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Chapter 10

Self-Management Training for Chronic Stable Angina: Theory, Process, and Outcomes

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1. Introduction

1.1. The societal burden of chronic stable angina

Chronic stable angina (CSA) is a cardinal symptom of coronary artery disease (CAD), characterized by pain or discomfort in the precordium, shoulder, back, arm, or jaw [1]. Angina pain symptoms—or equivalents such as shortness of breath, fatigue, and nausea—are considered stable if they are experienced over several weeks in the absence of major deterioration [1-3]. Those affected by CSA typically have CAD involving one or more large epicardial arteries, although individuals diagnosed with hypertrophic cardiomyopathy, hypertension, endothelial dysfunction, or valvular stenosis/deficiencies may also exhibit angina [1]. Symptoms usually occur predictably upon physical exertion and are relieved by rest or nitroglycerin [1]. The severity of symptoms experienced can vary, typically ranging from Canadian Cardiovascular Society [CCS] class I to class III angina. A number of factors can also aggravate symptoms including heightened emotional states, diet, smoking, and weather [1,4].

As CAD survival rates increase, the global incidence and prevalence of CSA are also on the rise. Prevalence estimates suggest that CSA affects more than 10 million Americans [5] and nearly ½ million Canadians over the age of 12 [6]. In Scotland, CSA affects 2.6% of the general population, with 28 per 1000 men and 25 per 1000 women diagnosed, respectively [7]. The age-standardized annual incidence of angina, per 100 population in Finland, 2006 was 2.03 among men and 1.89 among women [8].

Chronic stable angina poses significant risk for acute myocardial infarction, congestive heart failure, atrial fibrillation, and stroke [9], as well as increased risk of cardiovascular-related mortality or hospitalization (men: RR 1.62, women: RR 1.48) [10]. Moreover, multiple studies have shown that people living with CSA are among the more severely debilitated across several chronic illness populations including sciatica, arthritis, low back pain, diabetes and

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stroke [11-15]. Many of these patients suffer persistent pain episodes, poor general health, sleep disturbance, impaired social role functioning, activity restriction, and reduced ability to self-care [16-27].

As Lewin [28,29] and others [30] have argued, angina seems to have a disproportionately severe impact on one's self-perceived health status relative to other chronic illnesses. Extensive work in the field to date has shown that negative emotional states, such as anxiety and depression, are well-documented corollaries of CSA. For example, as part of a larger clinical trial, Ketterer et al. [31] (n= 196) examined the psychological profile of patients with stable CAD, angina symptoms during daily activities, and positive exercise stress tests. Anxiety and depression were strongly associated with recent angina, as well as angina in the presence of ischemia invoked by treadmill testing. Gravely-Witte et al. [32] found similar results in a prospective study of 121 patients following surgical and percutaneous revascularization procedures. Angina symptoms were predictive of higher levels of depression and lower levels of emotional and social functioning [32].

The central role of emotional distress in CSA may be explained, in part, by the fact that angina sufferers tend to hold erroneous and maladaptive beliefs about their condition. In Wynn's widely cited observational study (1967) [30], 23% of post-myocardial infarction patients (n=400) reported being anxious due to the misconception that each angina episode reflected further damage to the heart. In 40% of cases, failure to return to work was attributed to fear of immanent death [30]. Since the time of Wynn's seminal work, multiple studies have shown that CSA patients routinely interpret their angina symptoms as 'mini heart attacks' [19,22-24, 30,33]. Consequently, many patients adopt sedentary lifestyles, relinquish their normal routines, and/or retire early as means to avoid angina attacks [19,22-24,34,35]. Unfortunately, out of concern, family members, peers [17,19,36], and health care professionals [37] alike often reinforce such maladaptive coping behaviours which can evoke unintentional deconditioning as well as reductions in coronary blood flow, sheer stress, and impetus for healthy collateral coronary vessel formation [38].

Considering the high prevalence and major negative psychological impact of CSA, the cost implications are significant. The total costs associated with CSA management in the United States have been estimated to exceed 15 billion dollars per annum [1]. In the United Kingdom, the direct cost of chronic angina in 2000, including prescriptions, repeated emergency department visits and other hospital admissions, outpatient referrals, and procedures, was estimated at £669,000,000, accounting for 1.3% of the total National Health Service expenditure [39]. At the patient level, a Canadian study [40] estimated the mean cost RFA-related disability (2003 – 2005) from a societal perspective including direct out-of-pocket costs to patients, indirect costs expressed as forgone income and leisure time, and system-related costs paid by public and private insurers. The total estimated annualized cost of CSA per patient was $19,209 [40].

In recent years, increasing attention has been given to angina self-management training [SMT] interventions as a means to offset the societal burden of CSA. These interventions are multi-modal educational packages that employ learning materials and cognitive-behavioural strategies to achieve changes in knowledge and behaviour for effective disease self-management [41]. This chapter provides a brief overview of the concept of self-management and discussion of background theory, key elements of intervention structure and process, as well

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as specific angina SMT models developed in the United Kingdom and Canada. The overall effectiveness of SMT for angina will also be reviewed with respect to impact on symptoms, HRQL outcomes, and cost. Implications for future research and practice will also be discussed.

2. Self-Management training: Overview

Self-management training emerged as a priority for health systems in the 1980's and 90's, following a surge of population-based research on the prevalence of chronic illness in the 1960's and 70's [42]. The realization of the global prevalence of divergent chronic illnesses, without cure, led to major critiques of standard health care delivery models as too poorly integrated and siloed to address the consequences of chronic illness and related therapies [42]. Similarly, traditional patient education models have been critiqued as lacking adequate scope and complexity to address an ageing population, multiple co-morbidities, and the complex needs of individuals who must manage their chronic illnesses daily [42]. Traditional acute care models and related patient education focus on diagnosis and cure, technological interventions, and the imparting of specific disease-related information to inexperienced patients who act as passive recipients of health teaching. Within this paradigm, the health care professional is understood to be the knowledgeable, experienced authority on the patient's care priorities [42-44]. Thus, a fundamental premise of traditional models of care is that patient compliance with specific direction and principles taught will lead to improved health behaviours and outcomes [42-44].

In contrast, SMT interventions espouse the tenets of Wagner et al.'s Chronic Care Model (CCM) [45]. According to the CCM, chronic disease management refers to a system of health care that supports individuals with chronic illness to remain as healthy and independent as possible. The process of disease management is conceptualized as patient-centered, with health care professionals, the health care system, and the community at large collaborating with the patient to facilitate optimum health and well-being. Implicit within the CCM is the concept that patients should be well-informed about their illness, and should be active participants in their care [45].

The emphasis of SMT, therefore, is the role of the patient as an active player engaged in preventive and therapeutic health activities in partnership with health care professionals [46]. At the crux of such partnerships are patients' everyday problems as a result if living with chronic illnesses. As D'Zurilla [47] Lorig and Holman [44], and others [46] have argued, effective SMT is fundamentally problem-oriented. A common starting ground for SMT interventions in practice is identification, crystallization, and prioritization of patients' chief concerns [44-47]. Care is generally taken during this process to harmonize perspectives—through deliberative discussion—as health care professionals will often conceptualize the issues in terms of diagnosis and/or risk factor modification, whereas patients will think in practical terms about the day-to-day difficulties their illnesses present [19,48]. The problem list generated dictates the direction and scope of intervention for each patient [44-48].

Along with collaborative problem identification, additional key elements of SMT, which are typical [45,48,49], include a) *targeted goal setting:* identifying meaningful, realistic goals in the

context of patient priorities and preferences, b) *self-reflection:* sharing of feelings to provide opportunities for discussion about the personal meaning of chronic illness and difficult emotional responses, c) *mini-lectures and supplemental reading/workbooks*: providing opportunities for brief information sharing about relevant educational content in accessible language and formats, d) *brainstorming and problem solving*: facilitating discussion of the potential benefits of various self-management strategies such as safe exercise, sound nutrition, energy conservation and pacing, identifying and reframing negative self-talk, etc., e) *regular action planning:* learning the process of setting incremental positive behaviour change, and f) *self-monitoring, accountability, and feedback:* reporting back to peers or counsellors about individual progress and obtaining constructive feedback.

Self-management training programs have been delivered in a variety of formats including individual counseling, small group sessions, or individual and group-based approaches in combination. Programs that engage either health care professional facilitators or lay peer leaders have been shown to be effective, as have programs that use these delivery methods in combination [46,48,49]. Regardless of format, most established SMT interventions offer a range of self-management techniques for participant rehearsal and uptake over the course of several days or weeks [44-49]; typical settings for program delivery include clinical outpatient settings and community centres.

3. Key theoretical underpinning: Self-efficacy

As discussed, the majority of contemporary SMT programs foster an individualized approach, with a strong emphasis on coaching by a health care professional or peer leader [50]. A common goal of SMT intervention developers is to maintain a focus on wellness in the foreground and improve overall HRQL. In so doing, three key objectives of self-management coaching are to prepare people to do the following a) take better care of their health through physical activity, relaxation and stress reduction, and effective use of available treatments, b) maintain optimal social and occupational role functioning, and c) manage challenging emotional responses to chronic illness [51].

To facilitate effective coaching and desired health outcomes, most successful SMT interventions are developed on the basis of well-established psychological models of behavior change [50]. Such models delineate the instrumental processes inherent in successful role modeling, self-management skills acquisition, realistic goal setting, problem solving, and identification and management of obstacles to health-related improvements [50].

A well-integrated model in SMT research and practice is Bandura's Self-Efficacy Theory [52-54]. Renowned sociologist Albert Bandura [53] defined the concept of self-efficacy as "The exercise of human agency through people's beliefs in their capabilities to produce desired effects by their actions" (p iv). Bandura argued that fundamental to human nature is the need for control, or causative capacity in everyday situations. Human enactments of control are thought to be played out in the form of agency, or one's intentional actions. People's beliefs about their self-efficacy drive their personal senses of agency [52-54]. Therefore, chronic

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disease self-management is not simply a question of knowing what to do; the process requires incremental increases in one's perceived capacity to organize and integrate cognitive, social and behavioural skills to meet a variety of aims in managing illness from day to day [52-54].

Under the direction of Kate Lorig, the Stanford Patient Education Research Centre has been a world leader in the application of self-efficacy theory to chronic disease SMT research and implementation [55]. Lorig et al.s' seminal work, the Arthritis Self-Management Program (ASMP)—developed in 1978 and funded by the National Institutes of Health—has been widely disseminated through national arthritis societies on three continents [56-61]. Multiple process evaluations and randomized-controlled trials (RCTs) of the ASMP [56-61], and its prevalent, generic adaptation, the Chronic Disease Self-Management Program (CDSMP) [62-71] (developed in 1996), have shown that participation in a standardized SMT program results in significantly improved levels of self-efficacy for those with chronic pain and other chronic diseases. In the ASMP evaluations, improved self-efficacy was found consistently to mediate sustained significant changes in HRQL, knowledge, pain, depression and disability. Reductions in health care costs up to 4 years post intervention, without formal reinforcement of program content, have also been found [60,61]. Similarly, self-efficacy enhancement in the CDSMP trials has repeatedly demonstrated significant improvements in exercise, cognitive symptom management, communication with physicians, self-reported general health, health distress, fatigue, disability, and role and social functioning. Participants have also spent significantly fewer days in hospital; sustained outcome improvements have been demonstrated up to three years post-intervention [62-71].

Both the ASMP [56-61] and CDSMP [62-71] employ a standardized 6-week, community-based format, Sessions are delivered in 2-hour sessions weekly for small groups of approximately 12 to 15 patients. As preeminent models of SMT, the ASMP and CDMSP programs have consistently supported [72] the following major precepts of Self-Efficacy Theory—summarized by Lorig et al. [73], (p. 5-6)—as principal drivers of effective chronic disease self-management:

- The strength of people's belief in their ability to achieve certain outcomes reliably predicts motivation and behaviour.
- Perceived self efficacy can be enhanced via performance mastery, modeling, reinterpretation of symptoms, and social persuasion.
- Enhanced self-efficacy belief leads to lasting improvements in behaviour, motivation, thinking patterns, and emotional well-being.

4. Self-management training: Angina-specific models

Angina-specific SMT programs emerged in the early 1990s [74-76] and have been documented as recently as 2012 [82]. The majority of RCT evidence to date includes individual counseling or small-group interventions (i.e. 6-15 patients) employing varying combinations of educational materials on CAD and medications, risk factor identification and modification, planned exercise/physical activity, and cognitive-behavioural techniques targeted at lifestyle and

angina symptom self-management, relaxation training and/or stress reduction, or enhancement of physical activity. Intervention durations, formats, and processes have varied [74-82]. A range of outcomes have been used to examine the effectiveness of angina SMT, including: angina symptom profile (e.g. frequency, severity, stability) and related sublingual (SL) nitrate use, objective measures of ischemia such as treadmill stress tests, and self-report measures of HRQL and psychological well-being.

This review of the evidence will focus first on two more recent angina SMT models with clear underpinnings in self-efficacy theory: *The Angina Plan* [78,79,82,83] and the *Chronic Angina Self-Management Program* [17,81]. Second, results of meta-analyses [84,85] of the overall effectiveness of angina SMT will be discussed.

5. The angina plan

The Angina Plan, developed by Lewin, Furze et al. [78,79] is the most widely evaluated and disseminated angina SMT program to date; over 20,000 patients have been enrolled [83]. The Angina Plan is recognized in the United Kingdom [86] as a form of home-based cardiac rehabilitation geared toward debunking common misconceptions about angina, promoting relaxation, increasing physical activity and role functioning, and making positive changes in lifestyle (e.g. nutrition). Risk factor identification, and educational materials on CAD, medications, as well as seeking emergency medical assistance (as appropriate) are also key components [78,79]. The program materials are provided in a workbook and relaxation tape which patients are oriented to by a nurse intervener during a structured, individualized interview process [78,79]; this initial session is followed by a 12-week course of telephone-based support to facilitate incremental goal setting and pacing of activities [78,79]. A 2002 RCT of the Angina Plan (n=142), found that at 6 months follow-up, those assigned to the intervention group had significant reductions in angina frequency, anxiety and depression, and SL nitrate usage, as compared to controls who received standard education and counseling by a nurse [79]. Those who received the Angina Plan also demonstrated significant improvements in physical limitation scores, daily walking, and dietary habits [79]. A pragmatic RCT by Zetta et al. (n= 218) [82] found similar results for patients admitted to hospital for acute exacerbation of angina. Angina Plan recipients reported significant improvements in knowledge and cardiac misconceptions, social and leisure activities, perceived general health, and physical limitation. Improvements in cardiac risk factors including body-mass index and exercise were also found [82]. However, no significant improvements in anxiety and depression scores were found based on intention-to-treat analyses; extracardiac depression was proposed as a potential confounding factor diluting the treatment effect [82].

Recently, Furze et al. [83] evaluated (n= 142) a lay, peer-led adaptation of the Angina Plan in response to healthcare resource constraints as well as increasing interest in lay-facilitated SMT interventions. The Lay-facilitated Angina Management Program (LAMP) was delivered by people who had experience with CAD either as patients or caregivers [83]; outcomes were evaluated at 3 and 6 months post intervention. Compared to standard advice from a specialist

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nurse, the LAMP intervention did not significantly reduce the frequency of angina symptoms; it was hypothesized that this may have been a function of effective medication regimens for both groups [83]. Those in the intervention group did report significantly improved depression (6 months), anxiety (3 and 6 months) and HRQL scores (3 and 6 months), compared to controls. Significant improvements in hip-to-waist ratio were also found. The cost utility of the LAMP was assessed in terms of quality-adjusted life years (QALY). A significant difference in average QALY per patient of 0 045 (confidence interval [CI], 0 005-0 085) was found. Based on their cost utility model, Furze et al. [83] estimated the average net benefit of the LAMP intervention (over controls) at £354-360; there was some uncertainty around this estimate however due to a lack of coefficient significance (from zero) [83]. While the LAMP was deemed cost-effective, improvements in angina symptoms per se were not observed. Notably, this finding was in contrast to evaluations of the nurse-facilitated version of the Angina Plan [79,82].

6. The chronic angina self-management program

The CASMP [17,81] is a disease-specific adaptation of the generic Stanford Chronic Disease Self-Management Program (CDSMP). To develop the CASMP, McGillion et al. conducted a qualitative evaluation of the self-management learning needs of individuals living with CSA; perspectives from both patients and clinicians were solicited [19]. Based on this study, adaptations of the CDSMP curriculum were made to address the following angina-specific learning needs: safe exercise planning; relaxation and stress management; symptom monitoring, interpretation, and management techniques; CAD and related medication review; decision making about seeking emergency medical assistance; diet; and, managing emotional responses to angina [17,81]. The self-efficacy enhancing process elements of the original CDSMP were retained [17,81].

The CASMP follows the CDSMP standardized 6-week, community small-group based format (i.e. 2-hour sessions weekly, groups of 8-12 patients), but the program is delivered by nurse facilitators rather than lay leaders. The program is delivered according to a facilitator manual and participants receive a workbook to reinforce educational content. In a 2008 RCT (n=130), the CASMP was found to significantly improve the frequency and stability of angina symptoms compared to usual care at 3 months post-intervention. Significant improvements in self-reported physical functioning, perceived self-efficacy, and general health status were also found [81]. The CASMP did not reduce the financial burden of CSA on participants (estimated from a societal perspective), perhaps due to the short time frame of the study [81].

Concomitant to the RCT [81], qualitative evaluation of the CASMP found positive shifts in the perceived meaning of cardiac pain following self-management training [17]. CSA was initially described by participants as a major negative life change characterized by fear, frustration, limitations and anger [19]. Following the CASMP, chronic angina was interpreted more constructively as a broad, ongoing health problem requiring continual self-management in order to retain desired life goals and optimal levels of functioning [17]. Based on these positive evaluations, plans to implement the CASMP at select cardiac centres in Canada are underway.

7. Overall effectiveness of angina SMT programs: Results of meta-analyses

We first summarized the effectiveness of angina SMT interventions in a 2008 meta-analysis [84]. The results of 7 trials, involving 949 CSA patients in total, were included. In each case, the effects of a SMT intervention were compared to usual medical and/or nursing care as described [74-77,79-81]. We found that those who underwent angina SMT experienced significant reductions in the frequency of angina (nearly 3 less angina episodes per week) as well as SL nitroglycerin use (approximately 4 times less per week) up to 6 months post-intervention [84]. Significant, pooled effects were also found for angina-induced physical limitation and HRQL-related disease perception, but we were uncertain of the stability of these estimates due to broad confidence intervals [84]. At the time, we were unable to generate an estimate of the effect of SMT on psychological well-being due to the heterogeneity of measures used across trials to measure these HRQL dimensions. We signaled caution with respect to the interpretation of our results due to the wide range (low to high) of methodological quality across trials included in this review [84].

New, robust trial data contributed by Zetta et al. [82] and Furze et al. [83] allowed us to update our meta-analysis in 2012 [85]; nine trials including 1282 CSA patients in total were included. Outcome measures were more homogenous with the inclusion of these new data which allowed us to examine the impact of angina SMT on psychological outcomes. Consistent with our 2008 review [84], we found that angina SMT reduced the frequency of angina symptoms and the use of SL nitrates. Self-management training also reduced physical limitation for CSA patients. Our pooled estimates of effect for the impact on SMT for emotional well-being were less certain. We did find a significant improvement in depression scores, but there was considerable statistical heterogeneity for this outcome across trials [85]. Initially, we found no impact on anxiety, but, sensitivity analysis—via removal of 1 trial [83] with the widest confidence interval for this outcome—suggested that anxiety scores [85] are improved up to six months following SMT.

Based on our systematic reviews [84,85], evidence is clear that SMT consistently improves angina with respect to the frequency of symptoms and reduces the need for SL nitrates. The positive effect of SMT on physical limitations imposed by angina also appears stable. What is less certain is the potential for SMT to improve the psychological burden of CSA, particularly anxiety. Noteworthy is the fact that the overall improvements we observed in depression scores were yielded by the Angina Plan [78,79,82,83], suggesting that perhaps individualized SMT programs my yield greater benefits in terms of emotional well-being.

Some key questions about the effectiveness of SMT for CSA management remain. A critical element contributing to the effectiveness of intervention programs to date is the provision of an array of self-management strategies that can be tailored to individual problems, needs and preferences, in the context of living with chronic angina. This much is clear and entirely consistent with the broader chronic disease-self-management literature [42-48], as well as underlying principles of self-efficacy theory [52-54]. What is less clear is the ideal intervention design—or particular elements thereof—that would yield maximum symptom benefits and much needed improvements in HRQL for this heavily burdened population. For example,

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group-based SMT interventions are efficient and have been found to be equally effective as individualized approaches for arresting chronic disease progression and managing symptoms across populations; people with diabetes are one such example [86]. Yet, the available data suggest that this may not be the case for CSA patients when it comes to psychological outcomes; an individualized approach could be more effective.

There is also the question of whether angina SMT programs should be delivered by health professionals or lay peers. Indeed, lay-led SMT models have been demonstrated widely to be effective and cost-saving [42-48,82]. Such models are also idyllic in the sense that they embrace the concept of patients as active self-managers and experts in terms of the chronic illness experience [45]. However, in the case of CSA patients, Furze et al. [82] observed a high refusal rate (46%) in the RCT of their lay-led SMT program.

Other key questions pertain to the overall cost-effectiveness of angina SMT implementation as well as the ability of these programs to reduce the financial burden of CSA. The trial by McGillion et al. [81] showed no impact on cost illness but the follow up period was brief. To date, Furze et al.'s trial is the only study to [82] to examine comprehensively the cost utility of angina SMT. While the cost results of this trial are certainly promising, they pertain to the training and employ of lay leaders only.

8. Summary: Implications for research and practice

Without question, SMT interventions are gaining momentum in the arena of CSA management. Their positive impact on symptoms and aspects of HRQL is unequivocal. Relatively speaking, as a class of interventions, SMT programs have not seen the widespread uptake in cardiology as they have in other fields, such as rheumatology. Historically, this may be explained by the overarching dominance of surgical and interventional strategies as mainstays of effective treatment. But the culture is changing and the need to employ adjunctive secondary prevention approaches, to help offset the burden of CAD, has been recognized worldwide [1, 87-91]. The recent incorporation of angina SMT into national clinical practice guidelines for CAD management in both the UK [87] and Canada [88] speaks to this emerging cultural shift.

In order to more fully integrate angina SMT across health systems, funding support for continued research, development and dissemination of these programs is crucial. Some outstanding issues have major implications for the widespread uptake of angina SMT training. As discussed, there are the critical questions which remain about optimal intervention design (to yield maximal benefits) and cost effectiveness. These questions could perhaps be addressed best via robust, multi-national trials with long-term follow up [85]. There must also be however, a focused effort toward both integrated and end-of-study knowledge translation strategies with the overall goal of mainstreaming angina SMT.

Typically, self-management interventions are developed and tested within academic centres or research institutes, and formally (or informally) linked with a variety of hospital and community-based settings [68]. Dissemination of these programs therefore depends on strong

partnerships between researchers and key stakeholder representatives, such as leaders in regional health authorities. Ideally, these players should be involved at the onset of angina SMT research programs and implementation to maximize the success of integrating these programs into existing and diverse health system infrastructures [68]. The widespread success of the Angina Plan in the UK [78,79,82,83] is an excellent example of the benefits of such an integrated approach.

Policy makers and the general public also require timely notification of future developments in angina SMT research, in accessible language. In the clinical arena, broader uptake of angina SMT could be facilitated by the development of key competencies to adequately prepare health care professionals to educate and consult with their CSA patients about the effectiveness of SMT programs [88]. Akin to clinician preparation for patient counseling, there is also the important question of patient readiness to engage in angina SMT. Patient preparedness for self-management is an emerging field, not yet taken up by CSA researchers. Emerging evidence suggests that one's beliefs and perceptions about a) influential others contributing to his or her overall state of health, and b) his or her own internal locus of control, may be key factors in the pre-contemplation, or intention to engage in self-management practices [92]. Advancements in this area will be important to developing a better understanding of factors that drive one's readiness for angina self-management, and ultimately, who is likely to benefit most from angina SMT training.

9. Conclusion

In summary, SMT interventions have much to offer in terms of offsetting the major, societal impact of angina. As adjuncts to usual care, these relatively low cost-interventions are aligned with current global emphasis on the need for treatment approaches which help CAD patients better manage their long-term health. This chapter has provided an overview of self-management theory, key elements of intervention structure and process, as well as a comprehensive review of the evidence pertaining to the effectiveness of angina SMT programs to date. Support for continued research, knowledge translation and implementation work is critical to the successful integration of angina self-management as an integral part of the routine care of people living with CSA.

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