Task Sharing in the Diagnosis, Prevention, and Management of Rheumatic Heart Disease

A Systematic Review

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ABSTRACT

Background: Globally, rheumatic heart disease (RHD) is a major contributor to the burden of cardiovascular disease. Major gaps in RHD prevention and treatment have been documented at all levels of health systems in low- and middle-income countries. Task sharing is an approach that could prove effective in remediating bottlenecks in RHD-related care.

Objectives: This study conducted a systematic review to assess the state of the evidence for the use of task sharing in the diagnosis, prevention, and management of RHD.

Methods: Guided by a previously published protocol, we searched various databases using a systematic search strategy including MeSH and free-text terms for (1) group A streptococcus, acute rheumatic fever, and RHD and (2) strategies of task sharing in limited-resource settings. Two investigators independently screened the search outputs, selected the studies, extracted the data, and assessed the risk of bias, resolving discrepancies by discussion and consensus.

Results: The publications search yielded 212 records, of which 18 articles were deemed as potentially eligible for inclusion. None of the studies, however, met with the inclusion criteria.

Conclusions: There is a lack of evidence for the use of task-sharing approaches in scaling up RHD prevention and treatment services in limited-resource settings. Considering the persistent burden of group A streptococcus, acute rheumatic fever, and RHD in low- and middle-income countries, this work highlights the urgent need to develop and test models of RHD-related care utilizing an evidence-based approach to task sharing. [Task Sharing in the Diagnosis, Prevention, and Management of Rheumatic Heart Disease: A Systematic Review; CRD42017072989].

Rheumatic heart disease (RHD) refers to the long-term cardiac damage caused by either a single severe episode or multiple recurrent episodes of acute rheumatic fever (ARF) [1-3]. ARF results from the body's autoimmune response to group A streptococcal (GAS) pharyngitis [4,5]. The worldwide prevalence of RHD was estimated at 33 million cases in 2015, nearly all of which were in endemic low- and middle-income countries (LMIC). The decline in RHD mortality since 1990 has not been uniform, with a lack of progress in many countries in Africa, South Asia, and Oceania [6]. Impoverishing living conditions, inadequate control of pharyngitis, and low access to health care for RHD are believed to be among the major determinants of these inequalities in progress [5].

As has been observed in a number of country case studies, ARF and RHD can be prevented through comprehensive disease control programs [7]. Successful prevention of ARF and control of RHD involve treatment of streptococcal infection (primary prevention), regular administration of penicillin to prevent recurrences of ARF (secondary prevention), and medical and surgical treatment of patients with complications of RHD (tertiary prevention) [5]. A variety of different types of data, including human resources for health publications, primary care studies (focused primarily on infectious diseases), the REMEDY (Global Rheumatic Heart Disease Registry) study [8,9], and qualitative research on RHD barriers in Uganda, all point to human resources as a likely key bottleneck for ARF/RHD care [10]. Specific data on ARF/RHD care are not widely available, but severe human resource shortages have been documented in LMIC for a wide range of health conditions [11] and, because RHD is especially neglected and non-prioritized in most countries, it is likely that bottlenecks are even more pronounced for this particular condition [12].

A widely proposed solution to shortages in personnel is task shifting and/or task sharing. Task shifting involves

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TABLE 1. Search strategy

Subject	Search Terms
Task shifting	(task shift*[tiab] OR task-sharing *[tiab] OR balance of care[tib] OR non-physician clinician*[tiab] OR nonphysician clinician*[tiab] OR task sharing[tiab] OR community care giver*[tiab] OR community healthcare provider*[tiab] OR cadres[tiab] OR "Community Health Workers"[Mesh])
GAS < RHD and ARF	(("Pharyngitis"[MeSH] OR pharyngitis OR sore throat OR strep OR group a β-hemolytic streptococcal OR "streptococcus pyogenes"[MeSH] OR group a streptococcus OR group a streptococcal infection OR "impetigo" [MeSH] OR impetigo OR group a streptococcus skin infection OR rheumatic fever OR "rheumatic fever" [MeSH] OR rheumatic heart disease OR "rheumatic heart disease" [MeSH]))

ARF, acute rheumatic fever; GAS, group A streptococcus; RHD, rheumatic heart disease.

the reallocation of tasks among health workforce teams, often from a few, highly trained health providers to a larger contingent of providers with less formal health care training [13]. Task sharing involves the redistribution of responsibilities to allow a wider range of health care workers to offer certain services. Both approaches, when done safely, have been an effective means of rapidly expanding access to and improving the quality of health care [14]. Practically, the 2 concepts overlap substantially—and the terms used interchangeably—and have been implemented in a number of countries that are facing acute health workforce shortages. In this article, we will use the term "task sharing" to imply both task-shifting and task-sharing activities.

TABLE 2. Examples of outcomes recorded

Prevention Levels	Output	Outcomes	Impact
Primary	Cases of streptococcal pharyngitis or ARF prevented	Cost of care or time saved	Quality of care
Secondary	Proportion of months (or patients) adherent to secondary prevention	Patient satisfaction or demand-side quality	Hospitalizations, death
Tertiary	Volume of patients seen	Time in therapeutic range	Optimal medical care

ARF, acute rheumatic fever.

The vast majority of the publications on task sharing has focused on human immunodeficiency virus/acquired immunodeficiency syndrome, family planning, and overall strengthening of health systems [15,16]. There are systematic reviews and studies that investigated the task sharing for cardiovascular disease (CVD) [17]. The task sharing reported focused on nonphysician health care workers controlling risk factors for CVD and improving blood pressure and glucose control and providing advice on healthy weight [18-21]. However, CVD task-sharing studies did not specifically address RHD interventions. There is also emerging evidence from pilot studies that nonphysicians are being increasingly engaged in the screening and diagnosis of CVD [14]. Our systematic review aims to provide contemporary information on models of care that use task-sharing approaches to expand access to RHD prevention and treatment services and reduce costs with similar or higher quality.

METHODS

This study adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for reporting of systematic reviews [22]. We included randomized controlled trials, cluster randomized controlled trials, quasi-experimental studies, controlled before-and-after studies, and, where relevant, cross-sectional studies and case reports. We included studies of individuals at risk of, or affected by, GAS, ARF, and RHD (Table 1). We considered any intervention or program directed at RHD that involved task sharing of a clinical or public health service, including primary, secondary, and tertiary prevention approaches (Table 2).

A comprehensive search strategy was developed to search both published and unpublished articles, with restrictions to English language but no restriction on the publication date. The strategy included MeSH and free-text terms relating to GAS, ARF, and RHD, as well as various strategies of task shifting such as training of health care workers in LMIC. The peer-reviewed articles in the following electronic databases were screened: PubMed, Cochrane Central Register of Controlled Trials, Embase, Scopus, Web of Science, WHOLIS (World Health Organization Library Information System), Africa Wide, and CINAHL. Supplementary searches were conducted through reference and citation tracking of the key articles retrieved during the search.

Detailed information on the method are published in the protocol [23]. Two authors (L.H.A. and I.S) screened the search outputs to select potentially eligible studies. One (L.H.A.) obtained the full text of potentially eligible studies, and thereafter both (L.H.A. and I.S.) independently conducted the final study selection for inclusion in the review. In case of any discrepancies, we resolved any disagreements regarding the inclusion of studies through discussion or consulting a third author (D.W., L.J.Z., M.E.).

RESULTS

The research process and selection of studies for this review is presented in a PRISMA flow diagram (Fig. 1). The publications search yielded 212 records. We excluded 7 duplicates, screened 205 records, and found that 185 records were not relevant to our research question. We reviewed the remaining 18 potential full-text articles for inclusion in that they addressed an aspect of RHD in relation to the role of echocardiographer but not task sharing. After detailed review and discussion of the 18-potential full-text articles, all were excluded, leaving no studies for inclusion into our final review.

The majority of studies looked at training nonphysician health care workers to conduct echocardiographic screening for RHD. The main reason for exclusion was that none of the studies were based on RHD treatment or prevention programs in health care settings, and they did not specifically assess how task sharing could improve clinical outcomes for ARF/RHD [24-41] (Table 3).

DISCUSSION

Our study reveals that the published reports have, to date, not seriously addressed task-sharing approaches to expand access to RHD prevention and treatment services and reduce costs with similar or higher quality. Twenty candidate studies initially thought to be eligible for this review were, for the most part, focused on the narrow question of the diagnostic performance of echocardiography in the hands of nonphysician health care workers, despite implicitly or explicitly identifying their objectives as including task-sharing activities. The focus of this systematic review was task sharing in the context of RHD prevention and treatment, not the diagnosis of RHD.

RHD continues to be an important health problem in LMIC. Community-based screening studies suggest that most individuals who have RHD are unaware of their diagnosis [42]; among those who are aware and are engaged in care, outcomes are poor. Because a number of studies have been published on training of nonphysicians to use echocardiography to diagnose RHD, we hypothesized that there could be some helpful studies in the published reports on how to use task sharing to improve the delivery of RHD prevention and treatment services.

On the basis of our review, we provide 2 recommendations for future research. The first is that future studies

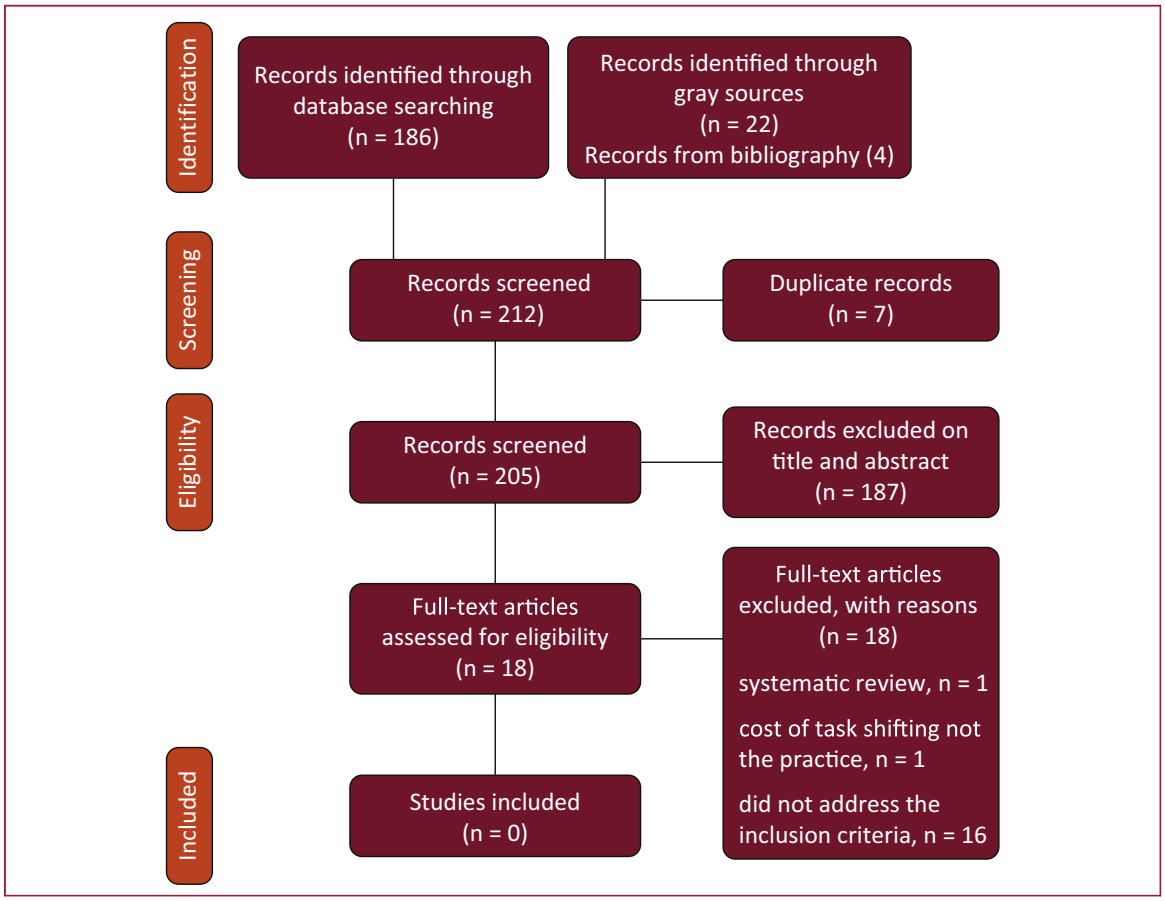

FIGURE 1. PRISMA flow diagram.

TABLE 3. Exclusion criteria of studies

Author(s), Year (Ref. #)	Reason for Exclusion
Maier and Aiken, 2016 [24]	The study compared task shifting between countries and not the practice in RHD.
Hendriks et al., 2015 [25]	The paper discusses task-shifting practicalities in saving money but does not explore task shifting in practice.
Saxena, 2016 [26]	The paper is a comment on task shifting in RHD screening to nonexperts and not a study that was performed with results.
Nascimento et al., 2016 [27]	The paper is a systematic review.
Zühlke et al., 2013 [28]	The paper is about RHD but does not discuss task shifting.
Iyengar et al., 1992 [29]	The paper is about the evaluation of the health education and training program on RHD between the control group and the intervention group.
Sliwa et al., 2016 [30]	The paper is on the cost of task shifting not the practice.
Zühlke et al., 2012 [31]	The paper discusses the use of task shifting for the use of computer-assisted auscultation.
Beaton et al., 2015 [32]	The study compared standard portable echocardiography vs. handheld echocardiography in Gulu, Uganda, for the sensitivity and specificity to detect RHD.
Beaton et al., 2012 [33]	The study was done on the prevalence of RHD in Kampala, Uganda. The paper does not discuss task shifting.
Colquhoun et al., 2013 [34]	The paper discusses a week-long RHD echocardiography training workshop, 2 weeks of echocardiography in the field supervised by experienced doctors and echo technicians.
Iyengar et al., 1991 [35]	The paper discusses a health education and training program.
Sims Sanyahumbi et al., 2017 [36]	The study compared 3 half-days of didactics and 2 days of hands-on echocardiography.
Beaton et al., 2016 [37]	The study discussed 3 weeks of self-directed education, no practical experience.
Engelman et al., 2015 [38]	The paper is on an 8-week training program: 1 week of classroom-based workshop training on RHD followed by 7 weeks of supervised practical training.
Lopes et al., 2018 [39]	The paper is on an Online RHD educational course and 8- to 12-week hands-on training supervised by a cardiologist.
Engelman et al., 2016 [40]	The paper is on 1-week classroom-based workshops, followed by 7 weeks of practical training on echo screening.
Ploutz et al., 2016 [41]	The study discussed 4 h of physician-directed teaching using a combination of computer-based training, didactics, and case studies. Two-day hands-on session with patients with supervision, again for RHD echo screening.

RHD, rheumatic heart disease.

looking at novel delivery models for RHD-related care should look at a range of services along the continuum of care—beyond secondary prevention. Much of the RHD publications over the past decade have focused on echocardiography-based "active case finding" for RHD. The justification for screening is that it could improve case identification and delivery of secondary prevention; however, the overall approach has not been shown to improve outcomes, and there remains ambiguity about how to manage "borderline" RHD. Furthermore, we found no studies that addressed prevention of ARF or "passive case-finding" of recurrent ARF and RHD; nor did we identify any tertiary prevention studies.

There are a number of potential task-sharing approaches that could be used to improve access to evidence-based interventions. For instance, school nurses could be engaged to screen for GAS pharyngitis in high-risk groups or areas (primary prevention) [43]. Under supervision, community health workers could be tasked with delivering monthly penicillin injections among patients already established in care (secondary prevention). Midlevel providers could play a crucial role in post-operative management of individuals who have undergone heart valve surgery, particularly if they are organized in geographically remote locations where it is not feasible for surgeons to visit on a routine basis [44].

Our second recommendation is that future research on RHD in health care settings should move beyond standard "clinical epidemiology" questions and begin to incorporate principles and methods from implementation science. For example, a study of task sharing should not stop at the question of diagnostic test performance; it should focus on how standard and task-sharing approaches perform in real-world clinical environments. To demonstrate potential impact of task sharing within a complex health system environment, the study could report on and, evaluate its intervention(s) using a result chain framework, incorporating all aspects of the program from inputs to final impact (Fig. 2). Result chains are a common tool for program evaluations and can be extended to systematic reviews to help meta-synthesize data from studies of health programs [45]. Models of care incorporating result chains or theory

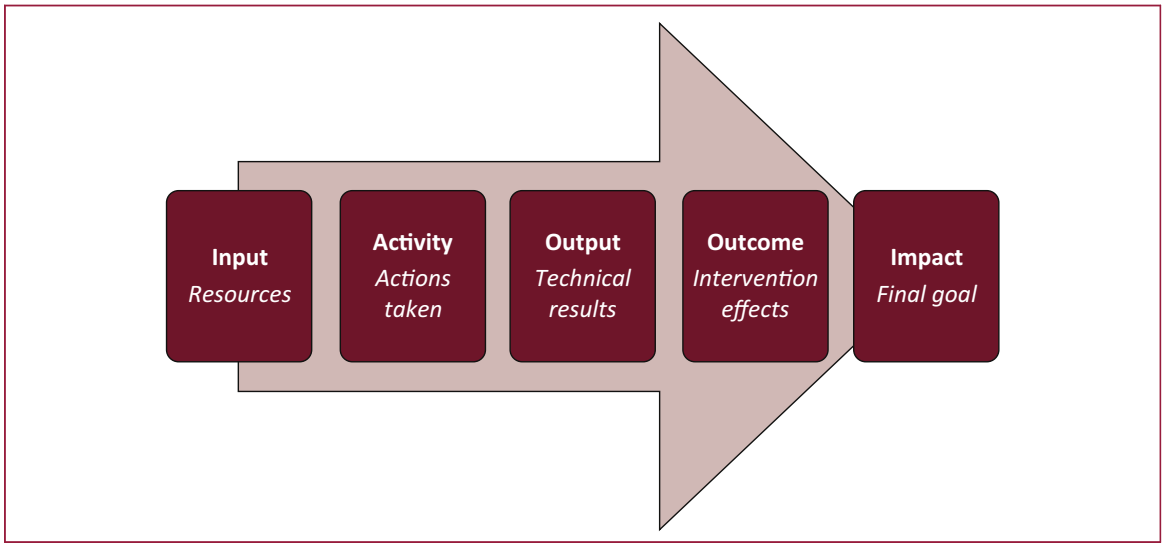

FIGURE 2. Example of a result chain framework.

of change frameworks provide the essential data required to roll out health system interventions in diverse settings.

CONCLUSIONS

There is a lack of evidence on the use of task-sharing approaches to scaling up RHD prevention and treatment services in limited-resource settings. In light of the persistent burden of GAS, ARF, and RHD in countries with weak health systems and inadequate human resources for health, there is an urgent need to develop and test models of RHD-related care that build on evidence-based approaches to task sharing. Our review suggests that the RHD community should prioritize new research related to primary prevention, non-echocardiography-based approaches to secondary prevention, and improving access to and quality of cardiac surgery in limited-resource settings. Greater efforts should be made to develop multi- and interdisciplinary study teams that include expertise in health services and implementation science methods. Generating this kind of "applied" scientific knowledge will be indispensable to efforts to eliminate ARF and RHD.

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