

Implementing Cardiac Rehabilitation as a First-Line Treatment for Stable Angina Pectoris

PERSPECTIVES OF CARDIOLOGISTS AND PATIENTS

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Purpose: Cardiac rehabilitation (CR) is a promising treatment for patients with stable angina pectoris (SAP) and has been postulated as a safe and effective alternative to revascularization in low-risk patients. We assessed the barriers and facilitators for the implementation of CR for patients with SAP.

Methods: We interviewed 12 clinicians (cardiologists and CR case managers) and 6 patients to assess perceived and expected barriers and facilitators in choosing CR as first-choice treatment for SAP in the Netherlands. The interviews were analyzed both inductively and deductively using the theoretical domains framework.

Results: We found a total of 44 barriers and 28 facilitators across 8 themes. Clinicians reported the following key barriers: lack of evidence and clarity in guidelines; knowledge gaps about the outcomes, treatment indication, and content of CR; higher perceived effort to discuss CR compared with a revascularization; a lack of support from colleagues and authorities; suboptimal treatment decision-making conditions; beliefs that affect openness to CR; and the organization/funding of care. Clinicians indicated these facilitators: their belief in CR and motivation to provide the best and affordable care. Patients reported no major barriers. As facilitators, patients indicated openness to CR and trust in the clinician advice.

Conclusion: Clinicians experience barriers to propose CR as an initial treatment strategy rather than revascularization in patients with SAP despite their motivation and belief in CR. Clinicians require more evidence, awareness of the existing evidence, clarity in guidelines, and support from their professional association.

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KEY PERSPECTIVES

What is novel?

- Clinicians believe in cardiac rehabilitation but are not ready to offer it as a first-choice treatment strategy instead of revascularization for patients with stable angina pectoris.
- Clinicians feel hindered by a lack of knowledge and evidence, higher perceived effort, lack of support, individual beliefs, and the organization and funding of care.
- Patients generally follow the clinician's advice.

What are the clinical and/or research implications?

- Implementation should focus on evidence and guidelines, education of clinicians, patient information materials, opinion leaders, and organizational improvements.

Key Words: angina stable • cardiac rehabilitation • exercise therapy • implementation • interview study

Patients with stable angina pectoris (SAP) experience chest pain or discomfort during physical activity or strong emotions, caused by myocardial ischemia, often due to obstructive coronary artery disease. The current

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treatment starts with optimal medical therapy and lifestyle modification. If symptoms persist, coronary angiography is performed, frequently followed by revascularization (percutaneous coronary intervention [PCI] or coronary artery bypass grafting). Recent studies questioned the clinical value of revascularization for patients with SAP.¹ The 2020 published ISCHEMIA-trial (n = 5179) compared optimal medical therapy with revascularization with optimal medical therapy alone and found no difference in ischemic cardiovascular events or mortality over a median of 3.2 years.² Three meta-analyses from 2014 (n = 4064), 2020 (n = 14 877), and 2023 (n = 16 443) reinforced that revascularization was not associated with a reduction in symptoms, cardiac events, or mortality at intermediate to long-term follow-up.³⁻⁵ Although revascularization relieved symptoms (up to 3 months),⁵ its superiority over conservative treatment has also been questioned in a 2018 randomized controlled trial (n = 200) comparing PCI with a placebo procedure.⁶

Cardiac rehabilitation (CR) might be a safe and effective alternative to revascularization. A 2004 randomized controlled trial (n = 101) compared CR with PCI, showing that CR resulted in fewer events, higher exercise capacity, and lower costs.⁷ Nonetheless, a 2018 review (n = 581) evaluated 6 other trials and concluded that the evidence for CR in patients with SAP is still weak.⁸ Recently, 2 retrospective cohort studies from 2022 (n = 18 383) and 2025 (n = 22) showed that CR was associated with lower mortality, rehospitalization, and cardiovascular morbidity,⁹ and reduced stress-induced ischemia and enhanced exercise capacity.⁹ Nonetheless, more evidence is necessary. Therefore, the PRO-FIT randomized controlled trial comparing revascularization with CR for patients with SAP started in the Netherlands in 2022.¹⁰

Recruitment in the PRO-FIT study varied substantially between centers, raising questions about the potential for large-scale implementation of CR. Previous implementation studies focused on coronary artery disease,¹¹ and results might not be directly applicable to patients with SAP. Although guidelines support CR uptake, they provide no clear guidance on timing and whether CR may replace or delay the need for PCI. Moreover, successful implementation requires active strategies in addition to evidence dissemination. Therefore, a tailored implementation approach will be most effective and efficient, if the PRO-FIT study confirms the effectiveness of CR. Preparing for implementation already during the trial, so-called hybrid effectiveness-implementation designs¹² enable quicker implementation of the results. Therefore, we aimed to identify the barriers and facilitators for referring patients with SAP for CR as a first-line treatment instead of a revascularization.

METHODS

DESIGN

We performed semistructured interviews with clinicians and patients from the Netherlands to identify barriers and facilitators for referring patients with SAP for CR instead of revascularization. We focused on patients eligible for elective PCI, since PCI is the most common revascularization modality in low-risk patients.

SETTING

In the Netherlands, the general practitioner initially sees patients with chest pain, starts with medical treatment

after the SAP diagnosis, and refers patients to a cardiologist for further diagnosis and treatment. The Netherlands Association of Cardiology supports the European Society of Cardiology guidelines recommending lifestyle modification, optimal medical treatment, and revascularisation if needed.

Cardiac rehabilitation is generally a personalized individual or group-based program lasting 6 to 12 weeks including exercise training, dietary advice, smoking cessation support, and behavior change strategies. Cardiologists and case managers (often a specialized nurse or a sports physician) work together to inform and include patients in CR programs. Some hospitals organize CR themselves; others collaborate with CR institutes. There is reimbursement for CR after referral by the cardiologist, but there is no automated referral process. A Dutch dataset showed that many patients with SAP already receive CR after revascularization (80% of patients after coronary artery bypass grafting and 40% after PCI), but only 13% receive CR without previous revascularization.¹³

PARTICIPANTS

We contacted 57 cardiologists via e-mail (35 from our professional networks and 22 cardiologists from a national working group) and asked network coordinators to spread the invitation. Using purposive sampling, we aimed to include a diverse sample of cardiologists, with variation in subspecialties (interventional cardiologists, general cardiologists, and case managers), hospital type (university or general), procedures available in their hospital (presence or absence of coronary angiography, revascularization, and CR), and attitude towards CR as first-line treatment for SAP (positive/negative). After the first interviews, we sent reminders to diversify our sample.

We asked participating clinicians and CR providers to approach patients for an interview and send us their contact details if interested. We initially targeted patients with SAP who were offered CR as first-line treatment. Later, we also included patients receiving CR after PCI or medical therapy only. We approached 2 patients who participated in the CR-arm of the PRO-FIT trial. We aimed to recruit a diverse sample of patients regarding experience with PCI and/or CR. We invited 8 patients, of which 7 agreed. One patient was excluded without an SAP diagnosis.

INTERVIEW GUIDE

Clinician interviews assessed experienced and expected barriers and facilitators for proposing CR as a treatment option instead of PCI and referring for CR. Patient interviews assessed experienced and expected barriers and facilitators for choosing CR. We developed interview guides (Supplemental Digital Content, Part 1, available at: <https://links.lww.com/JCRP/A713>) based on the Theoretical Domains Framework (TDF, 2012 revised version),¹⁴ which is a commonly used determinant framework to describe barriers and facilitators for implementation in 14 domains, based on underlying theories of behavior change. After 3 interviews, the results were discussed, and guides were adjusted. Because few patients with SAP are offered CR before or instead of a PCI, several questions were discussed hypothetically.

Interviews took place from September 2023 to January 2024 and were conducted by 2 researchers trained in interviewing (a combination of E.W.V., E.D.-S., A.S., and N.B.). Informed consent was obtained before the interview. One interview was performed in-person and the others via videoconferencing.

ANALYSES

The interviews were recorded, transcribed verbatim, and pseudonymized. Analysis took place in between the interviews using Atlas.ti 24.0.0. All transcripts were double coded (by a combination of E.W.V., E.D.-S., A.S., and N.B.) using a deductive thematic analysis in which codes were based on the data and categorized into TDF categories where possible. Since we found multiple connections between codes in different TDF categories, we developed overarching themes to support clinical interpretation of the results. Themes were developed through several rounds of rearranging codes, until we could describe all codes within a theme in a comprehensive and coherent way. After analyzing the 12th clinician interview, we concluded that saturation was reached, because we could fully understand the dimensions of the themes and had interviewed participants with diversity in the predefined characteristics (subspecialization and hospital type) including those with positive and negative attitudes towards CR.¹⁵ After 6 patient interviews with similar experiences and views, and only minor barriers towards CR, we scheduled no more patient interviews. It is possible that we have not achieved data saturation from patients.

This manuscript was written in line with the Consolidated Criteria for Reporting Qualitative Research (Supplemental Digital Content, Part 2, available at: <https://links.lww.com/JCRP/A713>).¹⁶

RESULTS

PARTICIPANT CHARACTERISTICS

We interviewed 12 clinicians (10 cardiologists and 2 case managers) and 6 patients. The interviews lasted an average of 42 minutes (ranging from 26 to 57 minutes). Participant characteristics are displayed in Table 1. All clinicians had experience with patients with SAP and referring patients to CR. All patients had knowledge of CR: 5 had attended CR recently, and 1 had attended CR after valve replacement surgery several years ago but declined CR for his SAP recently.

BARRIERS AND FACILITATORS FOR REFERRING PATIENTS WITH SAP FOR CR

The interviews identified 44 barriers and 28 facilitators in 13 domains, clustered in 8 overarching themes (Figure 1). We found several factors that did not fit the TDF framework and therefore added 2 domains (“innovation” and “general beliefs”). Barriers, facilitators, and example quotes are outlined in Supplemental Digital Content, Part 3, available at: <https://links.lww.com/JCRP/A713>. Here, we summarize the integrated results of each theme. Results reflect both clinician and patient views, unless otherwise specified.

THEME 1: PERCEIVED LACK OF EVIDENCE AND LOW AWARENESS

Not all participants recognize CR as an alternative to revascularization in low-risk patients with SAP who remain symptomatic after drug therapy. Furthermore, clinicians often lack knowledge about what CR for these patients encompasses. Some clinicians are not aware of the existing studies, while others find the existing evidence about the efficacy, safety, and cost-effectiveness of CR as a first-line treatment for patients with SAP insufficient. They also

Table 1

Characteristics of Patients (n = 6) and Clinicians (n = 12) Participating in Interviews Regarding the Barriers and Facilitators for Choosing CR as the First-Choice Treatment for Stable Angina Pectoris in the Netherlands, 2023 to 2024^a

Characteristics	
Patients	
Age, yr	67.3 ± 8.7
Diagnostic method	
CAG	1 (17%)
CT and CAG	2 (33%)
MRI	3 (50%)
Treatment	
None	1 (17%)
CR only ^b	2 (33%)
PCI and CR	3 (50%)
Clinicians	
Center type	
University hospital	3 (25%)
General hospital	9 (75%)
CR provided	
Internally	9 (75%)
Externally	1 (8%)
Both	2 (17%)
Interventions offered	
CAG and PCI	7 (58%)
CAG, no PCI	4 (33%)
No CAG, no PCI	1 (8%)
Profession	
General cardiologist	5 (42%)
Interventional cardiologist	4 (33%)
Cardiologist in training	1 (8%)
Case manager	2 (17%)
Working experience, yr	17.3 ± 8.8

Abbreviations: CAG, coronary angiography; CR, cardiac rehabilitation; CT, computed tomography; MRI, magnetic resonance imaging; PCI, percutaneous coronary intervention.
^aData are presented as mean ± SD or n (%).
^bThese patients participated in the PRO-FIT study and were randomized to the CR condition.

report a lack of generalizability and unclear clinical guideline recommendations. Patients did not report scientific evidence as an important factor for their treatment choice.

THEME 2: VARIATION IN TREATMENT GOALS AND EXPECTED OUTCOMES

The choice between CR or PCI depends on how the expected treatment outcomes align with individual goals. We found a large variation in goals. Symptom reduction is the most frequently mentioned goal by participants, with PCI perceived as most effective in the short term. Improving prognosis is a second important goal, with CR seen as more effective by improving coronary artery health. Participants value CR for enhancing physical condition and lifestyle and signaling to patients their own role in health, though long-term adherence to lifestyle changes was a concern. Reducing antianginal medication is a reason to prefer PCI over CR, especially in the treatment of younger patients with SAP. Some clinicians aim to resolve the coronary obstruction by

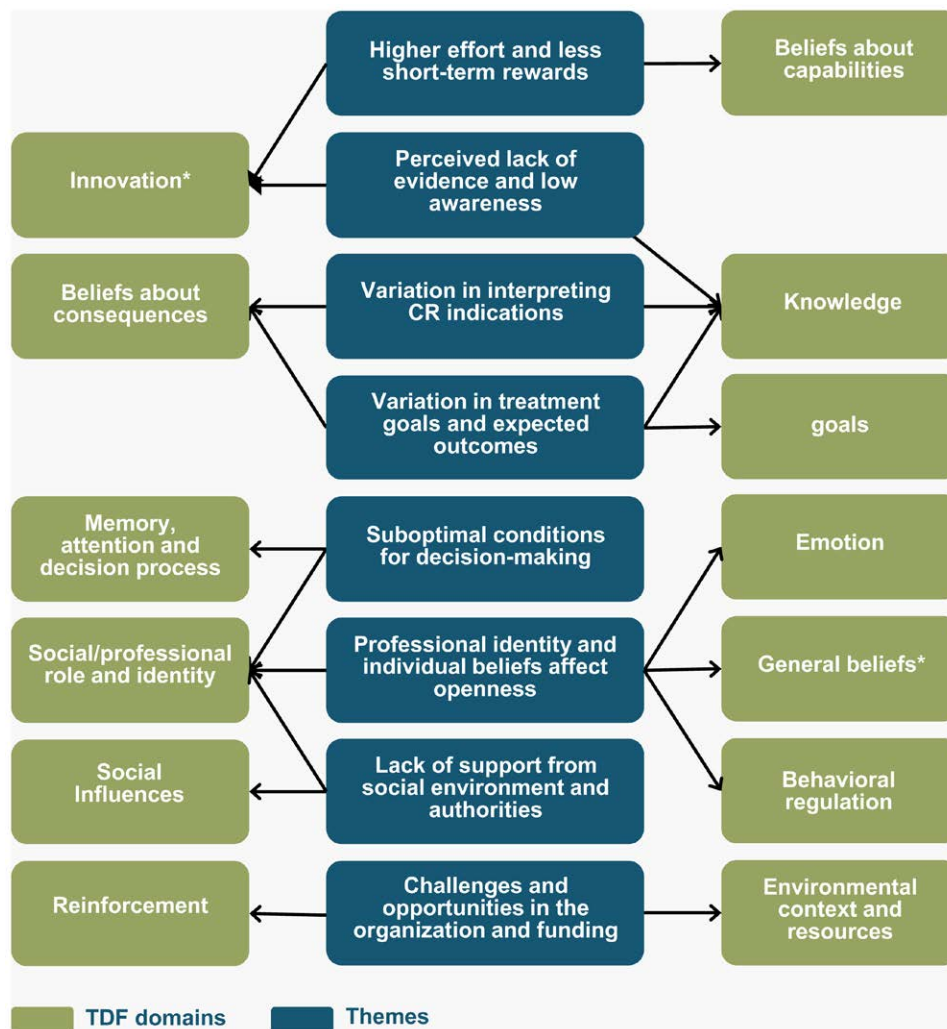


Figure 1. Identified themes and their relation to TDF domains among patients (n = 6) and clinicians (n = 12) participating in interviews regarding the barriers and facilitators for choosing cardiac rehabilitation as the first-choice treatment for stable angina pectoris in the Netherlands, 2023 to 2024. *Domains added to address factors that did not fit the TDF framework. Abbreviation: TDF, theoretical domains framework.

performing a PCI, while others believe CR fosters collateral formation. Finally, participants regard restoring trust in one's body as important, as many patients with SAP are afraid to exercise or move. Although a PCI could provide reassurance that "the arteries are clear," many participants value CR for its psychoeducation and supervised exercise.

THEME 3: HIGHER EFFORT AND LESS SHORT-TERM REWARDS

External factors affect the motivation to choose CR. Clinicians question whether patients will invest time and effort in CR when PCI is more convenient, is minimally invasive, requires little effort from patients, and relieves symptoms quickly and effectively. One patient did consider PCI too invasive and preferred CR. Furthermore, clinicians believe educating patients about CR and necessary lifestyle changes requires more time. Additionally, CR may increase follow-up appointments due to ongoing symptoms. Finally, leading the implementation of CR within the institution is regarded as burdensome for cardiologists. Cardiologists mention that personal financial gains or losses do not motivate their treatment choice.

THEME 4: VARIATION IN INTERPRETING CR INDICATIONS

Most clinicians know when CR is indicated based on the localization and degree of the obstruction, but some believe CR is only an option when a PCI is not indicated. Clinician opinions vary on other factors affecting suitability for CR. Some clinicians expect that elderly patients lack the vitality to exercise, while for others, patient age does not play a role. Some clinicians prefer CR in the treatment of younger patients, while others prefer PCI. Some consider CR less effective for patients with an already healthy lifestyle, while others argue that patients with an unhealthy lifestyle are unlikely to change. Motivation for lifestyle change is seen as a prerequisite by some, while others believe CR itself boosts motivation. There is consensus that severe comorbidities contraindicate CR and fear of exercise favors it. These varying assumptions cause the perception that CR benefits only a narrow patient group.

THEME 5: LACK OF SUPPORT FROM SOCIAL ENVIRONMENT AND AUTHORITIES

Clinicians are hesitant to discuss CR, anticipating negative reactions from colleagues, which some have

experienced. Support from their colleagues and the board is therefore crucial. Some clinicians worry that CR providers may be reluctant to treat patients with SAP due to fear of cardiac events, while others expect that providers will follow their advice. Patients value advice from their loved ones, most of whom support CR. Patients are also affected by experiences from others with PCI and CR, which can either be positive or negative.

THEME 6: SUBOPTIMAL CONDITIONS FOR TREATMENT DECISION-MAKING

Several internal and external factors might increase the tendency to choose PCI. Often, patients undergo cardiac catheterization to diagnose stenosis. The actual decision to proceed with a PCI is often made during the catheterization, limiting patients in time and mental resources to consider other treatment options. Furthermore, the mechanism of effect of a PCI is easier to comprehend than CR for both patients and clinicians, especially with images of the obstructed vessel in mind.

Participants had mixed views on roles during the decision-making process. Most clinicians follow patient preferences, although it was unclear if these were systematically assessed or based on assumptions. While clinicians believed most patients prefer a PCI, patients reported trusting physician recommendations, and most felt that they lacked the medical knowledge to participate in treatment decisions.

THEME 7: PROFESSIONAL IDENTITY AND INDIVIDUAL BELIEFS AFFECT OPENNESS

Clinicians' professional identity influences their openness to CR. They feel that intervening is in a clinician's nature, and CR feels like "doing nothing." They enjoy performing procedures and are proud of the PCI as a major accomplishment in their field. Still, most prioritize high-quality care, and they would adopt CR if proven more effective than PCI.

Individual beliefs and emotions also shape openness to CR. Some fear a higher risk of cardiac events with CR, while some patients prefer CR to prevent medical intervention. Many clinicians feel comfortable sticking to routines with limited external incentive to new perspectives. According to interviewed clinicians, younger cardiologists are more open to change. Finally, patients and clinicians recognize the importance of a healthy lifestyle.

THEME 8: CHALLENGES AND OPPORTUNITIES IN THE ORGANIZATION AND FUNDING OF CARE

First, clinicians perceive a strong incentive to perform PCI to maintain the financial health of the hospital or department. This is less important when the focus shifts from volume to quality of care. Additionally, offering CR has become less profitable for hospitals, increasing referral to external providers, which impedes the contact between referrers and CR providers. Third, clinicians expect that insurance companies will not welcome increased CR based on the negative advice by the Dutch Care Institute to perform CR in patients with SAP without PCI.

From an organizational perspective, clinicians regard CR referral convenient with short waiting times but also report limited consultation time to introduce CR. Furthermore, CR capacity should be increased to allow for a greater uptake. Patients prefer to attend CR in a familiar location with little travel time, which is currently possible.

Hospital type might also play a role. Cardiologists that have to refer patients to another hospital for the PCI consider the necessity of a PCI more thoroughly than cardiologists in intervention hospitals. In contrast, clinicians referring patients for both diagnostic catheterization and PCI feel little control over the subsequent treatment decision. Finally, university hospital clinicians feel that they see more complex patients with SAP that are not eligible for CR.

DISCUSSION

We found multiple barriers and facilitators across 8 themes. Most barriers for choosing CR were clinician or organization-related, whereas patients experienced few barriers. Clinicians were mainly hindered to refer patients for CR by (1) a perceived lack of evidence and guidelines, (2) knowledge gaps about the effects and (3) treatment indication of CR, (4) higher perceived investment to propose CR compared with revascularization, (5) a lack of support from colleagues and authorities, (6) suboptimal conditions for treatment decision-making, (7) beliefs that affect openness to CR, and (8) a lack of time, capacity, and funding of care. Key facilitators included the clinician belief in CR potential, and their motivation to provide the best and affordable care. Most patients were open to CR and relied on their cardiologist's treatment recommendation; some patients viewed that CR requires more effort than a PCI.

Previous studies reported similar provider- and system-level barriers and facilitators in other cardiac diseases, especially heart failure, including limited time and staff and clinician knowledge, awareness, and attitude.¹⁷ Other studies reported more patient-level factors including knowledge, perceptions, lack of transport, financial constraints, work obligations, and family.^{18,19} This may be explained by a different patient population.

An important barrier was a perceived lack of evidence supporting CR as the first treatment option, causing clinician hesitancy. Indeed, the only meta-analysis of CR for patients with SAP shows promising results but also concludes that more evidence is needed.⁸ Interestingly, clinicians stick to revascularization while evidence shows a lack of benefit on medium to long-term outcomes such as mortality and cardiovascular events, and patients are therefore not harmed by withholding or postponing a revascularization.³⁻⁵ This suggests that clinicians perceive evidence for revascularization and CR differently. Clinicians report they need strong evidence to challenge long-held practice, and/or when pathophysiological reasoning is (mis)used to support their assumptions.²⁰ Additionally, conservative treatments like CR might be judged by stricter evidence standards than surgical treatments like PCI.

Literature shows that it is possible to adopt promising interventions before definitive evidence emerges. Exercise therapy for intermittent claudication was implemented nationally with a comparable evidence strength as CR.²¹ A nationwide network and organizational structure led by clinical leaders improved accessibility and quality, increasing the uptake of exercise therapy first from 63% to 87% and reducing the lower limb revascularization rate.²¹ Furthermore, evidence alone rarely guarantees successful implementation. While CR has been shown to be effective for myocardial infarction or heart failure,^{22,23} only 6% to 11% of Dutch patients with heart failure and 43% to 75% with myocardial infarction are referred to CR.¹³ CR is also shown to be effective in patients with ischemia and no obstructive coronary arteries and myocardial infarction

with no obstructive coronary arteries, but only a third participate in CR.²⁴ Therefore, tailored implementation of CR in patients with SAP requires a comprehensive strategy targeting different domains and stakeholders, which we identified in our study.

Important for cardiologists' openness toward changing the default from revascularization to CR are their personal and professional beliefs and their peers. Clinicians often adopt a "better safe than sorry" mindset, feeling that inaction is wrong.²⁵ In addition, abandoning default treatment feels like admitting you might not have provided optimal care. Clinicians adopt new treatments more readily than they abandon existing treatments in response to negative evidence, due to psychological mechanisms or financial considerations.²⁶ Combined with the lack of perceived evidence and guidelines, this leads to cardiologist uncertainty regarding replacing revascularization with CR for patients with SAP. They need to feel supported by peers to offer CR as a first-choice option before choosing revascularization.

STRENGTHS AND LIMITATIONS

The strength of our study is the in-depth exploration of clinician and patient perspectives on CR for patients with SAP, providing a base for an implementation strategy. A limitation is that most responses reflected hypothetical barriers, as there have been no active implementation efforts yet, and not all participants had experience with referring for or receiving CR. Another limitation is that we cannot guarantee data saturation in patients since we interviewed only 1 patient that declined CR. Although we encountered few patient barriers, it is possible that there are patients in clinical practice with different views. While we deliberately focused on barriers and facilitators for CR referral, we acknowledge that successful implementation involves more steps. Therefore, future studies should explore CR provider and patient experiences with performing or attending CR, including program adherence and adoption of lifestyle changes. Furthermore, future studies should include other stakeholders, including managers, opinion leaders, and those involved with healthcare insurance. As we found that patient characteristics including age and lifestyle could influence the suitability of CR, future studies should include patients with a variety of these characteristics. Several of our barriers and facilitators, such as the financial incentive or influence of the Dutch Care institute, are specific to the Dutch context and might not be generalizable to other countries.

RECOMMENDATIONS

Considering the observed barriers, recommending CR instead of revascularization comes too soon for clinicians. Therefore, implementation efforts should focus on offering CR and postponing revascularization, similar to the successful implementation of exercise first in intermittent claudication.²¹ Even when revascularization is necessary, exercise therapy before revascularization may lead to improved outcomes.²⁷ This approach can overcome the (perceived) evidence gap, recognizing that randomized controlled trials take years, and new evidence alone rarely drives change. Support from clinical leaders at national and international level is crucial. Furthermore, guideline updates should consider clear recommendations on the indications on CR before revascularization.

Once evidence and support are in place, implementation should focus on practical barriers. Educational strategies

targeting clinicians can support dissemination of evidence and recommendations.¹¹ Patient information materials or consultation training could support clinicians in informing patients. An automatic referral system incorporated in the electronic health record could further increase the number of referrals. A review showed this achieved referral rates up to 86%.²⁸ Lastly, CR capacity needs to be expanded and sufficiently funded to enable more patients with SAP to join.

CONCLUSION

Patients with SAP report few barriers to attending CR instead of a revascularization. Most barriers were clinician-oriented, suggesting substantial opportunities to improve referral and participation. Implementation can likely be supported using a comprehensive strategy, targeting a perceived lack of evidence, awareness and knowledge, personal and social factors, and organizational barriers. Implementing a treatment strategy with CR first, postponing revascularization instead of replacing it, seems realistic. We recommend cardiology associations to lead the formulation of clear recommendations on CR as a first-line treatment for patients with SAP, to highlight the supporting evidence, and support patient-clinician conversations to discuss this option.

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