i>et al.</i>, 2020). 3. Standardized, context-appropriate referral forms based on free, open Fast Healthcare Interoperability Resources (Nigeria) (Chukwu <i>et al.</i>, 2022). 4. e-referral system that enables referral requests to be audited and provider-to-provider consultation during referral decision-making (Brazil) (Gadenz <i>et al.</i>, 2021; Pachito <i>et al.</i>, 2022). 5. e-consultation between primary care providers and referral facilities during referral decision-making, either formal communication or "curbside consultation," when the referral facility provider may provide clinical advice without a formal role in the patient's care (global review) (Walsh <i>et al.</i>, 2013). 6. Community health workers trained to use a community case management app in smartphones and tablets to provide more appropriate treatment recommendations to caregivers of acutely unwell children and facilitate urgent referral (Malawi) (Hardy <i>et al.</i>, 2017). 7. Structured SMS text messaging system for mental health referral and counter-referral between trained, trusted community members and mental-health-trained, facility-based health workers (Nepal) (Bhardwaj <i>et al.</i>, 2020).

(Continued)

Table 4. (Continued)

Actions for Digitally-supported Referral	Examples
	8. m-Health app, supported by phone calls, for MNCH referral and counter-referral between midwives at urban primary care facilities and staff at local hospitals (Indonesia) (Indriani et al., 2020). 9. WhatsApp triage, referral, and transfer system for bi-directional communication, data recording and decision-making (Liberia) (Reynolds et al., 2023).
Implement digitally-supported referral from facilities to community or social services	1. e-platforms that screen for social risks, provide a community resource directory and technology-facilitated referrals, and enable care coordination, tracking, reporting and analytics (United States of America) (Cartier et al., 2020). 2. Digital system to automatically generate personally tailored referrals for social determinants of health at the end of clinic visits, based on EHRs (United States of America) (Lindau et al., 2019; Vega et al., 2019; Tung et al., 2020). 3. System to universally screen patients for social determinants of health using self-administered tools, in order to refer them to appropriate non-clinical and community-based resources (United States of America) (Berry et al., 2020).

This table synthesizes the actions recommended for digitally-supported referral that were identified in the 33% (60/181) of included papers that address digitally-supported referral. Each action is illustrated by examples from relevant papers, prioritizing those that focused on low- or middle-income countries. The list of examples is not exhaustive; the 60 papers that address digitally-supported referral can be found in Supplementary Material 3.

Key: EHR = electronic health record; MNCH = maternal, neonatal and child health; NCD = noncommunicable disease; SMS = short message service.

phases are specifically relevant to digitally-supported referral systems, interventions and tools. In some health systems, for example, a variety of EHR systems have developed independently and interoperability between EHR systems can be a significant challenge for referral management.

One strength of this scoping review was the use of complementary sources of literature to reduce disproportionate representation of high-income countries. Notably, there were few duplicates among the papers identified from the three sources of literature, which highlights the immense and diverse nature of literature on referral. Nonetheless, the systematic, complementary approach seems likely to have captured major themes and patterns in the referral literature.

There are two methodological limitations of the scoping review approach, as opposed to a systematic review approach. First, only one reviewer conducted the search, extraction and analysis steps of this scoping review. Having a second reviewer duplicating these tasks and resolving any differences between the reviewers can help to reduce biases and error, but that approach was not logistically feasible in this review. Second, in this scoping review there was no attempt to evaluate the quality of the included studies or to assess the strength of the evidence. Such steps can be useful to identify and prioritize the findings from well-conducted studies with strong evidence, but this is a time-consuming, intensive process and also was not feasible within the scope of this review.

A further limitation is that, at its best, a scoping review only captures what is present in the literature. Gaps and biases in the referral literature may reflect gaps in referral practice and/or research biases. Notably, only one of the 33 papers that addressed general or specialized referral systems at national or large subnational levels focused on a country in the WHO African Region. Further, most of the 39 papers focused on digitally-supported referral coordination or processes were focused on specific high-income countries or involved global reviews, which typically are dominated by high-income country examples. In addition, only a few of the papers on e-referral systems stated that the studied e-referral systems were accessible by patients, highlighting both a challenge and an opportunity to improve patient-centred referral services.

An additional limitation is that, because the review sought referral initiatives in highly diverse settings, comparison between

findings is difficult. For example, even within the same country income group, a national referral system for a small, island nation may be much less complex and extensive than a regional or even district-level system in a large, densely populated country, making cross-national comparisons challenging.

Conclusion

The scoping review found that peer-reviewed literature on referral is vast and diverse. National, subnational, and facility-level stakeholders can consider the recommended referral actions identified in the scoping review when assessing and improving existing referral coordination and processes. The detailed findings and recommendations will also support WHO's ongoing development of practical guidance, tools and resources to help countries establish two-way referral systems that ensure seamless referral across service delivery platforms.

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