

ORIGINAL RESEARCH

Impact of intensive training on health professionals' self-efficacy in establishing, running and maintaining a cardiac rehabilitation program

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Received: February 12, 2019

Accepted: February 26, 2019

Online Published: March 27, 2019

DOI: 10.5430/jnep.v9n7p67

URL: <https://doi.org/10.5430/jnep.v9n7p67>

ABSTRACT

We developed an intensive five-day training program for health professionals working in cardiac rehabilitation (CR). The training covers topics related to establishing, running, maintaining and evaluating a CR program. The aim of this study was to assess the impact of the training on health professionals' self-efficacy regarding the effective delivery of CR. From 2014 to 2018, 167 health professionals participated in one of five training programs. Participants completed a 28-item pre- and post-training self-efficacy scale. For a sub-group, self-efficacy was re-assessed 4 months later. Factor analysis was used to identify self-efficacy domains. Paired sample t-tests compared pre- and post-training self-efficacy scores; repeated measures analysis of variance investigated change over the three time points. Variations in self-efficacy across profession, role in CR, and years of CR practice were investigated. Factor analysis identified three domains: Operational aspects of CR; Medical aspects of heart disease; and Psychosocial aspects of CR. Health professionals' self-efficacy increased significantly after training participation, across the three domains and for the total score. Effects were sustained in the 4-month follow-up. Few variations in self-efficacy trajectories by participant characteristics were identified. The study demonstrates that our health professional CR training significantly improves health professionals' confidence in a range of areas related to establishing, running, maintaining and evaluating a CR program, with immediate improvements sustained four months later. The pattern of findings was largely consistent regardless of participants' role and experience in CR. Findings highlight the benefits of this relatively brief intensive program on enhancing the capacity of the CR workforce.

Key Words: Coronary heart disease, Cardiac rehabilitation, Training, Continuing professional development

1. INTRODUCTION

Both in Australia and internationally, cardiac rehabilitation (CR) is recommended for all people after an acute cardiac

event.^[1-6] Attendance at CR has been shown to improve survival and quality of life and reduce hospital readmission and length of stay.^[6-10] CR aims to restore individuals to

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their optimal level of physical, psychological, social and vocational well-being.^[5,6,11]

CR programs differ across the world.^[6,12] In Australia, CR programs are typically centre-based and comprise 6-10 sessions held once or twice per week, involving both education and moderate intensity exercise conducted in groups.^[13] Programs are designed to involve a multi-disciplinary team of professionals^[2,5] and to include nurses, physiotherapists, occupational/physical therapists, exercise physiologists, dietitians, social workers, psychologists, pharmacists, physicians, mental health nurses, and others.^[6] Typically, the programs are facilitated by one or two coordinators supported by a range of specialist health professionals who deliver education sessions and/or facilitate the exercise component of the group program.

It has long been recognised that the delivery of CR programs, particularly for coordinators, is a specialised task that requires a breadth of knowledge and skills across a range of areas.^[2,6,14] For example, CR program coordinators require an understanding of the physiology and pathology of the heart and the causes and comorbidities of heart disease; cardiac investigations, interventions, medications and behavioural approaches to management; occupational, psychological, cognitive and lifestyle impacts of acute events and strategies for supporting recovery in these areas; as well as skills in group facilitation, adult education, program evaluation, and physical and psychosocial screening.^[6,13,15] Additionally, coordinators need the organisational and managerial capacity to ensure that quality indicators related to content and timeliness of program delivery are met^[16,17] in delivering the core components of CR. In Australia, the core components include: ensuring equity and access to services; undertaking assessment and short-term monitoring; planning recovery and longer term maintenance; facilitating lifestyle/behavioural modification and medication adherence; and undertaking evaluation and quality improvement.^[5] Many of these areas are not covered in undergraduate or post-graduate training within any specific profession.

As such, training across these areas is important for health professionals working in this field. Health professional training is designed both to improve knowledge and to build confidence, or self-efficacy, in applying that knowledge in the workplace.^[18-22] Self-efficacy refers to individuals' belief in their capacity to execute behaviours that are necessary to produce specific performance outcomes.^[23] Self-efficacy has been observed as a predictor of professional practice behaviours^[24] and as an outcome of clinical training.^[25] Self-efficacy has been studied in the training of health professionals^[20,22,26-28] and found to improve after training comple-

tion.^[20,22,26-28] Training also needs to support the translation of increased self-efficacy into positive practice change,^[24] which has been found to contribute to improved patient outcomes as a result of professional training.^[18]

We developed an intensive five-day centre-based training program designed to address the required knowledge and skills for health professionals working in CR programs across Australia and have been delivering the training since 1993. The training is delivered by a team of professionals who specialise in cardiology, cardiac surgery, cardiac nursing, physiotherapy, exercise physiology, occupational therapy, psychocardiology, behaviour change, and adult learning. To date, almost 1,200 health professionals have participated in 43 training programs over 26 years.

The aim of this study was to investigate changes in self-efficacy across the areas covered in the training for health professionals who have participated in the training program. Pre and post-training self-efficacy has been measured since 2014.

2. METHODS

The present study involved a pre/post design, with assessment of health professionals' self-efficacy before and after undertaking the training. For a sub-sample of participants, a 4-month follow-up enabled a third assessment of self-efficacy and thus investigation of maintenance of post-training improvements.

2.1 Development of the health professional training

The 5-day health professional training was developed in 1993 by the founding Directors of the Heart Research Centre who were experts in CR in Australia.^[2] The training was delivered several times per year during the initial 12 years, and has been delivered annually since 2005. The training covers a range of areas (as reflected in the self-efficacy items) and has evolved over the years to integrate contemporary topics, new practice guidelines and new research evidence. Early evaluations of the program sought participant feedback on training acceptability and new areas to be included. The training delivered by the ACHH and evaluated here is the most comprehensive program delivered to CR professionals in Australia, and the only Australian course recognised by the International Council of Cardiovascular Prevention and Rehabilitation.^[29]

2.2 Sample, recruitment and procedure for the present study

The sample for the present study comprised health professionals who participated in the training during the five years since 2014 when assessment of self-efficacy was introduced

into the evaluation. In 2014 and 2015 pre and post-training evaluations were undertaken using pen and paper questionnaires before the first session and after the final session of the program. Since 2016 the pre and post-training evaluations have been completed using an online questionnaire emailed to participants prior to and after completion of the training. In two years (2014 and 2015), a 4-month follow-up using an online questionnaire was undertaken to investigate longer-term self-efficacy ratings.

2.3 Measures

The CR Self-Efficacy Scale addresses each of the 28 topic areas covered in the training program and was designed specifically for this training. Each item is assessed on a 5-point Likert scale, ranging from 1 'not at all confident' to 5 'very confident'. Domains comprising groups of items were identified using factor analysis, as described below.

Other data collected at pre-program included participants' age, sex, profession, workplace, role in CR, years working in CR, and employment status.

2.4 Analysis

Continuous variables were assessed for normality and are expressed as means and standard deviations. Exploratory factor analysis was undertaken to identify the main domains of training content assessed by the CR Self-Efficacy Scale. Parallel analysis^[30] with oblimin rotation was conducted using the "psych" package in R version 3.51.^[31] Parallel analysis is considered superior to reliance solely on eigenvalue scores and can minimise over-identification of factors based on sampling error.^[32] Items were retained on the domain on which they had the highest loading, even if the cross-loading on a second domain was within 0.2. This was considered acceptable as the purpose of the factor analysis was to group topic areas rather than to develop a validated scale to be applied in other studies, when restrictions on cross-loading would apply.^[33] Domain and total pre-, post- and 4-month self-efficacy scores were calculated by summing scores across each of the domains and the full item set. Domain and total scores were then standardised by dividing the mean domain/total score by the highest possible score for that domain, then dividing by 100, giving a percentage for each domain.

Change in self-efficacy from pre- to post-training: Paired sample t-tests were used to compare health professionals' pre and post-training self-efficacy ratings across the domains and for the total score. Repeated measures analysis of variance (ANOVA) with post-hoc tukey tests were used to investigate main and interaction effects from pre-training to post-training for three key variables defined a priori as being po-

tential factors that might impact on participants' self-efficacy, namely: profession (nurse, physiotherapist, exercise physiologist, other); role in CR (coordinator, team member, other); and years working in CR (0-2 years, > 2 years). Change in self-efficacy from pre-training to four months: For two of the years (2014 and 2015), repeated measures ANOVA with post-hoc tukey tests were used to investigate main and interaction effects from pre-training to post-training, and for post-training to 4-months for two binary variables: role in CR (coordinator, other); and years working in CR (0-2 years, > 2 years). It was not possible to investigate variations regarding profession due to small sub-sample sizes within some professions and inability to combine professions to create a binary variable.

Apart from the factor analysis, all analyses were conducted using SPSS version 24.^[34] For all analyses the significance level was set at $p < .05$.

3. RESULTS

3.1 Characteristics of the sample

Over the five years since 2014, 177 health professionals participated in the training and, of these, 167 (94%) completed the pre-training questionnaire and formed the baseline sample for the evaluation. Participant characteristics are shown in Table 1.

Participating health professionals were predominantly female and, while the majority (72%) had a nursing qualification, a range of other disciplines was represented. Just over half worked in public hospitals and over a quarter in community health, with fewer in private hospitals and other settings. Over a third were CR program coordinators, and just under half were CR team members, with most of the remainder planning to work in CR in the future. Participants' role in CR varied significantly in terms of their profession ($\chi^2 = 13.48$, $p = .036$). The majority of CR coordinators were nurses (85%), with a small proportion of physiotherapists (8%) and exercise physiologists (2%) being in the coordinator role. Physiotherapists and exercise physiologists were more likely to identify as team members (63% and 83% respectively).

The full sample of 167 participants had worked in CR from less than one up to 14 years, with a mean (SD) of 1.95 (2.57) years. Amongst those currently working as a CR coordinator or team member ($n = 136$), the mean (SD) years in CR was 2.21 (2.67), again with a range of less than one to 14 years.

3.2 Self-efficacy domains identified through factor analysis

Exploratory factor analysis revealed the presence of three factors with eigenvalues exceeding 1, explaining 55% of the

total variance. The three factors were – Domain 1: Operational aspects of cardiac rehabilitation (14 items); Domain 2: Medical aspects of heart disease (9 items); and Domain 3: Psychosocial aspects of cardiac rehabilitation (6 items). The factors explained 24.7%, 16.0% and 14.4% of the variance respectively. The Cronbach Alphas for the three domains were 0.925, 0.890 and 0.865 respectively, all indicating very good internal consistency. Item factor loadings are shown in Table 2. Notably, the item regarding ‘explaining the causes of diabetes to patients’ did not load on any of the three factors: for the purpose of the later analyses, it was included in Domain 2 on the basis of face validity.

Table 1. Characteristics of the health professionals who completed the pre-training questionnaire

Characteristics	n	%
Sex		
Female	148	89
Male	19	11
Professional group		
Nursing	120	72
Physiotherapy	24	14
Exercise Physiology	11	7
Aboriginal health worker	2	1
Dietetics	2	1
Social Work	1	< 1
Physician	1	< 1
Psychology	1	< 1
Practice nurse	1	< 1
Other	3	2
Workplace		
Public hospital	89	53
Community health centre	47	28
Private hospital	17	10
Non-government organisation	9	6
Aboriginal health service	1	< 1
Other	3	2
Role in cardiac rehabilitation		
Member of multidisciplinary team	76	46
CR coordinator	60	36
Planning to work in CR in future	22	13
Other	9	5
Employment status		
Part time	75	45
Full time	68	41
2+ part time positions	22	13
Casual	1	< 1
Unemployed	1	< 1
Year training undertaken		
2014	44	26
2015	39	23
2016	27	16
2017	23	14
2018	34	20

Note. N = 167

3.3 Changes in self-efficacy after participating in the training

Of the 167 participants who completed the pre-training questionnaire, 160 (96%) completed the post-training questionnaire. Pre- and post-training standardised mean scores on

each domain and total self-efficacy scale are shown in Table 3 and Figure 1.

As shown in Table 3, participants’ self-efficacy scores increased significantly after undertaking the training, across the three domains and for the total score. Figure 1 highlights the similarity in self-efficacy scores and trajectories across the three domains.

3.4 Variations in self-efficacy improvements pre- to post-training by participant characteristics

Profession: For the operational domain, there was a significant main effect for profession ($F = 6.58, df = 3.155, p < .001$) and a significant interaction between profession and change over time ($F = 2.80, df = 3.155, p = .042$). Post hoc comparisons revealed that exercise physiologists scored significantly higher than both nurses and ‘others’ at both time points. However, while nurses had the lowest pre-training score, they made more gains over time than the other professions, nonetheless remaining lower than exercise physiologists by post-training. For the medical domain, again there was a main effect for profession ($F = 6.02, df = 3.156, p = .001$), with exercise physiologists and nurses scoring significantly higher than physiotherapists and ‘others’. There was no profession by time interaction effect for the medical domain, suggesting that all professions improved at the same rate. There were no significant main or interaction effects for the psychosocial domain or the total score, again suggesting that all professions improved at a similar rate in overall self-efficacy and for the psychosocial domain.

Role in CR: Regarding participants’ role in CR (coordinator vs. team member vs. other), there were no significant main effects nor were there any significant time by role interaction effects on any domain or on the total score. This suggests that participants across all CR roles scored similarly at both time points and improved at the same rate in all domains of self-efficacy.

Years working in CR: For the operational domain, there was a significant interaction between years working in CR and change over time ($F = 4.50, df = 1.157, p = .035$). While those with more experience in CR (> 2 years) scored higher than those with less CR experience (0-2 years) at pre-training ($M = 64.38, M = 60.92$ respectively), the less experienced made greater gains over time, with no difference between the two groups by post-training ($M = 84.08, M = 83.57$). A similar trend was evidenced for the total self-efficacy score, with the interaction effect approaching significance ($F = 3.50, df = 1.157, p = .063$). There were no significant main or interaction effects for the medical or psychosocial domains, suggesting similar improvement in these areas regardless of CR experience.

Table 2. Factors (domains) and factor loadings for each item

	Factor/Domain			Uniqueness
	Operational	Medical	Psychosocial	
Planning exercise sessions	0.874		-0.301	0.286
Developing a CR program	0.864			0.281
Monitoring patients' exercise	0.774			0.390
Using clinical outcome measures	0.756			0.414
Evaluating a CR program	0.720			0.409
Managing a CR program	0.696			0.487
Using evidence-based screening	0.674			0.424
Strategies to increase attendance	0.673		0.366	0.336
Assessments to identify goals	0.626			0.454
Encouraging physical activity	0.520			0.563
Using behaviour change strategies	0.515		0.410	0.449
Running interactive groups	0.458		0.373	0.514
Using principles of adult education	0.400		0.393	0.578
Assessing health literacy	0.441			0.581
Explaining investigations		0.852		0.282
Explaining interventions		0.843		0.323
Explaining pathology of CHD		0.730		0.386
Explaining causes of CHD		0.718		0.364
Advising patients about medications		0.681		0.521
Explaining rationale of CHD management		0.656		0.367
Providing dietary advice		0.453		0.691
Explaining evidence for CR	0.328	0.369		0.611
Identifying & supporting depression & anxiety			0.857	0.241
Understanding & supporting patients' psychosocial needs			0.819	0.268
Discussing patients' feelings & concerns			0.725	0.347
Providing support to patients who smoke			0.557	0.517
Supporting patients to return to work	0.366		0.390	0.486
Talking to patients about resuming sex		0.315	0.347	0.670
Explaining causes of diabetes to patients				0.792

Table 3. Domain and total self-efficacy scores before and after the training

Domain	Pre-training		Post-training		t	df	p
	Mean	SD	Mean	SD			
Operational domain	60.7	12.46	82.7	9.45	21.60	159	< .001
Medical domain	61.7	12.76	83.7	9.18	22.39	159	< .001
Psychosocial domain	59.4	13.09	80.7	9.87	20.36	159	< .001
Total score	60.8	10.59	82.7	8.11	24.48	159	< .001

Note. N = 160. Statistics = paired sample *t*-tests. Each item rated on 5-point Likert scale from 1 = not at all confident to 5 = very confident. Possible score range = 20-100 for domains/total.

3.5 Maintenance of self-efficacy improvements four months after the training

For the subsample of participants who attended the 2014 and 2015 training programs (n = 83), 54 participants completed the four month follow-up questionnaire, representing a 65%

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response rate. For this sub-group, mean scores for total self-efficacy and each of its three domains increased significantly from pre- to post-training, then remained stable from post- to 4 months, as shown in Table 4 and Figure 2.

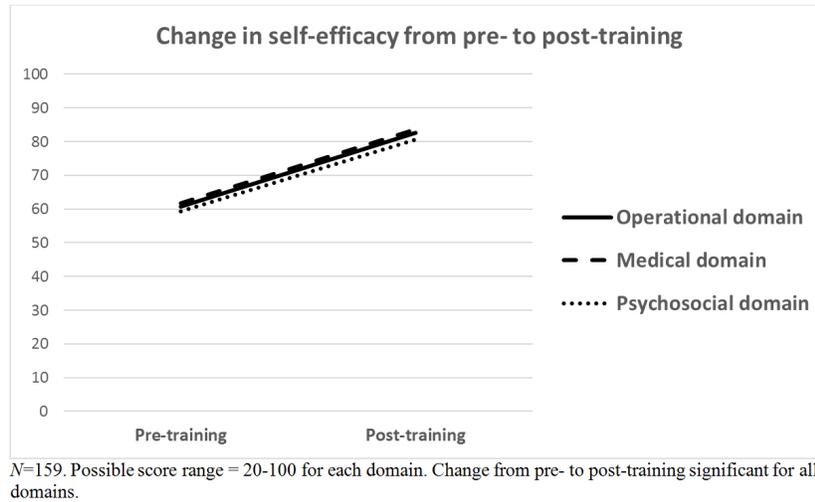


Figure 1. Pre-training and post-training standardised mean scores for each domain

Table 4. Domain and total self-efficacy scores before and after the training

Domain	Pre-training		Post-training		Four months		Comparison	t	df	p
	Mean	SD	Mean	SD	Mean	SD				
Operational	60.9	11.03	83.8	8.33	82.5	9.14	Pre-Post	6.87	53	< .001
							Post-4mth			
Medical	63.2	13.18	84.7	9.79	82.6	10.08	Pre-Post	5.20	53	< .001
							Post-4mth			
Psychosocial	60.2	12.25	81.0	9.32	78.6	9.50	Pre-Post	5.36	53	< .001
							Post-4mth			
Total	61.5	10.64	83.8	8.05	81.7	8.39	Pre-Post	14.29	53	< .001
							Post-4mth			

Note. N = 54. Statistics = paired sample t-tests. Each item rated on 5-point Likert scale from 1 = not at all confident to 5 = very confident. Possible score range = 20-100 for domains/total.

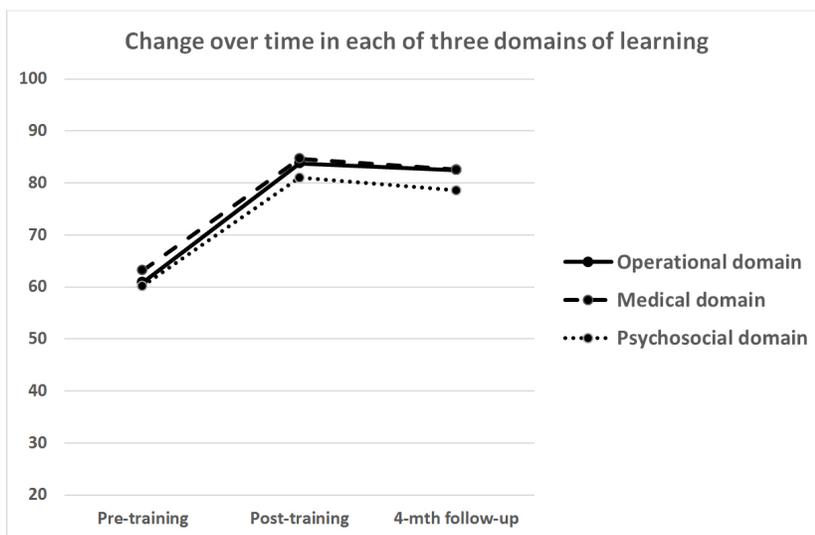


Figure 2. Pre-training, post-training and 4 month follow-up standardised mean scores for each domain

3.6 Variations in 4-month self-efficacy trajectories by participant characteristics

Role in CR: Regarding participants' role in CR (coordinator vs. other), there was no main effect for either the operational domain ($F = 0.259$, $df = 1.48$, $p = .613$), the medical domain ($F = 0.15$, $df = 31.48$, $p = .700$) or the psychosocial domain ($F = 0.01$, $df = 1.48$, $p = .991$), nor were there any significant time by role interactions.

Years working in CR: Regarding years working in CR (0-2 years vs. > 2 years), there was a main effect for the operational domain ($F = 4.64$, $df = 1.51$, $p = .036$), with those with more CR experience scoring higher than those with less experience. The difference for the medical domain approached significance ($F = 3.28$, $df = 1.51$, $p = .076$), while there was no main effect for the psychosocial domain ($F = 1.10$, $df = 1.51$, $p = .300$). There was no significant time by years in CR interactions.

4. DISCUSSION AND CONCLUSION

The present findings demonstrate that health professionals achieved significant improvements in self-efficacy after undertaking an intensive CR training program. These improvements were evident for each of the three domains, relating specifically to the operational aspects of establishing, running and maintaining a CR program, the medical aspects of heart disease, and the psychosocial aspects of CR. These findings are testament to the benefits of the training in terms of increased confidence in a range of areas required for the successful delivery of effective CR.^[5, 13, 15-17] Importantly, the training addresses the key areas of establishing, delivering, maintaining and evaluating a CR program, while attending to issues such as patient health literacy, effective adult education approaches, and effective group interaction.

The improvements in self-efficacy evidenced immediately post-training were also maintained four months later. This is particularly encouraging, as immediate gains in confidence can be challenged once training participants return to the workplace and encounter barriers to implementing the knowledge and skills they have gained.^[21] These challenges can include both personal and workplace-related barriers to practice change.^[21] Whilst only a small sub-sample, participants in the present study maintained their gains in self-efficacy across all three domains. Future studies could investigate actual practice changes implemented in the months after the training, and explore the facilitators of and barriers to practice change.

Importantly, improvements in self efficacy were evidenced largely across the entire participant group, with few differences based on participant characteristics. Indeed, for the

total self-efficacy score, there were no significant differences in improvements over time in terms of profession, role in CR, or years of CR experience. This pattern of universal benefit was seen also for the psychosocial domain. These findings highlight the benefits of the training for health professionals across a range of disciplines, years of CR experience and roles within the CR team.

There were some exceptions to the pattern of universal benefit, particularly in relation to the operational domain. In this area, exercise physiologists came into the training with greater confidence than other professions, and maintained this higher self-efficacy over time. Notably, the operational domain includes items related specifically to planning exercise sessions, monitoring patients' exercise and using clinical outcome measures, which could be considered the speciality of exercise physiologists. However, even when items related to exercise physiology specialist areas were removed from the operational domain, exercise physiologists still demonstrated higher self-efficacy than other professions (data not shown). It is possible that the topics covered in the training program evaluated here are most closely aligned to the undergraduate and postgraduate training in exercise physiology than in other disciplines such as nursing and physiotherapy.

Interestingly, those with fewer years of experience made greater gains in the operational domain than their more experienced counterparts immediately after the training, despite coming into the program with less confidence in establishing, running and maintaining a CR program. These findings suggest that health professionals with less prior experience are able to benefit equally if not more so than those with more direct CR experience and contact. Importantly though, this pattern was not evidenced in the sub-group analysis.

The role of CR coordinators and team members is a specialised one that requires a breadth of knowledge and skills across a range of diverse areas.^[14] That this breadth of training is not covered in undergraduate or post-graduate training within any specific profession in Australia underscores the importance of the ACHH training. In this intensive format, it is possible to offer the range of content covered in longer post-graduate programs such as the MSc in Preventive Cardiology at Imperial College London,^[35] although not in the same depth.

Some limitations of the study should be noted. First, the study is based on self-report which can be unreliable and prone to response bias. Second, and related to this, we did not assess actual practice changes, which could be the focus of a future more intensive evaluation. Importantly though there is evidence that self-efficacy is a good indicator of work practice.^[24] Third, our 4-month follow-up, while pro-

ducing encouraging results, achieved only a 65% response rate. While typical in follow-ups of this kind, the response rate cautions that findings cannot be considered representative of the entire group. Moreover, the study would be strengthened by the inclusion of a longer follow-up assessment, ideally at one-year post-training, to assess maintenance of gains achieved. Others have demonstrated sustained self-efficacy improvements 18 months after health professional

training.^[22] Despite these limitations, our findings provide sound evidence of the benefits of the training in terms of improved self-reported confidence regarding the effective delivery of CR.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest statement.

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