Original Article

Facilitators and Barriers to Cardiac Rehabilitation Uptake Among Patients with Coronary Artery Disease in Thailand: A Qualitative Study

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ABSTRACT

Objectives: This study explored factors affecting cardiac rehabilitation (CR) uptake among patients with coronary artery disease (CAD) in Thailand.

Study design: An exploratory qualitative design

Setting: Data collection was conducted at two CR centers, one in an urban hospital and one in a remote hospital.

Subjects: CR healthcare providers (HPs) and patients with CAD who had been referred for CR by medical staff during their in-patient stay.

Methods: An exploratory qualitative research design using semi-structured interviews of 20 patients and 22 HPs was employed. Data were collected from June 2018 to July 2019. Transcribed interview data were analyzed thematically.

Results: The common themes identified by patients and HPs that contributed to uptake of CR included culture and religion, as well as social, logistical, and educational themes. Knowledge of CR and its benefits also facilitated attendance. Both groups recognized commitments to family and work as barriers to CR. Both groups also perceived that they had misconceptions about CR exercise programs and inaccurate communication regarding CR as barriers to CR attendance. Importantly, high respect for doctors as well as Buddhist beliefs and practices were cultural factors mentioned by patients as important enablers of CR. Notably, this is the first study in Thailand to identify feeling safe attending CR as being a major enabling factor for CR uptake.

Conclusions: Religious and cultural factors impact the uptake of CR among patients with CAD in Thailand. Creation of culturally-based CR programs should be considered a priority, as should identifying potential approaches to successful delivery of CR in rural areas of the country.

Keywords: cardiovascular disease, rehabilitation, qualitative study, facilitators, barriers, attendance

ASEAN J Rehabil Med. 2024; 34(2): 85-94.

Introduction

Coronary artery disease (CAD), also known as coronary heart disease (CHD), is mainly caused by atherosclerosis of coronary arteries which occurs due to an inflammatory process of the coronary arterial wall.[1] CAD is the leading cause of death worldwide and is rising.[2] In 2022, the global annual mortality from CAD was approximately 8.95 million,[2] with almost half of the deaths from all cardiovascular diseases (CVD).[2]

Even though mortality from CAD in developed countries has declined in recent years because of an emphasis on primary prevention and the enhancements in the diagnosis and treatment of CAD, a similar reduction has not been observed in developing countries.[3] In Thailand, according to World Health Organization (WHO) data published in 2020, CAD deaths reached 51,305 cases, accounting for 11.53% of total deaths and ranking the country 165th globally for CAD-related mortality.[4] CAD represents the highest disease burden for Thais,[5] impacting patients' quality of life, the national budget, and the healthcare system.[5]

Currently, standardized approaches for preventing and treating CAD include pharmacological therapy and coronary revascularization.[6] Primary prevention, defined as prevention of the first occurrence of CAD, includes assessing and managing cardiovascular risk factors, e.g., weight management, healthy eating, regular exercise, and not smoking.[7] Secondary prevention, an essential part of contemporary care of patients with CVD, is designed to prevent the recurrence of cardiovascular events as well as complications of CVD. This prevention involves medical care, modification of behavioral risk factors, psychosocial care, education, and support for self-management, all of which can be delivered in various settings.[8]

Cardiac rehabilitation (CR) is recommended worldwide in evidence-based clinical guidelines as a secondary prevention strategy for patients with CAD.[9] CR is the sum of all activities

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Received: December 5, 2023 Revised: March 27, 2024 Accepted: March 28, 2024

which can favorably influence the underlying causes of the disease, as well as the provision of the best possible physical, mental, and social conditions, so that patients may, by their own efforts, preserve or, if lost, resume as much as possible their usual place in the life of the community.[10] There is substantial evidence supporting the effectiveness of CR, including restoration and maintenance of the heart's physical functioning, a considerable reduction in morbidity and mortality from cardiac causes, and improved psychosocial well-being and quality of life.[11]

Despite its known benefits, CR uptake could be better around the globe: current rates of attendance at CR programs internationally are suboptimal.[12] Many factors can contribute to CR uptake and adherence, including demographics, psychological and medical conditions, access to programs, and sociocultural factors.[12, 13] In Thailand, the CR uptake rate needs to be improved. It has been estimated that only approximately 18.3% of eligible patients attend CR programs.[14] Currently, there is a lack of understanding of the reasons for this poor rate of patient CR program uptake. This study explored factors affecting CR uptake among patients with CAD in Thailand, a nation where cultural and religious beliefs strongly influence many people's lives and health.

Methods

Design

An exploratory qualitative design using semi-structured interviews was employed to investigate patients with CAD regarding their decision whether or not to attend an outpatient CR program. Data collected from patients and HPs were used to gain a deeper understanding of factors that impact patients' decision to attend CR.

Settings and participants

The study was conducted in two Thai CR outpatient centers, one urban and one rural. Convenience sampling was used to identify patients to be invited to attend phase two, the early outpatient phase of CR. A second sample consisted of medical staff whose duties included referring patients to CR from an inpatient setting. Details of participants from both hospitals are shown in Table 1.

Ethical considerations

The study protocol, which conforms to the Helsinki Declaration, was approved by the Human Research Ethics Committees of University of Queensland (approval #2017001672), the urban hospital (#MURA2018/339), and the rural hospital (#HE621143). All participants gave written informed consent to participate in the study.

Data collection

The researchers developed a qualitative semi-structured interview guide following Kaillio's five phases of development (2016).[15] The first phase included evaluation of the appropriateness of the semi-structured interview research questions. A semi-structured interview was considered a suitably rigorous method for answering the research questions in this study. The interviews involved seeking people's perspectives, experiences, and opinions as factors which could potentially affect

Table 1. Characteristics of participants of both hospitals (n = 42)

Interviewee characteristics Patients with CAD (n=20) HPs (n=22)	Urban center number (%)	Rural hospital number (%)
Patients with CAD	10 (50.0)	10 (50.0)
Age		
< 60 years	2 (20.0)	3 (30.0)
≥ 60 years	8 (80.0)	7 (70.0)
Gender		
Male	7 (70.0)	3 (30.0)
Female	3 (30.0)	7 (70.0)
Procedures/condition		
Post CABG	5 (50.0)	6 (60)
Heart failure developed from CAD	2 (20.0)	1 (10)
ACS/MI	3 (30.0)	3 (30)
HPs	12 (54.5)	10 (45.5)
Cardiac surgeon	3 (25.0)	3 (30.0)
Cardiologist	4 (33.3)	3 (30.0)
CR physician	2 (16.7)	1 (10.0)
Physiotherapist	1 (8.3)	1 (10.0)
CR nurse	2 (16.7)	2 (20.0)
Work experience in CR		
< 10 years	2 (16.7)	2 (20.0)
≥ 10 years	10 (83.3)	8 (80.0)

CAD (coronary artery disease); CR (cardiac rehabilitation); HP (healthcare provider).
CABG (coronary artery bypass grafting); ACS (acute coronary syndrome); MI (myocardial infarction)

CR uptake. In the second phase, a predetermined framework for the interview guide was created based on a comprehensive literature review of factors contributing to CR uptake among patients with CAD both in Thailand and worldwide. Based on that review, factors identified were classified as either enablers or barriers. As some factors did not fit clearly into one of those two categories, a third category, "other factors," was used to include those factors as well as any newly identified factors that could potentially contribute to CR uptake among patients with CAD in the Thai context. In the third phase, the researchers formulated two levels of guide questions: main theme questions and follow-up questions. The guide questions were categorized as either main theme questions (which factors contribute to CR uptake?) or as follow-up questions (which enabling and preventive factors or reduce CR uptake?). In the fourth phase, the guide questions were pilot-tested with two Thai Ph.D. students to confirm the coverage and relevance of the preliminary guide's content, to identify any questions requiring reformulation and to test the implementation of the guide. Testing of the interview guide confirmed that no change to the interview questions was required. The fifth and final phase involved the researchers confirming the completeness of the semi-structured interview guides.

The completed guide was then translated into Thai and pilot-tested with two Thais to check the clarity of the questions. Face-to-face interviews in the Thai language were conducted. Interviews with both patients and HPs lasted from 20 to 90 minutes and were conducted between June 2018 and July 2019. The following interview questions were used: (a) "What factors have enabled you/patients with CAD to attend a CR program?"; (b) "What factors have prevented you/patients with CAD from attending a CR program?"; and (c) "What other factors have contributed to your/patients with CAD uptake of CR?". Both hospitals provided the interviewer with a private room in the hospital to interview each participant.

Data analysis

Interview transcripts were analyzed using a deductive thematic approach.[16] All authors independently read the English transcripts of the responses to develop initial codes and themes, which were then discussed to refine the analysis, reach a consensus, and finalize the extracted themes.

Results

Five general themes were identified from the patients' perspective. The themes were the influence of Thai culture on CR uptake, patients' knowledge and understanding of CR and its benefits, patients' feelings and attitudes towards CR and its benefits, and patients' ability to access or attend CR. There were also seven themes identified from the perspective of HPs. These themes included the current situation of CR and the Thai healthcare system; strong support from patients' family members; patients' knowledge and understanding of CR and its benefits; patients' health literacy regarding CR and its benefits; patients' educational level; patients' feelings and attitudes towards CR and its benefits; patients' ability to access or attend CR; and communication issues. Themes identified from the perspective of both patients and HPs from both hospitals have been combined and are presented as intrinsic and extrinsic factors (facilitators and barriers) to CR uptake (Table 2). Facilitators and barriers to CR uptake with illustrative quotes are provided in the text below.

Table 2. Themes and corresponding sub-themes from the perspective of patient and HPs of both hospitals

Major themes/subthemes	Urban center		Rural hospital	
	Patient	HP	Patient	HP
Facilitators of CR uptake				
Intrinsic facilitators				
• Respect for doctors	✓	-	✓	-
• Patients' feeling safe attending CR	✓	✓	✓	✓
• Buddhist beliefs and practices relevant to patients' health	-	-	✓	-
Extrinsic facilitators				
• Family support	✓	✓	✓	✓
• Communication between/among patients and HPs	✓	✓	✓	✓
Barriers to CR uptake				
Intrinsic barriers				
• Patients' knowledge and understanding of CR and its benefits	✓	✓	✓	✓
• Patients' educational levels	-	✓	-	✓
• Patients' health literacy	-	✓	-	✓
• Patients' feeling that their daily activities provide sufficient exercise	✓	✓	✓	✓
Extrinsic barriers				
Patients' ability to access or attend CR				
• Family and work responsibilities	✓	✓	✓	✓
• Transport/distance	✓	✓	✓	✓
• CR-related costs and the economy	✓	✓	✓	✓
• Access to CR services (CR setting/staff)	-	✓	✓	✓

CR (cardiac rehabilitation); HP (healthcare provider)

1. Facilitators of CR uptake

Participants described intrinsic and extrinsic facilitators of CR uptake. Intrinsic facilitators from patients' and HPs' views were similar at both hospitals regarding patients feeling safe attending CR. However, only patients highlighted that they highly valued their doctors' opinions and recommendations. Notably, only rural patients described the intrinsic facilitators of Buddhist beliefs and practices as being relevant to patients' health.

1.1 Intrinsic facilitators of uptake of CR

1.1.1 Patients' feeling safe attending CR: Patients from both hospitals highlighted that they preferred exercising at the hospital, believing that the hospital CR settings were safer than at fitness centers.

"When I came here to join rehab, I felt safe and relaxed. If anything happened to me or my heart, the doctors and nurses could save my life, or else I would be sent to the emergency room quickly." (P6, urban hospital)

Patient safety was also a perspective noted by HPs from both hospitals.

"Some patients told me they came to attend CR here because they felt their heart condition and life would be safe. This was because they were closely monitored by qualified CR staff at an advanced CR facility." (HP2, urban hospital)

1.1.2 Respect for doctors: All patients highlighted that they had the greatest respect for their doctors, trusting that their advice would benefit their heart health and well-being. Consequently, when their doctors invited them to attend CR, they would do their best to do so.

"What did the doctor advise? I would do that thing. I did not dare to disobey the doctor's order." (P4, rural hospital)

However, when their doctors did not support their attending CR, even though they would like to do so, they would accept that advice.

"When the doctor suggested to me that I could exercise anywhere, even though I wanted to join rehab at the hospital, I would accept that doctor's advice." (P7, urban hospital)

1.1.3 Buddhist beliefs and practices relevant to patients' health: Although all participants were Buddhists, only rural patients identified that their beliefs and practices as Buddhists impacted their health. For example, two older rural male patients (aged over 60) discussed the importance of Buddhist doctrine as articulated by monks, relating that it calmed and helped them attend CR at the hospital.

"When I was diagnosed with heart disease, as I am Buddhist, I accepted this heart disease. Sometimes, I listened to Dhamma or Buddhist doctrine from monks. I joined rehab because that may make my heart better." (P5, rural hospital)

1.2 Extrinsic facilitators to uptake of CR

Extrinsic facilitators from both patients' and HPs' perspectives and across both settings were similar and included family support, good communication about CR between and among patients and HPs, and the national healthcare system.

1.2.1 Family support: Both patients and HPs felt that family support positively impacted patients' decision to attend CR. All patients noted strong physical, emotional, and/or financial support from their spouse, partner, or children.

"When I come here to join rehab, my wife usually accompanies me. However, if my wife is busy, my daughter takes me to the hospital and takes care of me while attending CR. My wife and my children are supportive and helpful." (P8, urban hospital)

Rural patients specifically noted that the support from extended family structures in remote villages encouraged them to attend CR. On occasion, patients highlighted that they felt uncomfortable and not supported if their family members were unable to accompany them to CR.

"I came here to join rehab alone. My wife and my daughter were working during weekdays. Sometimes I was quite upset when I did not have anyone to accompany me." (P9, rural hospital)

HPs also highlighted the strong support patients received from family. Additionally, the HPs from the rural hospital emphasized that strong physical, emotional, and financial support was required for patients who were elderly and living in remote villages.

"These elderly patients must have caregivers or relatives accompany them when they attend CR at the hospital. If they came here twice or three times a week, their caregivers had to take leave from their jobs often. That may be the major problem for both patients and their caregivers." (HP7, rural hospital)

1.2.2 Communication about CR

Communication between patients and HPs: Patients and HPs from both hospitals mentioned the need for good communication when CR staff encouraged patients to join a CR program.

"When I joined a rehab here, the rehab doctors and other staff gave me useful advice. They had excellent communication with patients. They treated me as a family member, and I felt they loved me. This reaction made me love myself and want to join rehab here." (P8, rural hospital)

Communication between patients was also noted as being necessary. Patients who joined a CR group session highlighted that they were able to share their feelings, experiences, and feelings of well-being, which encouraged them to continue attending a CR program.

"When I joined rehab here, I did exercises with other patients as a group. This activity was enjoyable and better than doing exercises alone. We could talk, share knowledge and our heart conditions, and live together. I got to know others who joined rehab, and we gave our phone numbers to each other." (P7, rural hospital)

Communication between HPs and HPs

Physicians, CR nurses, and physiotherapists from both settings indicated that having good communication between HPs improved CR uptake among patients with CAD.

"I discussed with the CR team about referring patients to CR after I set up a new surgery program 20 years ago. I needed this type of rehabilitation for my patients. I and other cardiac surgeons usually referred patients to CR because of the good collaboration with the cardiac rehab." (HP9, urban hospital)

2. Barriers to CR uptake.

Participants described intrinsic and extrinsic barriers to CR uptake. Intrinsic barriers from the view of patients and HPs from both hospitals were similar, and included patients' knowledge and understanding of CR and its benefits and whether patients felt their daily activities provided sufficient exercise. However, only HPs viewed patients' educational level and health literacy as affecting CR uptake.

2.1 Intrinsic barriers

2.1.1 Patients' knowledge and understanding of CR and its benefits: Generally, younger patients with higher educational levels mentioned knowing about CR.

"Yes, I think it (CR) was useful. Rehab gave me a faster recovery and knowledge of what I should do. What behavior could I modify in my everyday life? What should I refrain from eating? What foods should I eat? What foods are helpful to my heart? (P4, urban hospital)

However, some elderly patients with fewer years of education and lower family incomes highlighted that they did not know anything about CR.

"I did not know about rehab, and I had no idea what a rehab program was." (P6, urban hospital)

2.1.2 Patients' health literacy: HPs recognized that patients' knowledge and understanding of CR and its benefits affected their uptake of CR. They highlighted the importance of patients' health literacy, which was noted to be low among elderly, poor, and low-educated patients.

"I think patients' health literacy related to CR is very poor in Thailand." (HP1, rural hospital)

2.1.3 Patients' educational levels: HPs highlighted that eligible patients with CAD who never attended CR generally did not know about CR or the availability of CR at hospitals.

"The majority of Thai patients with heart problems or CAD did not have sufficient knowledge about what CR is and its benefits. Many patients also did not know whether CR was available in the hospitals." (HP3, urban hospital)

"Some patients and their caregivers did not understand about CR and its benefits as a result of their low educational levels." (HP7, urban hospital)

2.1.4 Patients feeling that their daily activities provide sufficient exercise (adequacy of home exercise)

Some patients felt that their daily activities provided sufficient exercise; this view discouraged them from attending CR. HPs mirrored this view.

"Patients believed that they could do any exercises at their home on their own, and that some of their household activities were tougher than attending CR here." (HP7, urban hospital)

In particular, patients from rural hospitals who were farmers highlighted that their farming activities provided enough exercise to address their condition; therefore, they did not need additional exercise as part of CR.

"I do many household activities and spend much energy with my farming work such as planting rice. That is similar to joining rehab or doing exercises at the hospital." (P7, rural hospital)

2.1.5 Patients' health: The severity of patients' heart disease and comorbidities, e.g., diabetes and hypertension, affected attendance at CR sessions. Some patients reported additional hospital admission due to the severity of their heart disease prevented CR attendance.

"I could not join rehab two times. The first time, I was admitted for bacterial sepsis. The second time, I was diagnosed with occlusion of heart blood vessels. This was the second occurrence of occlusions, so I received a balloon (angioplasty)." (P1, rural hospital)

This perspective was also recognized by HPs.

"Some patients were readmitted to hospitals for health and heart problems. In particular, many patients with CAD have comorbidities such as diabetes or hypertension. Because of that, these patients could not attend CR." (HP3, urban hospital)

2.2 Extrinsic barriers

Extrinsic barriers to CR attendance noted by patients and HPs alike included family and work commitments, transport-related factors, and the costs of attending CR. However, urban and rural HPs both also indicated that the small number of CR facilities and the limited CR staff were the key barriers to CR uptake among patients with CAD in Thailand.

2.2.1 Family and work commitments finances

Work commitments: Employed patients as well as HPs mentioned that sometimes CR sessions were canceled due to conflicts with patients' work schedules. They both noted that CR sessions were not available on weekends or after working hours on weekdays.

"I had to manage my working time properly as I held a high position at my office." (P2, rural hospital)

"Sometimes, some patients could not attend CR due to their work responsibilities." (HP3, rural hospital)

Farming commitments, such as rice planting or harvesting, affected CR attendance for some rural patients.

"This month until July, is the season of planting rice for us. It will be raining during these three months. I had to plant rice during these months. Sometimes, I could not come to join a rehab here." (P9, rural hospital)

This barrier was reinforced by HP comments, which highlighted that farming activities such as planting rice are an integral part of people's work.

"Many patients were farmers, and few attended CR during the rice planting and harvesting seasons. Importantly,

their agriculture relied on rain and the seasons. Therefore, it was difficult to make appointments for them to come to attend CR at this hospital during those times." (HP2, rural hospital)

Family responsibilities: In general, more women than men highlighted that they could not attend some CR sessions because of family responsibilities.

"Sometimes, I could not come to join rehab in the morning as I had to cook for my family members and do other household activities for them as well." (P3, urban hospital)

HPs from both hospitals also mentioned that family responsibilities could be a barrier.

2.2.2 Transport-related factors: Distance from patients' homes to the CR location, transportation difficulties, the availability of parking, and traffic congestion were mentioned as key concerns by patients and HPs from both hospitals, although congestion and parking were noted more frequently by urban hospital patients.

"When I came here to join rehab, I spent almost three or four hours on the road during rush hour. As this hospital is surrounded by many public offices such as the National Cancer Institute, Faculty of Science and Pharmacy, etc., the traffic jam was a serious situation here." (P5, urban hospital)

For rural patients living a long distance from the CR setting, other transportation problems were the most serious difficulties that prevented them from attending CR.

"From Laos (Savannakhet) to here is approximately 240 kilometers. My daughter and I drove from my hometown. It took approximately four hours for one trip. Sometimes, I had to spend one night at a hotel near the hospital before attending a rehab program." (P2, rural hospital)

Rural HPs also recognized the issue of distance.

"Some patients who did not have their own cars and who lived a distance from this hospital had difficulty with transportation from their homes to here. I think it was tough and time-consuming for them." (HP5, rural hospital)

2.2.3 CR-related costs and the economics of attending CR: Patients and HPs both viewed CR-related costs as impacting patients' decision to attend CR. Although patients who were fully covered by health insurance did not pay for the CR sessions, they still had to pay for CR-related costs such as travel, accommodations, and food. These costs directly affected their CR attendance. This was especially true for people with low incomes, patients with financial problems, and those who lived far from the CR location.

"Although my health insurance fully covered CR, I had to pay for other things such as petrol, accommodations, and food. Sometimes I had to pay my neighbors to accompany me to each CR session. Together, these cost me approximately 2,000–3,000 baht for each visit. It was a lot for me." (P6, urban hospital)

HPs reinforced how CR-related costs such as travel, accommodation, and food affected patients who were poor, aging, or living far from CR settings.

"Some patients were living in villages far from the hospital. When they came to attend CR, they had to pay for their accommodations, petrol, and food. Some patients paid their caregivers to accompany them." (HP6, rural hospital)

2.2.4 Access to CR services: HPs from both hospitals mentioned that there were only a few CR locations in Thailand, and most of these were located in Bangkok and some tertiary hospitals in the rural provinces. In one instance, a single rural CR facility served more than 20 provinces. A national shortage of CR staff and the cost were important concerns.

"Some CR hospital-based settings were closed as a result of a variety of problems e.g., resources, management, and funding as well as patients' concerns, etc." (HP2, urban hospital)

Patients designated as high-risk had to wait for the CR physician to be available before attending CR. The shortage of CR staff seemed to be a more serious concern for the rural hospital than for the urban hospital.

"There is a shortage of CR physicians nationwide. . . . . In Thailand, approximately 30 CR physicians have been trained. Few CR physicians have been interested in studying rehabilitation fields, especially CR." (HP2, urban hospital)

2.2.5 Communication related to CR

Communication between patients and HPs: Patients and HPs from both hospitals mentioned that a lack of communication related to CR between HPs and patients contributed to poor CR uptake.

"If patients knew that this program was available and would be useful for them, I believed many would join the programs. Some physicians who treated patients did not inform them about CR and its benefits." (HP2, urban hospital)

Communication among HPs: HPs from both hospitals emphasized that communication differed between physicians, and that a lack of communication resulted in some patients not being referred to CR.

"Sometimes, I would have liked to refer my patients to rehab, but I did not know who to talk to. This could be because of the small number of CR staff" (HP6, urban hospital)

Discussion

Facilitating factors and barriers to CR uptake from the perspective of patients and HPs across different settings were explored in the current study. Consistent with other international studies, the present study found that solid support from family members played a crucial role in encouraging patients with CAD to attend CR.[12,17,18] These supports were physical, mental, and spiritual.[13] Spouses in particular played a crucial role in promoting attendance and often attended sessions with their partner. This finding is consistent with an earlier study that found family support was the most substantial factor affecting patients' decision to attend CR in Thailand.[19]

The finding that physician support and recommendations are strong facilitators of CR attendance is in accord with international studies.[12, 20] Those studies reported that physicians were viewed as authoritative, knowledgeable people who rarely made mistakes and whose recommendations should be followed. While respect for doctors is universal, it is even more vital in some Asian cultures[21], as was evident in the current study. Culturally, these relationships could be based on the principle of "hierarchical order," which is characterized by a formalized superordinate–subordinate relationship or as a "respect pattern".[22] First, they could be based on status inequalities, e.g., age, wealth and power, knowledge, and religious or government roles. Second, they could be based on the assumption that these individuals deserve respect.[22]

In Thai society, cultural and social values based on interpretations of Buddhism have been fundamentally embedded in the Thai way of life, and behavior plays an important role in the caring relationship between husbands and wives.[23] These results are consistent with studies showing that Buddhism can affect the psychosocial well-being of individuals. In particular, elderly rural patients followed Buddhist doctrine associated with health when they were diagnosed with heart disease. They listened to Buddhist doctrine from monks which is linked to Buddhist beliefs regarding "karma" (actions) and "merits" (positive karma). This belief may have encouraged them to attend CR.

For some patients, this belief in karma is manifested in believing that their CAD resulted from their "karma." In other words, they were responsible for wrong actions in their past lives, and, as a consequence, they are now suffering in this present life, including developing CAD. Seeing their disease in this way can make these patients more relaxed or "sabai jai," helping them to accept treatment plans related to their CAD, including attending CR.

In line with other studies, our study demonstrated that attendance at CR was facilitated by patients feeling safe about attending the hospital.[12] If any subsequent cardiac events occurred, such as chest pain during exercise, HPs were available to assist or care for these patients. Notably, this study is the first in Thailand to identify that feeling safe attending CR is a major enabling factor for CR uptake.

This study also found that there are numerous barriers to CR participation. Consistent with the findings of several international studies, patients with a higher education level were more likely to attend CR.[13] At the rural hospital, CR non-attendees generally had fewer years of education than attendees at the urban hospital, reflecting the considerable gap in accessing the Thai educational system between the urban and rural areas of the country. This education gap may result in reduced ability of populations in rural areas to access, understand, and appraise health information, including information about CR.

In line with other international studies, health literacy among patients with CAD was related to increased knowledge gained from cardiac education through a CR program.[24] People with adequate health literacy were more likely to engage in physical activity and have better physical and mental health status.[25] A lack of knowledge regarding CR was the most common reason for not participating in a CR program.[26] Urban and rural HPs reinforced this view when they mentioned that patients' health literacy may affect their uptake of CR, particularly patients who are elderly, poor, and/or who have fewer years of education. However, these findings are contrary to one study that reported no association between health literacy and CR uptake.[27]

The association between health literacy and low education level among patients with CAD has previously been observed.[27] However, educational attainment should not be used as a definitive indicator of health literacy, as even among individuals with high educational attainment, there are still those with limited health literacy.[28]

In this study, patients' knowledge and understanding of CR and its benefits affected the uptake of CR. Consistent with the findings of some international studies, there was an association between patients' knowledge of CR and CR uptake.[12,17,20] This study suggests that CR attendees, especially younger CR attendees with higher educational levels, had practical knowledge of CR and its benefits. Despite this knowledge, some patients still did not attend CR, possibly because the perceived benefit was not high enough or because the barriers to attendance were too great.

In Thailand, availability of CR programs is limited. Throughout the northeast of Thailand, for example, only one CR facility currently provides a CR program which serves 22 Thai provinces areas as well as patients from the nearby countries of Laos, Cambodia, and Vietnam. Most rural non-attendees of CR lived more than 100 kilometers from the nearest CR program. The finding that the distance from patients' homes to the CR setting was a critical barrier preventing them from attending CR is in accord with other international studies undertaken in Europe, Japan, and Indonesia, where the distance to a CR facility was a common barrier to attendance, especially in rural areas.[13, 29, 30]

Additionally, in accord with other studies, our study demonstrated that transport difficulties, including heavy traffic and lack of parking, were associated with low CR uptake.[12, 20] In Thailand's remote areas of the northeast, the transportation system needs to be better developed. Many road networks need to be improved, some patients do not own cars, and public transport is minimal. However, transport is not a problem only for rural people, but is also a barrier for urban people[12] where traffic congestion is common, particularly in Bangkok[31], and parking is problematical.

Consistent with some international studies, our study found that women's decisions to attend CR are influenced by their family obligations.[21, 32] This could be explained culturally based on Buddhist beliefs that women and wives play essential roles in performing household duties and as caretakers

supporting other family members. Thai women live in a patriarchal social structure where they have prime responsibility for providing family care.[33]

The results of the present study are consistent with international studies which have found that some employed individuals do not attend CR due to their work responsibilities.[12] What is novel about this current research is the identification of specific work demands in rural areas. At the rural hospital, 63% of CR non-attendees were farmers, which could explain why they did not attend CR during the rice planting and harvesting periods. Many rural Thai people are heavily dependent on agriculture as their main source of income.[34]

Consistent with international studies[12, 30], this study suggests that the costs associated with CR influence CR uptake, while the Thai healthcare system was seen as an enabler of CR uptake. Public healthcare fully covers the cost of CR sessions, and the Universal Health Coverage Scheme covers 78% of the Thai population. However, patients were still responsible for indirect costs related to CR attendance, including food, transportation, parking, and accommodations. Although patients in both urban and rural areas had similar CR costs, transport and accommodations costs would usually be higher for those traveling from rural areas.

The results of this study also align with other studies that have reported patients interpreting CR as an exercise-only program.[20] This study has shown that some patients considered exercising in daily life activities is comparable to attending CR. The rural HPs and patients also reported that rural patients considered that their regular farming work and agricultural activities provided sufficient exercise. These views, which negatively impact CR attendance, are consistent with the findings of other studies.[20, 35]

International studies have also reported that poor communication and poor quality of information about CR have resulted in low CR uptake.[36] This study also found that ineffective communication between patients and HPs as well as among HPs was a barrier to CR uptake. Patients in rural areas, who tended to be elderly, have lower educational levels and have poor health literacy experienced communication difficulties. Interestingly, this study also found that not being contacted by the rehabilitation program staff resulted in poor CR uptake among patients with CAD at the rural hospital.

These results highlight specific implications for the successful delivery of CR in Thailand. These include improved access, better communication, and consideration of alternative methods of CR such as home-based CR programs, eHealth CR, and cardiac-tele rehabilitation, which should be considered as they could reduce CR cost, distance, and transportation barriers, e.g., implementing a smartphone CR home-based program which had been tested through a randomized control trial (RCT) as a way to increase CR use and improve patients' quality-of-life outcomes.[37]

Study limitations

This study has some limitations. First, as this study was only conducted in two CR settings in Thailand, the results may fail to reflect other significant national and international perspectives. Second, although the 42 interviewed participants came from diverse cultural and ethnic backgrounds, their experiences may not be representative of all patients with CAD and CR HPs in Thailand. Third, the study participants consisted mainly of Thai males, hence, the findings might not adequately reflect women's experience. Finally, most participants were elderly, had comorbidities, and had to follow up with many physicians, which may have introduced recall bias.

Conclusions

Family support, respect for doctors, a safe CR environment, plus spiritual beliefs and practices as Buddhists were found to be pivotal factors in encouraging patients to attend CR in Thailand. More specifically, CR uptake among patients with CAD in this study was in part shaped by the uniqueness of cultural and Buddhist beliefs, practices, and interpretations.

Patients' age, rural location, educational level, medical health provider communication, plus patient health literacy and knowledge of CR were found to be the main factors affecting CR uptake. Although these factors are similar to those in other countries, there were some local differences in the Thai context.

What is evident from the study is the need to create culturally-based CR with easily accessible programs and to identify practical methods to successfully deliver CR to remote populations in Thailand. Potential responses could include involving community leaders and other authorities, family members, as well as Village Health Volunteers (VHVs) in the empowerment of elder patients working on farms or in remote villages to participate in a CR hospital-based program or to use a CR home-based program. Potential approaches include: 1) initiating community engagement activities to raise awareness about the importance of CR, e.g., conducting community workshops or awareness sessions to educate community leaders, authorities, family members, and VHSs about the benefits of CR; 2) collaborating with local authorities to gain support for implementing CR programs in the community; 3) increasing family involvement, e.g., emphasizing the role of family members in supporting the participation of older patients and farmers in CR, conducting family-focused awareness programs to educate individuals about the significance of CR in improving cardiovascular health outcomes; 4) providing training for VHVs, e.g., training VHVs to act as CR advocates and educators in the community and providing VHVs with resources and information about CR to disseminate among community members; 5) consider cultural sensibilities and nuances and tailor CR programs to align with the community's cultural beliefs and practices. Incorporate

traditional or culturally relevant activities into the CR program to enhance acceptance; 6) design flexible CR programs that can be adapted to the unique needs and schedules of older patients and those working on farms, including considering offering home-based CR programs for those who face challenges in traveling to hospital settings.

Disclosure

The authors have no conflicts of interest to disclose.

Acknowledgments

The first author was a recipient of a scholarship from the Thai government and the University of Queensland. Special thanks should be given to Dr. Benja Songsangrit and Mr. Montri Yasud, research coordinators at Queen Sirikrit Heart Center of the Northeast of Thailand. Many thanks also to Miss Phermsuk Ua-Aree and Mrs. Kanokkarn Kobkitsumongkol, CR nurses and research coordinators at Ramathibodi Hospital, Mahidol University.

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