REVIEW ARTICLE

Cardiac rehabilitation services for people in rural and remote areas: an integrative literature review

AUTHORS

Patricia E Field\textsuperscript{1} MPH (Syd), PhD Candidate *

Richard C Franklin\textsuperscript{2} PhD, Associate Professor

Ruth N Barker\textsuperscript{3} PhD, Associate Professor, Rehabilitation

Ian Ring\textsuperscript{4} FAFPHM, Adjunct Professor, ian.ring@jcu.edu.au

Peter A Leggat\textsuperscript{5} MD, Professor

CORRESPONDENCE

*Ms Patricia E Field patricia.field1@my.jcu.edu.au

AFFILIATIONS

\begin{itemize}
  \item \textsuperscript{1, 2, 4, 5} James Cook University, College of Public Health, Medical & Veterinary Sciences, Townsville, Qld 4811, Australia
  \item \textsuperscript{3} James Cook University, College of College of Healthcare Sciences, Cairns
\end{itemize}

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**ABSTRACT:**

**Introduction:** Morbidity and mortality from heart disease continues to be high in Australia with cardiac rehabilitation (CR) recognised as best practice for people with heart disease. CR is known to reduce mortality, reoccurrence of heart disease, hospital readmissions and costs, and to improve quality of life. Australian Aboriginal and Torres Strait Islanders (Australian First Peoples or Indigenous peoples) have a greater need for CR due to their higher burden of disease. However, CR referral, access and attendance remain low for all people who live in rural and remote areas. The aim of this integrative review was to identify barriers, enablers and pathways to CR for adults living independently in rural and remote areas of high-income countries, including Australia.

**Methods:** Studies were identified through five online data bases, plus reference lists of the selected studies. The studies focused on barriers and enablers of CR for adults in rural and remote areas of Australia and other high-income countries, in English peer-reviewed journals (2007–2016). A mix of qualitative, quantitative and mixed method studies were reviewed through a modified Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), followed by a critical review and thematic analysis.

**Results:** Sixteen studies were selected: seven qualitative, four quantitative and five mixed method. Five themes that influence CR attendance were identified: referral, health services pathways and planning; cultural and geographic factors necessitating alternative and flexible programs; professional roles and influence; knowing, valuing, and psychosocial factors; and financial costs – personal and health services. Factors identified that impact on referral and access to CR were hospital inpatient education programs on heart disease and risk factors; discharge processes including CR eligibility criteria and referral to ensure continuum and transition of care; need for improved accessibility of services, both geographically and through alternative programs, including home based with IT and/or telephone support. Also, the need to ensure that health professionals understand, value and support CR; the impact of mental health, coping with change and competing priorities; costs including travel, medications and health professional consultations; as well as low levels of involvement of Australian First Peoples in their own care and poor cultural understanding by non-Australian First Peoples staff all negatively impact on CR access and attendance.

**Conclusion:** This study found weak systems with low referral rates and poor access to CR in rural and remote areas. Underlying factors include lack of health professional and public support, often based on poor perception of benefits of CR, compounded by scarce and inflexible services. Low levels of involvement of Australian First Peoples, as well as a lack of cultural understanding by non-Australian First Peoples staff, is evident. Overall, the findings demonstrate the need for improved models of referral and access, greater flexibility of programs and professional roles, with management support. Further, increased education and involvement of Australian First Peoples, including Indigenous health workers taking a lead in their own people’s care, supported by improved education and greater cultural awareness of non-Australian First Peoples staff, is required.

**Keywords:**
Aboriginal and Torres Strait Islanders, Australia, barriers, cardiac rehabilitation, enablers, First Peoples, indigenous, pathways.

**FULL ARTICLE:**

**Introduction**

Heart disease is the largest single cause of death in Australia and contributes to significant illness, disability, poor quality of life and high healthcare costs. Rates of heart disease in rural and remote areas are higher than in urban areas. Whilst Australian Aboriginal and Torres Strait Islander First Peoples (Australian First Peoples/Indigenous peoples) disease rates, including heart disease and complex comorbidities, are higher, this only partially accounts for the disparity in health status between people in rural and remote and urban populations. Disparity may be worse than reported due to people with poor health moving to urban areas for better services.

There is significant evidence that cardiac rehabilitation (CR) is best practice for people with heart disease. However, despite this and known higher levels of heart disease of people living in rural and remote areas, referral and access to CR remain low, and access issues are exacerbated by geographic distance, fewer health services and staff, compounded by poor telephone and IT services to support alternative programs in rural and remote areas.

**Cardiac rehabilitation**

CR is known to reduce reoccurrence of hospital readmissions, mortality and morbidity from heart disease, and improve general health and quality of life. WHO describes CR as including physical, mental and social conditions for people with heart disease, so that by their own efforts, together with support through medical or clinical management, they may preserve or resume optimal function. The term ‘cardiac rehabilitation continuum’ is preferred by the Heart Foundation of Australia, due to the general perception that CR refers to short term, centre based exercise and education programs, usually run by hospitals. The CR continuum is a ‘coordinated system of long-term care’ necessary to help people with heart disease return to an active and satisfying life, and to prevent the reoccurrence of heart disease or new cardiovascular conditions. This indicates the need for a lifelong individual commitment to healthy lifestyle choices, and adherence to medical advice with health service support.

**Costs and priority**

Expenditure for hospital-admitted patient services for coronary
heart disease, stroke and other cardiovascular diseases in 2008–09 was A$4460 million, and accounted for the highest level of healthcare sector spending, with coronary heart disease expenditure of A$1517 million. Other costs associated with coronary heart disease were out-of-hospital medical expenses (A$223 million) and prescription pharmaceuticals (A$311 million). Costs of pharmaceuticals for males were nearly twice that of females, but comparatively similar for other out-of-hospital expenses. Drugs prescribed for lowering cholesterol (statins) account for the highest number of Pharmaceutical Benefits Scheme prescriptions and are major contributors to the cost of all pharmaceuticals. Despite evidence that CR reduces recurrence of heart disease and hospital readmissions and improves general health, it is estimated that only 30% of people hospitalised with heart disease are referred to CR in Australia. A recent cost–benefit analysis that considered the impact of increased CR uptake to the internationally acknowledged standard of 65%, included costs for CR programs, direct inpatient costs, burden of disease, informal care costs, and loss of productivity and earnings, estimated a net financial saving of A$86.7 million per annum.

**Multidisciplinary teams and staffing**

A CR program based on a multidisciplinary team that includes a general practitioner, and if possible a cardiologist, nurse, physiotherapist, dietitian, psychologist and exercise physiologist, is recommended by the Heart Foundation of Australia and Australian Cardiac Rehabilitation Association. Realistically, due to lack of resources, such a multidisciplinary team is only available in major centres.

A range of issues negatively impact on recruitment and retention of allied health professionals in rural and remote areas. These include a lack of or inadequate (i) prior information to recruitment, (ii) ongoing education opportunities, (iii) career prospects, (iv) rural placements during undergraduate studies, (v) work–life balance, (vi) management and support – which all contribute to high staff turnover. Staffing difficulties have also been identified by nurses in Australia’s rural and remote areas in northern Queensland such as excessive working hours, high levels of responsibility and resultant high staff turnover. This leads to an increase in staff stress for inexperienced staff who are still learning, and unable to work to full capacity due to the unfamiliar environment. Whilst the majority of health professionals working in these areas are nurses and Indigenous health workers, it is likely that these issues impact on all health professionals and subsequently quality of services in rural and remote areas.

**Major issues for cardiac rehabilitation services**

Whilst it is estimated that throughout Australia only 30% of eligible people are referred to CR, and less attend, rates cannot be substantiated due to a lack of data. Negative impact on service delivery and access to CR due to large geographic regions is significant. This is compounded by health professionals and potential participants’ poor understanding of the benefits of CR. Distance and costs are identified as barriers to attendance in rural and remote areas, however, with changing technology options these barriers may be more readily addressed. The major issues identified were limited and suboptimal CR services in rural and remote areas, with more information required to inform policy, management and organisation of CR for adults with heart disease living in rural and remote areas.

**Methods**

An integrative review is an established evidence based practice method for reviewing qualitative, quantitative and mixed method research. The present integrative review was undertaken through systematic identification, analysis, critique and synthesis of selected peer-reviewed literature to facilitate the identification of a new framework and perspective of barriers, enablers and pathways of CR in adults with heart disease in rural and remote areas of high-income countries, with a focus on Australia.

**Searches and selection criteria**

Electronic database searches used to identify relevant studies included CINAHL, SCOPUS, Informit, PsycINFO and Medline (OVID). Electronic searches were augmented by reviewing reference lists and citations of selected studies and professional networks (snowballing). Google Scholar was used in this process for forward searching of reference lists and citations to check for additional studies. The 107 articles identified through this process were due to a large meta-analysis identified by the database search. However, the abstract review of these references revealed only 13 studies eligible for critical review and thematic analysis. Following this process, only two extra studies were included for further analysis.

Search terms used were ‘cardiac rehabilitation’ OR ‘secondary prevention’ AND ‘rural’ OR ‘remote’; OR ‘Aboriginal and Torres Strait Islanders’ OR ‘Indigenous’ AND ‘enablers’ OR ‘barriers’. These key words were varied for specific databases, for example Medline (OVID), which uses medical subject headings (MeSH), which required that the terms ‘cardiac disease’ OR ‘coronary disease’ OR ‘heart disease’ be expanded and combined with ‘rehabilitation’ to identify articles about CR. Also, the Medline MeSH term ‘oceanic ancestry groups’ is used for First Peoples. The term ‘indigenous’ was used as a generic term because it is in common use internationally. The database searches identified a comprehensive range of studies: Medline (OVID) for wide ranging studies, Informit for studies that focused on Australian First Peoples, SCOPUS for international studies, PsycINFO for psychosocial and mental health and CINAHL for allied health. Limitations applied were English studies, with human subjects and dated 1 January 2007 to 31 December 2016. Supplementary table 1 contains further information about the searches.

Inclusion criteria for papers were:
Published in English in peer-reviewed journals from 1 January 2007 to 31 December 2016 focusing on cardiac rehabilitation in rural and remote areas of Australia and high-income countries internationally; barriers, enablers and pathways to CR; or First Peoples, indigenous (Australian and global) and general populations.

Exclusion criteria were:

- Effectiveness of center-based and home-based (technology-supported) CR due to available evidence of effectiveness.
- Clinical cardiac procedures, acute treatment and interventions.
- Non-high-income countries are equated to developing countries, according to the 'List of developing countries as declared by the Minister of Foreign Affairs (2015)'. This is because studies that focus on developing countries are considered to have little relevance in Australia, which is amongst the 10 largest advanced economies in the world, based on International Monetary Fund criteria.

Programs that include only one component of CR (e.g., exercise), rather than having a holistic view outside the date limit, to ensure a contemporary basis due to rapid changes in technology that have had a large impact on possibilities for CR in rural and remote areas and due to the recent decentralization of health services in Queensland, the establishment of primary health networks and their impact on health service delivery.

Whilst this study includes all adults living independently in rural and remote areas of Australia as well as high-income countries, because of the known poor health status of Australian First Peoples, studies were sought specifically for CR with Aboriginal and Torres Strait Islanders people and/or Indigenous people. Using this strategy, six studies with a primary focus on Australian First Peoples were identified. No international studies were identified specifically for Indigenous people.

Preliminary review and critical appraisal

Principles and processes of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Fig. 1) was used to describe the collection, review and identification of final studies for analysis.

Following screening of abstracts, a full text critical review to assess research quality, outcomes and eligibility was undertaken on the remaining 56 quantitative, qualitative and mixed method studies. A modified process, suitable for critical review of all research methods, was developed based on the premise that all research includes clearly focused research questions, constructs arguments, collects data from appropriate participants, speculates about outcomes of data analysis and considers important outcomes and results. To achieve this, McMaster’s qualitative research guidelines, and the Critical Appraisal Skills Program quantitative review guidelines, were combined. Studies were assessed according to McMaster’s guidelines for study design, type, methods, sampling and data collection and Critical Appraisal Skills Program quantitative research guidelines to assess the research question, including appropriate sampling, equal treatment of all participants, chance minimization and research rigor, with all results presented to ensure epidemiological and statistical strength.

The critical review was further strengthened by a thematic analysis in which key findings were coded and grouped to identify ‘patterned responses’ or ‘themes’, to enable extraction of further meaning.

Supplementary table 2 provides details of the critical review and thematic analysis carried out by the first author and peer reviewed by the other authors. This process of review and validation continued throughout.

Following the critical review and thematic analysis, a further analysis, evaluation and integration of findings from the 16 final studies that identified barriers, enablers and pathways was undertaken. These are synthesized in the results according to identified themes.
Results

The review and analytic process identified 16 studies, from which five themes emerged. Table 1 summarises the pertinent themes including factors that influence failure or success of CR. These factors provided the underpinning criteria for the emergent themes. The themes identified were referral, health service pathways and planning; cultural and geographic factors necessitating alternative and flexible programs; professional roles and influence; knowing, valuing, and psychosocial factors; and financial costs – personal and health services. Embedded in these themes are barriers, enablers and pathways for CR in rural and remote areas by general population and Australian First Peoples.

Table 1: Themes identified through critical analysis and underpinning thematic criteria

<table>
<thead>
<tr>
<th>Theme</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>Referral to cardiac rehabilitation and continuing along the health pathway</td>
<td>Framework for continuum of care, transition of care, referral, eligibility</td>
</tr>
<tr>
<td>Cultural and geographic factors necessitating alternative and flexible programs</td>
<td>Education and information about heart disease risk factors and the benefits of CR are an important part of hospital discharge and referral processes. A transition of care framework and care planning, together with systematic assessment to ensure that participants have appropriate, and if necessary, individualised programs, is recommended.</td>
</tr>
<tr>
<td>Professional roles and influence</td>
<td>No eligibility criteria were identified in the selected studies. Many potential CR participants were deemed ineligible without explicit decision-making criteria. Other barriers to CR include non-completion or delay in post-hospitalisation referrals, lack of information and prioritisation of CR (Table 2).</td>
</tr>
<tr>
<td>Knowing, valuing, and psychosocial factors</td>
<td>Financial costs – personal and health services</td>
</tr>
</tbody>
</table>

Referral, health services pathways and planning

General populations: Low levels of referral are commonly identified as barriers to CR. Education and information about heart disease risk factors and the benefits of CR are an important part of hospital discharge and referral processes. A transition of care framework and care planning, together with systematic assessment to ensure that participants have appropriate, and if necessary, individualised programs, is recommended (Table 2).
Australian First Peoples: Lack of data on referral rates and poor discharge planning were identified as barriers to CR for Australian First Peoples. Lack of services, low levels of involvement of Australian First Peoples staff and culturally inappropriate services are identified as contributory factors to low rates of CR referral and access. In one community in Western Australia, the number of people who attended CR was reported as being augmented by self-referral of people interested in learning more about health and risk factors rather than formal referrals or involvement in CR (Table 3).

### Table 3: Final analysis, evaluation and integration – Australian First Peoples

<table>
<thead>
<tr>
<th>Author</th>
<th>Purpose</th>
<th>Study design</th>
<th>Findings</th>
<th>Barriers</th>
<th>Evaluation/ethnics</th>
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</table>
Indigenous health workers are identified as an essential part of the holistic, flexible and include family and community. It is known that distance from services impacts on access to CR. Technological or personal support home based programs are identified as alternatives to centre based programs. There is a demonstrated need for flexible and individualised programs to accommodate factors related to employment, age and gender, supported by community involvement. The use of a ‘heart health’ manual combined with home visits has been shown to be of benefit. Innovative management policies are recommended to enable alternative and flexible models necessary to meet individual and local need.

Australian First Peoples: Studies repeatedly found that First Peoples programs must be of high standard, culturally appropriate, holistic, flexible and include family and community. Indigenous health workers are identified as an essential part of the health service team, which needs strong relationships and trust within the team and program participants. Strong links with mainstream health services are necessary whilst retaining flexibility and individuality, such as ‘yarning’ or storytelling to encourage attendance.

The barrier of distance from services is not identified by First Peoples to the same extent as for the general population. In one Tasmanian First Peoples study, transport was provided for participants. This was regularly used by 48% of the participants and by 15% ‘some of the time’.

Professional roles and influence

General population and First Peoples: Medical officers and/or CR coordinators’ personal involvement, accessibility and follow-up, together with supportive and non-judgemental attitudes, were found to be enablers for CR attendance. Further enablers identified included health professionals’ knowledge and prioritisation, their willingness to share information and work as part of a coordinated multidisciplinary team, as well as ensuring effective interhealth services communication.

There is evidence that professional relationships between Australian First Peoples and general population staff are strengthened when they are based on trust and respect, with Australian First Peoples in primary professional roles. Improved cultural skills of general population staff are of primary importance in this process. These are identified as core components for effective CR and secondary prevention for Australian First Peoples.

Two studies involving Australian First Peoples also identified multidisciplinary teams as being important, together with flexibility of professional roles.

Knowing, valuing, and psychosocial factors

General population: Public perception generally demonstrated that CR is unnecessary for younger, fitter people, or not suitable for people with comorbidities or advanced disease. Lack of information, few positive role models, negative local attitudes, poor experience or misinformation, and insufficient health professional support, have all been identified as limiting the perceived value. It is also noted that people experience difficulty in acknowledging the need for lifestyle changes, especially if families continue with risky behaviour such as smoking. People may opt to deny the need for risk modification, cease taking their prescribed medications and seek alternative therapies. Depression, anxiety, denial, sadness, guilt, grief and personal loss have been found to result in poor motivation and non-completion of programs.

Australian First Peoples: Inequities in First Peoples health services are compounded by ‘Western’ medical practices reported to be ineffective in taking accurate medical histories and to mirror a ‘power inequity that resembles colonialism’. The need for flexible and innovative programs that consider all aspects of chronic disease risk factor minimisation, with a possible focus on primary and secondary prevention and consideration of mental as well as physical health, to address these barriers has been identified.

Financial costs – personal and health services

General populations: On a personal level, travel costs, medications, visits to health professionals and potential loss of income due to work commitments are identified as significant barriers to CR.

Australian First Peoples: Current studies do not identify the same financial issues for First Peoples, who largely attend local Indigenous medical services or government health services, which, whilst accessible, provide few CR or secondary prevention services.

Limitations

The methodological quality of articles was assessed and demonstrated validity in research methods, with some limitations. The majority of qualitative and mixed method studies used purposive sampling and semi-structured interviews, with data analysed and themes identified using NVivo software. However, many studies were limited in their generalisability due to specific geographic location of data collection. Other limitations were non-inclusion of essential representatives and lack of data verification. Three quantitative studies were limited by lack of exclusion criteria (CR eligibility), with one sample not randomised. One mixed method study relied on a small and possibly non-representative sample.

Results are assimilated according to themes, barriers, enablers and pathways to provide information as a basis for developing a
revised framework and perspective for CR referral and access models that will ultimately improve health and quality of life for all people with heart disease in rural and remote areas (Tables 4,5).

Table 4: Themes, barriers, enablers and pathways – general populations

<table>
<thead>
<tr>
<th>Theme</th>
<th>Barriers</th>
<th>Enablers</th>
<th>Pathways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral, access, and planning</td>
<td>Low level referrals (18,20,23,24,41)</td>
<td>Not aware of CR (24)</td>
<td>CR not offered (19)</td>
</tr>
<tr>
<td>Cultural and geographic factors</td>
<td>Lack of CR services (15,19)</td>
<td>Poor participation</td>
<td>Family support (23)</td>
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<tr>
<td></td>
<td></td>
<td>Poor participation, family responsibilities (25)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Taking time off work (19,21)</td>
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<tr>
<td></td>
<td></td>
<td>Social, cultural, and rural attitude, decline of groups, anxiety and depression (23)</td>
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<td></td>
<td></td>
<td>Women’s care role and possible inability to drive (23)</td>
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<td></td>
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<td>Support groups, informal networks, so effective home based alternative (23,24)</td>
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<td></td>
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<td>Nutritional, opportunistic casual interventions, home visits community activities eg walking, healthy cooking, healthy cooking, healthy eating to promote healthy living (24)</td>
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<tr>
<td></td>
<td></td>
<td>Family support (23)</td>
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<td></td>
<td></td>
<td>Range of alternative programs eg home based, telephone support, positive attitude, motivation, groups for people who enjoy working with, active volunteer, and phone contact program (23)</td>
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<tr>
<td></td>
<td></td>
<td>Home based programs are more efficient and easy to access for younger, older and residents who live in remote areas (24)</td>
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<tr>
<td></td>
<td></td>
<td>All identified</td>
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</tbody>
</table>

Table 5: Themes, barriers, enablers and pathways – Australian First Peoples

<table>
<thead>
<tr>
<th>Theme</th>
<th>Barriers</th>
<th>Enablers</th>
<th>Pathways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral, access, and planning</td>
<td>Exchange processes not working with First Peoples (18), Australian First Peoples not identified as such (43)</td>
<td>Abundance of current Western Australian data set and a review of referral pathways (44)</td>
<td>Find out what people want and attend to their needs and the first sessions (44)</td>
</tr>
<tr>
<td></td>
<td>Lack of a minimum database to record and monitor CR referrals and outcomes in Western Australian (44)</td>
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<tr>
<td>Cultural and geographic factors</td>
<td>Not culturally appropriate, programs not connected with First Peoples (47)</td>
<td>Western medical practices are ineffective in taking into account cultural values and experiences of First Peoples (45)</td>
<td>First Peoples influence on medical practice (47)</td>
</tr>
<tr>
<td></td>
<td>Family responsibilities and commitments (43,45)</td>
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<td></td>
<td>Western medical practices are ineffective in taking into account cultural values and experiences of First Peoples (43)</td>
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<td>Negative perceptions and media of Australian First Peoples (44)</td>
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<td></td>
<td>Intercultural differences between physical and mental concerns (43)</td>
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<td></td>
<td>All identified (40)</td>
<td></td>
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<tr>
<td>Professional roles and influences</td>
<td>Low level of cultural awareness, training for health professionals (47-49)</td>
<td>Aboriginal health workers part of multidisciplinary team and involvement of Aboriginal medical services (43-47)</td>
<td>Aboriginal health workers part of multidisciplinary team and involvement of Aboriginal medical services (43-47)</td>
</tr>
<tr>
<td></td>
<td>Western medical practices are ineffective in taking into account cultural values and experiences of First Peoples (43)</td>
<td>Increased knowledge of the National Heart Foundation guidelines for the Aboriginal and Torres Strait Islander population (43)</td>
<td>Increased knowledge of the National Heart Foundation guidelines for the Aboriginal and Torres Strait Islander population (43)</td>
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<tr>
<td>Knowing, valuing, and psychosocial factors</td>
<td>Established disease patterns were less likely to extend to people with risk factors only (47)</td>
<td>Participants learning new skills, community interaction and cooperation (47)</td>
<td>Participants learning new skills, community interaction and cooperation (47)</td>
</tr>
<tr>
<td></td>
<td>Poor understanding of medication regimens and correct use of prescribed medications, reluctance to call on an advanced practice due to the possible costs (47)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Various education levels and social vulnerability (43)</td>
<td>Strong relationships and trust between staff and patients (47)</td>
<td>Strong relationships and trust between staff and patients (47)</td>
</tr>
<tr>
<td>Financial costs – personal and health services</td>
<td>All identified (40)</td>
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</table>

CR, cardiac rehabilitation.

Discussion

CR is known to be effective in improving quality of life, reducing mortality, morbidity and hospital readmission, and consequently reducing costs for hospital treatment for heart disease. The true value of CR is not realised in rural and remote areas due to poor access and/or attendance to CR services. Whilst this integrative review provides information on barriers, enablers and pathways to models of referral and access to CR, there remain many unanswered questions, including why referral and attendance rates continue to be low despite the significant evidence of CR effectiveness. Whilst the reason for this is not completely understood, contributing factors identified in the selected studies include poor understanding of the benefits of CR by health professionals and potential attendees, compounded by low levels of referral. Whilst some pathways of referral and transition of care planning are reported, referral rates are not known in many areas of Australia.

Early results of a recently instituted Queensland Health CR database are insufficient to draw conclusions about referral rates in
Queensland. It is anticipated that as data collection increases, this information will become available.16,53

Australian First Peoples experience many of the same barriers as the general population, compounded by cultural issues, lower socioeconomic and educational levels, and greater geographic isolation.1,3. However, they have a greater need for CR, primary and secondary prevention due to higher levels of heart disease and comorbidities.1,15,43. To provide Australian First Peoples adequate and effective CR, their increased involvement, together with non-Australian First Peoples’ improved cultural awareness, mutual trust, respect and two-way learning is required, as well as improved support and access to specialist services.43-46,48. Many of these issues are not well investigated and described.

Costs associated with recurring heart disease are high and it is known that these costs can be reduced with improved systems that facilitate referral, accessibility and CR attendance.6. To improve services, more information is required about hospital discharge and CR referral processes, including eligibility, inpatient education, perceived benefit and meeting participant needs.

The current situation demonstrates weak or poorly implemented systems. These include models of health services delivery, referral processes as well as inconsistent knowledge and value by health professionals and potential participants.14,15,19,23,40,48. Plus a range barriers to access and appropriateness of services. Many of the issues identified are common to health service provision and access to services in rural and remote areas of Australia.56. As such, findings of this integrative review potentially have broad applications. To address the deficits, the following priorities need to be considered.

Referred, health services, pathways and planning

A systematic referral process based on well-defined criteria, individualisation of CR, personal contact, trust, information and support from health professionals,13,22-24,46,49 needs further investigation. The systematic referral process, based on eligibility criteria, education on heart disease and risk factors, needs to commence prior to hospital discharge.20,22,27.

Cultural and geographic factors necessitating alternative and flexible programs

Flexibility in CR is essential because of the diversity of demographic profiles, geographic location and health status in rural and remote areas.23,41,47,48. Alternative models of CR, including home based programs with telephone support, such as Queensland Health’s Coaching Patients on Achieving Cardiovascular Health (COACH)17, telehealth, purpose designed apps and community involvement, are all known enablers for CR.31,41. However, attendance rates remain low.10,16,17. In Australia there is little evidence of CR being provided by Aboriginal/Indigenous medical services, compounding poor access to CR by Australian First Peoples who live in remote area communities. This highlights the need for further advocacy and a review of systems of health care for Australian First Peoples in remote area communities. In line with a holistic and culturally appropriate approach and scarcity of resources, consideration of an integrated, flexible primary and secondary prevention model that is appropriate for Australian First Peoples as well as the general population needs further investigation.

Professional roles and influence

Key issues identified include ongoing staff shortages14,15 indicating the need for increased professional role flexibility and modified multidisciplinary team models, supported by appropriate management policy.15,43. A further priority is including a primary role in CR, supported by further education, for Indigenous health workers working with Australian First Peoples13,45,47. These are all key issues that need further consideration to work towards optimal effectiveness of CR in rural and remote areas.

Knowing, valuing, and psychosocial factors

Poor understanding of the concepts and benefits of CR contributes to low attendance rates.19,21,23,25,41,57,58. This is exacerbated by the general perception that acute care health services are of greater importance than primary and secondary prevention services24. Lack of knowledge and negative perceptions of CR need to be addressed. Mental as well as physical health issues are of primary importance and currently not prioritised in many CR programs19,21,23. A holistic approach to CR, primary and secondary risk factor prevention and use of resources need further consideration.46.

Financial costs – personal and health services

Through effective CR it is known that healthcare costs can be significantly reduced through a reduction in reoccurrence of heart disease and hospital readmissions.6. To achieve increased CR participation, improved professional understanding and support is essential.41. The cost factors for general populations include travel, loss of work, cost of health services, professional consultations and medications19,23,24,42. It is also reported by James Cook University, Cairns and Anupimip Indigeneous health services (unpublished internal report, 2016) that Australian First Peoples are faced with financial costs, practical and cultural barriers when attending centralised specialist services that require them to travel and stay away from their families and community. The overall low level of health services in rural and remote areas results in poor access and overloaded services, and resultant staff turnover and cost implications14,15,42,59. Reconsideration of the system, current health services and resource allocation is required.

Limitations

Due to the predominantly qualitative or mixed method research the results are not outcome focused and have limited generalisability due to the specific geographic areas and small purposive contextual samples of the studies. Therefore, conclusions drawn by this integrative review on health service systems and services are based in part on selected studies’ discussions, findings and conclusions, and subject to the limitations of the study. No northern Queensland or Northern
Territory studies on CR were identified in this integrative review. These are extensive regions of Australia with large rural and remote areas. This and the overall low number of studies indicate the need for further research to improve information that will facilitate decision making and identify further CR enablers and pathways and minimise barriers specific to rural and remote areas of Australia, so that service improvements can be achieved.

**Conclusion**

The purpose of this integrative review was to explore barriers, enablers and pathways for access to CR, with the aim of optimising services, improving health and quality of life for all people living independently in rural and remote areas. The review indicates that CR services are fragmented and lack a systematic policy driven approach, with resultant low levels of referral and access. Even when alternative services are offered in Australia (eg COACH), attendance rates remain low.

To address this, the following elements for improved referral and access to CR need further investigation and development:

- referral systems and eligibility criteria
- availability and access to flexible centre based and home based CR programs including telephone/personal support and technology based programs via telephone apps, with distance support
- education/awareness/training on CR for providers and potential participants, family/significant others
- information systems for CR referral and access
- improved education and training for general populations staff on Australian First Peoples’ cultural issues
- improved workplace support and education for Indigenous health workers
- greater flexibility and extended professional roles supported by management policy and protocols
- consideration of combined CR primary, secondary prevention and risk factor management
- improved funding.

CR works to improve health status and reduce costs, and there are a range of ways to provide effective services for more people. These include a systematic, policy driven approach that includes referral, eligibility and access. This is necessary if CR is to fulfil its role as a valuable tool in substantially lowering coronary heart disease morbidity and mortality. Understanding and addressing these factors has the potential to reduce costs, through reduced cardiac events and hospital readmissions as well as improved quality of life and contribute to improved CR and/or secondary prevention services and ultimately health outcomes for all people living independently in rural and remote areas of Australia.

**Supplementary table 1: Summary of database searches**

**Supplementary table 2: Critical review and thematic analysis:**
(1) studies from database search, (2) reference lists, (3) snowballing

**REFERENCES:**


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