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REVIEW

Barriers and Facilitators to Delivering Inpatient Cardiac Rehabilitation: A Scoping Review

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Objective: The purpose of this scoping review was to summarize the literature on barriers and facilitators that influence the provision and uptake of inpatient cardiac rehabilitation (ICR).

Methods: A literature search was conducted using PsycINFO, MEDLINE, EMBASE, CINAHL and AgeLine. Studies were included if they were published in English after the year 2000 and focused on adults who were receiving some form of ICR (eg, exercise counselling and training, education for heart-healthy living). For studies meeting inclusion criteria, descriptive data on authors, year, study design, and intervention type were extracted.

Results: The literature search resulted in a total of 44,331 publications, of which 229 studies met inclusion criteria. ICR programs vary drastically and often focus on promoting physical exercises and patient education. Barriers and facilitators were categorized through patient, provider and system level factors. Individual characteristics and provider knowledge and efficacy were categorized as both barriers and facilitators to ICR delivery and uptake. Team functioning, lack of resources, program coordination, and inconsistencies in evaluation acted as key barriers to ICR delivery and uptake. Key facilitators that influence ICR implementation and engagement include accreditation and professional associations and patient and family-centred practices.

Conclusion: ICR programs can be highly effective at improving health outcomes for those living with CVDs. Our review identified several patient, provider, and system-level considerations that act as barriers and facilitators to ICR delivery and uptake. Future research should explore how to encourage health promotion knowledge amongst ICR staff and patients.

Keywords: inpatient, cardiovascular diseases, cardiac rehabilitation, early mobilization, scoping review

Introduction

Contributing to over 17.9 million deaths each year, cardiovascular disease (CVD) are the leading cause of death worldwide.[1] CVD, such as ischemic heart disease (IHD) and coronary artery disease (CAD), are a group of disorders of the heart and blood vessels resulting from an array of biological, behavioural, environmental, and social risk factors including unhealthy diets, physical inactivity, and substance abuse.[1] In the last thirty years, the global incidence of CVD has doubled, with nearly 528 million cases of CVD being reported across the world in 2019.[2] In the United States alone, the direct and indirect costs of CVD amounted to $863 billion in 2010 and are estimated to rise by 22% to $1044 billion by 2030.[3] To reduce the incidence of CVD, primary and secondary prevention efforts should be intensified.

Cardiac rehabilitation (CR) is a comprehensive and evidence-based model of care for managing CVD that involves a combination of exercise, education on modifiable risk factors and lifestyle changes, and/or psychological and social support.[4,5] CR programs are integral to limit the physiological and psychological effects of cardiac illness, reduce the risk of sudden death and re-hospitalization, control cardiac symptoms, contribute to secondary prevention, and enhance the psychosocial and vocational status of cardiac patients.[4,5] Prior research has highlighted the importance of early intervention, such as inpatient CR (ICR) as it optimizes patient independence and autonomy through the promotion of regular physical movement, education, and medication adherence.[6] ICR is specifically known to promote functional recovery,

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psychosocial well-being, long-term survival, and improve overall quality of life in cardiac patients.[6] ICR is particularly important as the knowledge and skills obtained in the hospital is known to help the patient reach the next level of activity as an outpatient and establish patterns of care at home.[7]

Although there is ample evidence supporting the effectiveness of ICR, these programs are still being underutilized worldwide with attendance rates of only 20%-50%.[5,6] Barriers to enrollment in CR programs include but are not limited to distance, lack of time, accessibility, and prior work commitments.[8–10] There are also home-based CR programs (HBCR) which are used to increase participation in patient populations. For instance, HBCR programs can enhance the accessibility of CR programs by removing travel-related barriers and accommodating those that are immunocompromised.[11]

Further, little is known about ICR practice patterns and implementation considerations, such as what is working well and what can be improved within these programs.[12] To our knowledge, no review exists that summarizes the barriers and facilitators to delivering ICR programs, highlighting a need to explore and map the available evidence related to the implementation of ICRs. As such, we aimed to identify and categorize the various barriers and facilitators that influence the provision and uptake of ICR.

Methods

This scoping review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist.[13] The review was conducted according to the five stages described by the Arksey and O'Malley's methodological framework.[14] This methodology was appropriate given our interest in the broad topic of ICR and the heterogeneous nature of the body of literature. This scoping reviews' protocol has been registered in the Open Science Framework (OSF) (10.17605/OSF.IO/XQE7R).

Stage I: Identifying the Research Question

The guiding research question for this scoping reviewer is: What are the barriers and facilitators that influence the use, provision, engagement and overall implementation, of ICR? We also aimed to describe the scope of ICR, including how these programs are developed, who implements these programs, and which outcome measures are used to quantify the success of ICR.

Stage II: Identifying Relevant Studies

A research librarian was consulted for the development of a comprehensive search strategy for the following databases: PsycINFO, Medline, Embase, CINAHL and AgeLine on October 28, 2020. The search strategy included terms such as "cardiovascular disease", "rehab", and "inpatient/in-hospital" (see Appendix A for Medline search strategy). There have been substantial changes in our understanding of cardiac conditions, structure, and organization of the healthcare system in the last two decades, leading to progression in ICR intervention strategies.[6] Thus, this scoping review omitted literature published prior to the year 2000. Detailed inclusion and exclusion criteria are described below.

Stage III: Study Selection

Articles were included if they were in English and focused on adults who were receiving some form of ICR, such as physical exercise or nutritional counselling. Only primary research articles, regardless of study design, were included. We excluded review articles, unpublished dissertations, study protocols, and conference proceedings. Articles were also excluded if they focused on pediatric populations, primary prevention, or did not describe the hospital setting in sufficient detail.

Records identified in the database search were uploaded into Covidence systematic review software for screening. Three reviewers (K-W.W., S.S., and Z.S) screened 10% of the titles and abstracts to establish inter-rater reliability (k=0.837, 96% agreement). Once reliability was established, the remaining titles and abstracts, as well as full-texts, were independently screened. If there was disagreement between the reviewers, an additional team member was consulted to reach consensus on the inclusion of the article.

Stage IV: Charting the Data

A data extraction chart was created to extract key information that would help us answer our research question, including study design and details (eg author, country), ICR program characteristics (eg interventions provided, staffing model), and relevant findings (eg benefits of ICR, barriers/facilitators to ICR implementation and utilization). Similar to full-text screening, the included articles were distributed across four reviewers (A.V, K-W.W., S.S., and Z.S) for independent extraction of the relevant information.

Stage V: Collating, Summarizing and Reporting Results

The present review employed a descriptive summary and a narrative analysis. Our descriptive summary highlighted details on the type and frequency of studies included, and the location where the study was conducted. We then categorized and narratively summarized findings into barriers and facilitators of ICR delivery and uptake.

Results

Our database search identified a total of 44,331 records in addition to one record identified through network sharing. We removed 8423 duplicates, leaving 35,909 unique records for title and abstract screening and 2099 were selected for full-text review. The most common reasons for exclusion were due to being an ineligible publication type (conference abstracts, letters, or editorials [n = 766]) or the CR program did not occur in an inpatient setting (n = 732). 48 of the full texts could not be located and were excluded. In total, 229 articles were included, as shown in Figure 1.

Study Characteristics

Studies used a variety of designs and methodologies including randomized-case studies (n=48), observation-based methods (n=32), general pre- and post-test (n=21), surveys (n=19), case studies/reports (n=10), and qualitative methods (n=8). Most studies were conducted in Germany (n=40), the USA (n=31), Italy (n=30), and Japan (n=27). Studies focused on a variety of surgical conditions including coronary artery bypass graft surgery (CABG) (n=34) and valvular surgeries (n=13), as well as cardiac conditions including myocardial infarction (MI)/acute myocardial infarction (AMI) (n=59), CAD (n=39), and heart failure (HF) (n=35). Some studies also reported on comorbidities, with the most common being hypertension (n=50) and diabetes (n=50). Out of the 228 included articles, 157 included samples of males and females,[15–169] 25 included males only,[170–194] and four included a female-only sample.[195–198] Studies were conducted in various acute settings including acute hospitals (n=125), designated inpatient rehabilitation hospitals (n=51), and rehabilitation centres (n=23). Full study details and characteristics can be found in Appendix B. Below, we report specifically on our synthesis of the barriers and facilitators to ICR delivery and uptake from the included studies.

Barriers to ICR Delivery and Uptake

Patient Level

Individual Characteristics: Studies reported factors, behaviours, and attitudes that impaired patients' ability to participate in and receive ICR. These factors included a lack of knowledge, interest, and motivation to participate in ICR, and pain and anxiety when participating in ICR exercises and therapies.[70,71,73,75,87,113,115,119,134,142,143,148,166–168,190,199–205] Additionally, sociodemographic conditions impacted patients' ability to participate, with some studies noting that older adults and those coming from lower socioeconomic status were less likely to participate in ICR.[28,39,166,200,206]

Provider Level

Provider Knowledge and Efficacy: Studies indicate that providers lack expertise and interest in ICR[131,152,166,206] and have limited knowledge about the types of ICR interventions that exist and their importance and benefit.[39,58,70,80,84,99,108,113,130,142,164,166,168,199,201,206–211] Further, many of them have difficulty forming new concepts and skills to implement novel interventions[84] and are challenged by time/scheduling restrains as well as narrow scopes of practice when it comes to implementing ICR.[51,78,108,124,142,201,207,209,210]

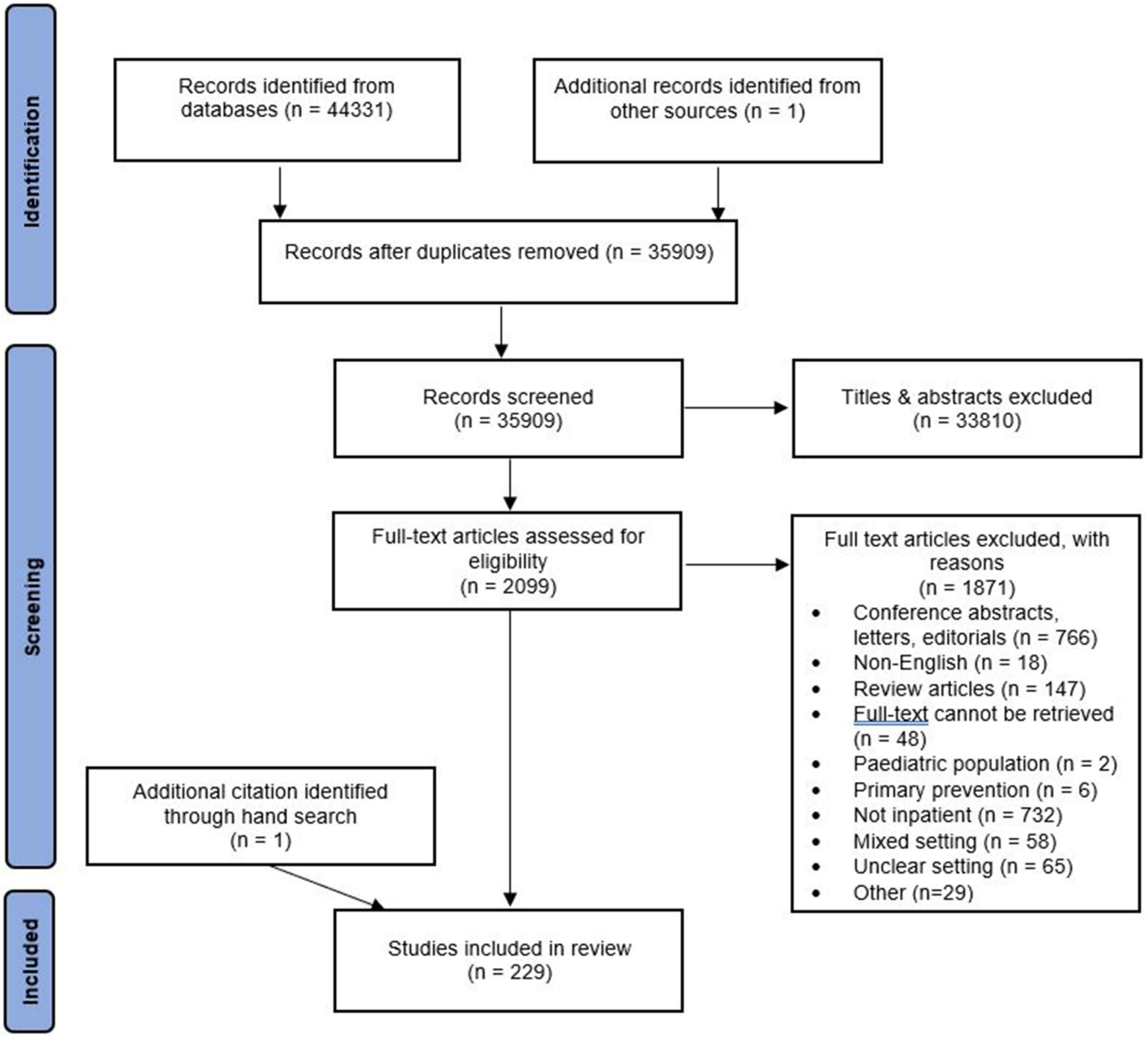

Figure 1 Flowchart.
Notes: *Adapted from* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi: 10.1136/bmj.n71.

Team Functioning: The absence of strong social networks impacted program delivery. Some studies described multidisciplinary teams that lacked interdisciplinary communication, leadership, and administrative support.[39,70,108,130,142,164,166,199,201,207,209–211]

System Level

Financial Costs and Resource Limitations: Broadly speaking, inadequate funding and resources both negatively influenced the ability to access and deliver ICR.[39,70,80,99,108,130,142,164,166,199,201,207,209–211] Vincent et al[145] and Schweikert et al[128] reported that it cost their institutions $4709 USD and €3388 EUR for total therapy charges per patient, respectively. Costs are significantly higher for those who require ICR in comparison to outpatient or community-based rehabilitation.[128,145] Many of these charges are covered by insurance and national health coverage, however not all recipients of ICR are insured or have insurance that covers ICR.[210] Therefore, this creates a gap in access to ICR programs. Namely, those who have the financial means may have greater access to ICR and as a result, those who do not

have monetary access are forced to miss the opportunity to participate in such programs. Moreover, Weiser et al[212] reported that it costs Swiss health insurance companies over $462 million CHF each year to cover the costs of ICR. Out-of-pocket costs present significant barriers for the uninsured, especially for those who access ICR programs multiple times a week. Overall, costs impact participation in ICR programs.

Poorly Coordinated Processes: Referrals for ICR were inconsistent across the system and more likely to be provided when there was infrastructure that allowed for easy communication and collaboration (eg electronic medical record sharing between discharging and receiving facilities).[180] A lack of referrals and poor cross-regional collaborations (eg not having healthcare alliances across the region) acted as a barrier to patient participation in ICR. Acute care centres offering very early ICR did not always offer referrals to continue CR in an outpatient or tertiary setting. Moreover, not all facilities or clinicians offered referrals for patients to participate in ICR entirely. This often occurred when CR facilities and programs were limited and inaccessible, such as in rural regions.[39,70,80,99,108,130,142,164,166,199,201,207,209–211]

Inconsistency in Evaluation: There was inconsistency in the literature related to how patient and provider feedback was obtained and incorporated to improve the quality of delivery and program design.[84,96,166,207] Some studies described the use of validated and systemic processes to evaluate the ICRs, including patient surveys of changes in cardiac health outcomes, illness beliefs, and expectations.[84,96] However, other research relied on qualitative interviews as a form of feedback to improve program use. For example, patients provided frontline clinicians with suggestions to improve the quality of care patient-centeredness of future programmes, particularly as it relates to consultation, accurate information, and equal access to treatment options.[84,166] Other research reported using seminars or medical and nursing grand rounds as a means to gain feedback, information, and support from care providers to continuously improve patient outcomes.[207]

Facilitators of ICR Delivery and Uptake

Patient Level

Individual Characteristics: A facilitator for patient participation included recognition of their illness stage and the severity of their condition. This often occurred in tandem with a belief in the efficacy and importance of ICR, as those with more serious illnesses were more likely to endorse and participate in ICR.[200] Prior knowledge and habits, including prior experiences with leading a healthy lifestyle, also facilitated patient participation and long-term benefits in ICR.[51,52,58,70,71,73,77,78,92,115,124,142,143,153,157,158,165,167,168,174,191,200,201,203]

Provider Level

Provider Knowledge and Efficacy: Much like the absence of provider knowledge and efficacy can act as a barrier, its presence functions as a facilitator. When providers believed in the value and benefit of ICR programs, they were more likely to offer ICR and refer patients to continue with CR in an outpatient setting.[51,78,108,124,142,201,206,207,209,210] ICR delivery was facilitated by providers who were confident in their capabilities and keenly aware of patients' needs.[51,78,108,124,142,201,207,209,210] For example, physiotherapists (PTs) perceived themselves as trusted clinicians in the context of exercise-based CR, with patient relying on their support and motivation during rehabilitation.[165] Similarly, nurses acknowledged their role in supporting the day-to-day care of patients compared to other medical professionals and recognized their influence on promoting health-related behaviour changed.[26,87] Notably, several studies indicated that provider knowledge and efficacy can be promoted by providing clinicians with appropriate supports such as education modules[26,84,118,152,159,166,188,193] and well as support and communication from organizational leadership.[207]

Accreditation and Professional Associations: In one study, clinicians were more likely to offer and facilitate the use of ICR if they were affiliated with professional associations, such as the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR).[142]

Patient- and Family-Centered Practices: Building a strong rapport between clinicians, patients and families facilitated engagement in ICR and promoted its long-term benefits.[49,92,167,168] When families are included in care and have the opportunity to gain knowledge of cardiac conditions, risk factors, and general healthy living habits, patients report more long-term positive health outcomes.[96,114,145,158,162,163,179] When clinicians recognized patients' needs and resources, such as whether they were supported by family caregivers of whether they had healthy food options that were geographically accessible, patients were more likely to participate in ICR. Incorporating patients' needs and resources allowed for ICR

to be more tailored, relevant, and applicable and led to more long-term success, particularly with increasing independence at home.[39,46,70,75,77,87,96,115,116,119,142,149,165–167,169,201]

System Level

Interestingly, no studies reported on facilitators at the system level.

Discussion

The goal of this scoping review was to provide a comprehensive synthesis of the factors that act as barriers and facilitators to ICR delivery and uptake. In total, we included 228 eligible articles. Our review identified several patient, provider, and system-level considerations that act as barriers and facilitators to ICR delivery and uptake.

Knowledge and Attitudes Towards ICR

Knowledge of ICR and a belief in the importance and necessity of the intervention were highlighted as key factors that influence the provision and uptake of ICR. For patients, knowledge and attitudes emerged as having the potential to both challenge *or* facilitate the uptake of ICR. Namely, when patients were aware of and convinced of the benefits of ICR, they were more likely to participate in the intervention. Conversely, when patients lacked knowledge, interest or motivation to participate in ICR, uptake was lower. Patients' lack of knowledge of what ICR entails may lead them to think they do not need the therapeutic benefits or attribute the content of ICR as being synonymous with physical exercise. Our review, as well as prior research, have highlighted that patients often have negative views towards physical exercise and hold a belief that they can undertake CR independently.[164,213]

Similarly at the provider level, beliefs and attitudes towards ICR appeared to influence delivery, with poor knowledge and lack of expertise limiting providers' provision of ICR and strong knowledge and efficacy with ICR promoting its application. In a survey of clinicians' attitudes towards ICR, findings revealed that their belief in the efficacy of ICR was highly influenced by whether they value lifestyle modification as an effective means for behaviour change, rather than just as a mandatory way to change health behaviour.[214] In addition to personal values, a review of the literature suggests that a lack of clinician knowledge of ICR, such as not understanding who would most benefit from ICR or who should be referred, affects whether patients attend ICR.[215] Individual attitudes of clinicians can influence patients' own views on CR and can even promote healthy behaviours amongst patients.[216] In order to increase ICR participation, further efforts are needed to educate healthcare providers, healthcare systems, patients, and their families about the benefits of ICR, including efforts to change the perception that ICR is forced upon individuals or is less important than pharmacological or surgical therapy.[217] Future research should explore how to promote health promotion knowledge amongst ICR staff and patients and knowledge of behaviour change techniques amongst ICR staff.

Patient Characteristics Influence ICR Uptake

Our review begins to elucidate that patient characteristics have an important influence on ICR participation and uptake—particularly sex and gender. Out of 228 articles included in this scoping review, only 13 had more female participants than males,[43,50,61,81,94,110,114,131,155,195–197,218] with some studies consisting solely of males (n=25). While this sex disparity might be due to the higher incidence of CVD among males,[219] it remains concerning that the female population is under-represented in these studies given that females have a higher mortality and hospitalization rates and experience poorer prognosis after a cardiac event, including future pregnancy complications.[219] Women have also been reported to have poorer participation rates in and referrals to CR programs,[220] illustrating a need to understand how to optimize ICR programs to mitigate low attendance and compliance in this population. Ways to improve women's CR attendance may include exercise regimes (ie, yoga) and can be used to increase participation and engagement.[198] Future research that evaluates ICR programming should consider the factors associated with women's health, and future ICR programs should consider how to minimize non-adherence when catering interventions for female participants.

ICR is Highly Challenged by System-Level Issues

A notable finding from this review was that that system-level issues acted exclusively as barriers, with no system-level facilitators identified from the included studies. These issues included financial and resource limitations, inconsistent patient evaluations, and poorly coordinated processes across the continuum of care. A key issue was the lack of referrals to both ICR itself and referrals to continuing CR after ICR discharge. When patients receive long-term follow-up for at least 12 months following ICR discharge, they are more likely to sustain the benefits gained during their stay in ICR.[116,130,148,153,190] Despite the recognized importance of long-term follow up, few ICR programs in the present review explicitly described a clear follow-up plan in the discharge planning process. This echoes the broader body of literature on CR which has identified a lack of referrals as a recurring issue that challenges the provision of CR.[221,222] As has been demonstrated by Shanmugasegaram et al, these system-level issues can have a "trickle down" effect on patients in as far as a lack of physician referral for CR can generate patient perceptions that CR is not needed. As was discussed earlier in our paper, patients' knowledge and attitudes towards ICR have an important impact on their participation in this intervention. Thus, addressing provider-level knowledge and attitudes as well as system-level challenges around integrated referrals can both have an ameliorative effect on ICR uptake at the patient level.

Need for Standardized Reporting of ICR Research

Our scoping review revealed that some confusion exists around the conceptualization of ICR. Many studies defined ICR as a part of acute care while others defined ICR as a rehabilitation period where patients stay in a dedicated institution, further illustrating the lack of uniformity in ICR delivery, goals, content, etc. These variable ways of classifying ICR makes summarizing the evidence challenging since the programs – though all referred to as ICR – entail different goals, staffing models, and resources depending on their settings. Moreover, the variability in classifying ICR means that the barriers and facilitators that influence ICR may differ depending on how it is contextualized. For example, while distance and transportation is often cited by patients as barriers to cardiac intervention participation,[223] these barriers are not applicable to ICR as patients are staying in the institution during the rehabilitation period. To this end, standardization of design and reporting of ICR studies would better-enable evidence synthesis and comparison across existing and future studies.

Strengths and Limitations

Strengths of this scoping review include the rigorous development of search strategies tailored for each database and consultation with an academic librarian to identify proper keywords for each database. The search strategy was also validated with a test set which includes a list of relevant studies the reviewers identified a priori. The agreement rate among the reviewers was well above 80%, indicating a high level of accuracy in the study selection process. This review does have limitations, including the exclusion of non-English literature and studies that did not clearly state the care setting. Secondly, this scoping review did not undertake a bias and quality assessment. Given that this review's focus was to synthesize the nature of ICR and the breadth of factors that influence implementation, critical appraisals and bias assessments were deemed "not applicable" by the review team, a distinction that is supported by current PRISMA-ScR reporting guidelines.

Conclusion

ICR programs can be extremely effective at improving health outcomes for those living with CVDs. This review identified several patient, provider, and system-level considerations that act as barriers and facilitators to ICR delivery and uptake. Future research should explore how to enhance health promotion knowledge amongst ICR staff and patients and knowledge of behaviour change techniques amongst ICR staff.

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Disclosure

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