TITLE PAGE

Title

Does delivery of a training program for healthcare professionals increase access to pulmonary rehabilitation and improve outcomes for people with chronic lung disease in rural and remote Australia?

Running Title
Improving access to pulmonary rehabilitation

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KEY QUESTION SUMMARY

1. What is known about the topic?

Pulmonary rehabilitation (PR) including exercise training, education and psychosocial support, is an effective and well-evidenced management strategy for people with COPD which improves exercise capacity and quality of life (QOL), and reduces hospital admissions and length of stay. Despite the fact that participation in PR is seen as an essential component in the management of COPD, access remains limited, particularly in rural and remote settings. Difficulties with establishing and maintaining PR have been attributed to lack of physical and financial resources and/or adequately trained and skilled staff. There have been no published reports evaluating the impact of training programs for healthcare professionals in the provision of PR.

2. What does this paper add?

This paper is the first to demonstrate that the delivery of a well-supported, interactive healthcare professional training program may facilitate the establishment of PR in rural and remote settings. Following delivery of the Breathe Easy Walk Easy (BEWE) program PR which broadly met the Australian recommendations for practice in terms of program content and structure, were established. Factors influencing the establishment of PR were related to the characteristics of the healthcare setting, such as remoteness, and to issues around staff retention. The settings where PR was not established were in less well staffed, community based and more remote settings. People with COPD who participated in these programs showed significant improvements in exercise capacity and quality of life.

3. What are the implications for practitioners?

One of the factors limiting the delivery of PR may be a lack of appropriately trained and skilled staff. Healthcare professionals' participation in locally provided education and training programs targeted at developing skills for providing pulmonary rehabilitation may enable effective PR programs to be established and maintained in rural and remote settings.

ABSTRACT

Objective: Access to pulmonary rehabilitation (PR), an effective management strategy for people with chronic respiratory disease, is often limited particularly in rural/remote settings. Difficulties with establishment and maintenance of PR have been reported. Reasons may include a lack of adequately trained staff. There have been no published reports evaluating the impact of training programs on PR provision. The aim of this project was to evaluate the impact of an interactive training program for healthcare professionals (the Breathe Easy, Walk Easy Program,) on the delivery of PR in rural/remote settings.

Methods: The study was a quasi-experimental before-after design. Data were collected regarding the provision of PR services before and after delivery of the BEWE program and patient outcomes before and after PR.

Results: The BEWE program was delivered in one rural and one remote region. Neither region had active PR prior to BEWE program delivery. At 12 month follow-up, three locally-run PR programs had been established with structure and content broadly meeting Australian practice recommendations. PR program audit and patient outcomes indicated that the programs were being delivered effectively.

Conclusions: The BEWE program enabled the successful establishment of PR programs and improved COPD patient outcomes in rural and remote healthcare regions.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD), a leading cause of death and disability worldwide, imposes a high cost on individuals and healthcare systems.[1] Pulmonary rehabilitation (PR) including exercise training, education and psychosocial support, is an effective and well-evidenced management strategy for people with COPD[2,3] resulting in improved exercise capacity, reduced symptoms, reduced anxiety and depression, improved quality of life (QOL) and reduced healthcare costs through decreased hospital admissions and length of stay.[4-6]

Despite the evidence-based importance of PR as a management strategy for people with COPD, access for those who could benefit remains limited.[7,8] This is particularly the case for rural and remote regions where the proportion of the population living with chronic diseases, including COPD, is higher than major cities[9,10] and where healthcare service delivery is often constrained.[10] Individual patient issues, including lack of transport, lack of perceived benefit, impact of exacerbations and poor social support, have been most commonly investigated as reasons for poor participation in pulmonary rehabilitation.[7,11] However other factors such as lack of referrals from healthcare professionals and/or lack of pulmonary rehabilitation programs are likely to also be significant contributors to low participation in PR and have not been specifically investigated. Poor PR referral rates from hospital medical officers, general practitioners and specialist physicians have been documented.[12-17] Reasons for this may include limited knowledge of PR, a perception of lack of benefit of PR, workload/time constraints or lack of referral due to limited availability of PR.[7,8,18,19]

Difficulties with establishing and maintaining PR have been reported and reasons may include physical and financial resource constraints and/or a lack of adequately trained/skilled staff.[8,20,21] Shortages of healthcare professionals in rural and remote regions are common[22-24]

and access to continuing professional development may be limited[23,25-28] potentially restricting the number of staff with appropriate knowledge, training and skills. The combination of these factors may impact on the delivery of healthcare services, including PR. The influence of healthcare professional training on the provision of PR has not been investigated.

Educational training packages/programs to upskill staff can result in increases in individual healthcare professional knowledge, confidence and skill[29,30] but whether these changes translate into an improvement in the delivery of a service such as PR is unknown. There are studies examining implementation and training relating to general COPD guidelines for management[17, 29, 31-34] however there are none which specifically examine the impact of a health practitioner training program on the provision of PR. The aim of this project was to evaluate the impact of a training program for healthcare professionals (the Breathe Easy, Walk Easy program) on the delivery of pulmonary rehabilitation in rural and remote Australia.

METHODS

Study Design

The study was a quasi-experimental before and after design. Ethics approval was granted for the study from Sydney South West, Greater Southern (GSAHS) and Central Australian Human Research Ethics Committees.

Participating sites and site informants

The selected participating sites were those where local healthcare managers had contacted Lung Foundation Australia (LFA) expressing an interest in establishing pulmonary

rehabilitation programs. Factual information about the provision of PR was obtained from the health service managers.

Intervention

The intervention, the Breathe Easy Walk Easy (BEWE) program, was delivered as an interactive educational program consisting of an initial training workshop, a follow up visit at three months, a review/update workshop at 12 months, online and hard-copy resources, community awareness-raising materials and ongoing support.[34] Content of the BEWE program was based on Australian recommendations for practice contained in the Pulmonary Rehabilitation Toolkit.[35]

Outcomes and data collection process

Provision of pulmonary rehabilitation

Data regarding the provision of PR for each site were collected before and 12 months after delivery of the BEWE program via telephone and face-to-face interviews. All interviews were recorded and transcribed verbatim and used to supplement the written notes taken during the interviews.

Before the delivery of the BEWE program, information was collected about the geographical and socio-demographic characteristics of each potential site for PR within the region and provision of PR. At 12 month follow-up the following information regarding PR was collected for each site: current provision, process of establishment, structure and referrals, patient assessment and exercise prescription/training.

Patient outcomes

If PR was established at a site after the BEWE program, data were collected from each patient before and at the completion of PR: exercise capacity measured by the distance walked in the six-minute walk test (6MWT) and quality of life (QoL) measured by the St George's Respiratory Questionnaire (SGRQ). These data were collected during the 12 months following the initial BEWE workshop and were provided by health professionals at each site.

Data Analysis:

All data relating to the provision of services for people with chronic lung disease were analysed and are presented descriptively. Interview and written responses were examined and are presented descriptively under relevant headings. Patient data for 6MWT and SGRQ before and after PR were analysed and compared using paired t-tests.

RESULTS

Description of participating regions

One region was rural (New South Wales) and one remote (Northern Territory) and, in both regions, chronic lung disease and a lack of PR had been identified as important local healthcare issues.

Rural region

Health professionals based in five separate sites within the same Local Health District (LHD) participated in the initial BEWE workshop. Data were collected from two of these sites within this LHD: the central workshop location site (Rural 1) and another local site (Rural 2). Both sites were classified as public hospitals. The central site (Rural 1) had an urban population of 25 000 and a regional population of 75 000. An estimated 9% of the population

were Indigenous Australians. The other site (Rural 2) was located in a smaller town within the same LHD with a population of 9000, largely rural and non-indigenous. The data relating to provision of PR were provided by the coordinator of Allied Health and Chronic Care and the Respiratory Nurse, Community Care (Rural 1) and the Nurse Manager/Program Integration Coordinator (Rural 2).

Remote region

In the remote region, healthcare professionals based at eight separate sites participated in the initial BEWE workshop. The sites were not formally linked or organised at an administrative level. Healthcare delivery data were collected from five sites. Data was provided by the respiratory clinical nurse coordinator and the senior respiratory physiotherapist (Remote 1), clinical managers (Remote 2), community physiotherapists (Remote 3, 4) and community nurses (Remote 5)

Remote 1 was a public hospital servicing a town population of 27 000 and a regional population of 50 000. An estimated 30% of the town and 70% of the regional population were Aboriginal Australians. Remote 2 and 3 were community health services based in the same location as Remote 1. Remote 2 delivered services to people located within 100 km of the town centre and Remote 3 was a community health team delivering services to people over 100 km distant from the town centre.

Remote 4 was a healthcare service based entirely within a remote Indigenous community (250km from the town centre). The service population was 600 and also included five outstations with variable populations. Remote 5 was an Aboriginal Corporation Community Health Service with 11 clinics and one aged care facility. The service population was variable, entirely Indigenous and spread over very remote lands.

Pulmonary rehabilitation

Provision of Pulmonary rehabilitation pre-BEWE program

Pulmonary rehabilitation was not being delivered in any of the included sites before the BEWE program. Description of the provision of PR in Rural 1, 2 and Remote 1-5 before the BEWE program is provided in Table 1

TABLE 1

Provision of pulmonary rehabilitation post-BEWE program

At 12 month follow-up, locally-run PR programs had been established at Rural 1, 2 and Remote 1. At least one group of patients had completed PR rehabilitation at each site. A maintenance PR program had also been established by Remote 2 in conjunction with Remote 1.

Establishment of pulmonary rehabilitation

Rural region

At the time of 12 month follow-up PR had been established Rural 1 and Rural 2. The establishment of PR was also planned in another four sites within the LHD. Two of the new sites which had progressed towards establishment of PR had healthcare professional representation at the initial BEWE workshop. The other two sites had become involved via informal LHD communication following the BEWE workshop.

At Rural 1, PR was coordinated by the community-based respiratory nurse and exercise sessions were staffed by rotating hospital physiotherapists. The physiotherapists had not attended the initial BEWE workshop.

Rural 1 had run three PR programs at 12 month follow-up. These programs had commenced approximately three months after the initial BEWE workshop. At the time of 12 month follow-up, 12 patients had completed PR.

Pulmonary rehabilitation at Rural 2 was coordinated by the health service nurse manager and the exercise sessions were staffed by hospital physiotherapists. The physiotherapists had not participated in the initial BEWE workshop. Rural 2 had run two PR programs at 12 month follow-up. The programs had commenced approximately nine months after the initial BEWE workshop and at the time of follow-up nine patients had completed PR.

Remote region

At the time of 12 month review, PR had been established at one site in the remote region (Remote 1). None of the other services from which data were initially collected, or who had health professional representatives at the initial BEWE workshop, had established or were planning to establish a PR program.

The program at Remote 1 was coordinated by a hospital-based physiotherapist and sessions were staffed by the physiotherapist and a physiotherapy assistant/allied health assistant or Aboriginal health worker. The coordinating physiotherapist had attended the initial BEWE workshop. The physiotherapy department at the site had decided to divert funds from a related project towards supporting time for implementation of PR. The department recognised the importance of sustainability and, due to high staff turnover, the need to up-skill multiple

staff members to ensure ongoing program viability. Planning was therefore underway for the incorporation of PR into the caseload of the usual physiotherapy departmental rotations.

At 12 month follow-up, Remote 1 had run two PR programs, the first commencing approximately six months after the initial BEWE workshop with 12 patients having completed PR. Two Aboriginal people had completed PR, one in each group.

At 12 month follow-up, Remote 2 was providing a maintenance program for those patients who had completed a program at Remote 1. This program was delivered by the community physiotherapist who had attended the initial BEWE workshop and who worked closely with the coordinating physiotherapist at Remote 1. The program was offered once a week and consisted of general patient support as well as simple individually prescribed exercise.

Remote 3 and 4 provided services to remote communities via visiting health professionals and, as such, were unlikely to be suitable sites for PR requiring availability of an appropriately trained health professional 2-3 times per week. At 12 months, the participating healthcare professionals from Remote 3 and 4 had maintained links with the program at Remote 1. The healthcare professionals in Remote 3 managed patients who had attended PR at Remote 1, or who were identified as eligible for PR when inpatients at Remote 1 and who were discharged home to remote communities. It was planned that the prescribed home exercise programs for such patients would be monitored by visiting healthcare professionals. At 12 month follow-up, this model had not been implemented or evaluated for effectiveness.

Remote 4 was a healthcare clinic based in a remote community and the two health professionals who attended the BEWE workshop were the managers and sole staff providing a wide range of medical services to the local community. While these health professionals indicated interest in providing an exercise program for people with chronic lung disease, the

workload and location presented major challenges. At 12 month follow-up, the plan to establish PR at this site had not been progressed.

No information was able to be gained from Remote 5 at 12 month follow-up due to staffing changes and inability to contact the participating healthcare professionals. Pulmonary rehabilitation had not been established in this service.

Pulmonary rehabilitation structure and referrals

Details of PR structure, content and referrals for Rural 1, 2 and Remote 1 are presented in Table 2.

Patient assessment

Details of pre and post-PR patient assessment processes for Rural 1, 2 and Remote 1 are presented in Table 2.

TABLE 2

Exercise prescription and training

For Rural 1, 2 and Remote 1, the exercise training component was reported to be based on the recommendations contained in the Pulmonary Rehabilitation Toolkit (35) with exercise prescription performed on an individual basis, including 30 to 40 minutes (exclusive of rests) of both interval and continuous exercise. Details of exercise training mode and intensity are presented in Table 3.

TABLE 3

Patient outcomes

Thirty-three patients completed PR across Rural 1, 2 and Remote 1 during the 12 months following the BEWE workshops. Available data for exercise capacity (n=22) and QOL (n=10) before and after PR were pooled for all participating sites that established PR (Table 4).

TABLE 4

DISCUSSION

This study is the first to document a change in the availability of pulmonary rehabilitation, following the delivery of a training program for healthcare professionals. Prior to delivery of the BEWE program none of the included sites provided PR. At twelve month follow-up, PR was established at three sites with an additional site providing a community-based maintenance program. Initial patient outcomes provide preliminary evidence for the effectiveness of the PR programs established during this study.

Other important study findings were that nearly 12 months was required for establishment of PR and that those sites based in remote community settings and/or with variable/sporadic health professional staffing had not progressed with establishing PR. The health professionals coordinating PR at the newly established sites had all attended the initial BEWE workshop and had remained in their original positions at 12-month follow-up.

The absence of locally available PR programs may limit access for those patients who could benefit.[7,21] In a survey by Lung Foundation Australia one in two PR programs surveyed indicated that keeping PR running was challenging.[8] This is supported by the findings of the

current study that none of the participating sites had active PR at the time of study commencement and that PR had been provided in the past at two sites but had ceased and not been restarted. There is minimal published evidence as to what underlies the limitation in provision and sustainability of PR. Resource constraints are likely to be involved however it is also possible that a shortage of suitability trained, knowledgeable and skilled staff may also be a major contributing factor.[8,21,34] This is supported by the current study with all sites indicating that a lack of trained staff was a reason for the unavailability of locally delivered PR. In addition, the establishment of PR following the BEWE program occurred in the absence of any increases in material resources or significant external funding for the sites involved.

The BEWE program aimed to upskill local healthcare professionals via increasing knowledge, confidence and skills in providing care for people with COPD.[34] Published research on the impact of training programs for health professional in the management of people with COPD has generally focussed on individual participant outcomes such as confidence, knowledge and/or skills.[29,31,36,37] However the impact of health professional training programs on the actual healthcare services being delivered has not been reported. One strength of the current study was that change in provision of PR following delivery of the training program was specifically measured.

In combination with in an increase in specific training of local healthcare professionals and support from the healthcare organisation, staff retention and the format of the training program were also likely to have been factors contributing to the successful establishment of PR. There was strong local organisational support for improving the management of people with chronic lung disease at all sites and ongoing participation from all stakeholders including both managers and clinicians. This was further enhanced through stakeholder

consultation and establishment of steering committees prior to the delivery of the BEWE program.

All healthcare professionals who were instrumental in establishing PR had attended the initial BEWE workshop and had remained in their positions for the subsequent 12 months. The retention and commitment of these healthcare professionals were likely to have been important factors in establishing PR programs. It is doubtful whether the programs would have been successfully established if those initial participants had left to take up positions elsewhere since their knowledge and skills may not have been transferred and therefore lost from the site.

Patient outcomes indicated that PR at the established sites was being delivered effectively. The mean improvement in 6MWD exceeded the minimal important difference of between 30-40m[38] and the mean improvement in the SGRQ Total Score also exceeded the minimal important difference of -4 points[39]. The structure and content of the programs broadly met recommendations for components (including exercise training, and patient education), patient assessment, program length, session frequency and exercise duration[35]. Informants indicated that exercise prescription and training were performed according to the recommendations contained in the Pulmonary Rehabilitation Toolkit[35] however when further details were obtained, it appeared that type/mode, intensity and progression of exercise training were not being delivered according to recommendations. This requires further investigation and would indicate that further training and support may need to be provided for this area of practice.

The BEWE program was specifically designed for rural and remote settings and was developed as an interactive strategy including didactic small group teaching, case based scenarios, practical skills sessions, directed individual problem solving and the provision of online hard copy resources. Interactive, multifaceted educational strategies are more effective

in terms of changing practice than more traditional methods such as lectures and conferences.[40,41] The BEWE program materials and delivery emphasised a straightforward message of evidence-based practice based on the Pulmonary Rehabilitation Toolkit.[35] The provision of support to participants in the period following the program was also likely to have been important in assisting healthcare professionals to establish pulmonary rehabilitation.

Sites where PR was not established following initial participation in the BEWE program were often in more remote and less well staffed settings. Often in these cases physical space and resource limitations and lack of regular health professional staffing were issues which impacted on the ability of these sites to establish PR. Further investigation as to the support needed by sites with such characteristics is required.

One limitation of the study was that an economic analysis was not undertaken for the BEWE program. However the delivery of the BEWE program was relatively low cost: approximately $AU3000 to deliver in a rural/remote setting. This would easily be offset by the significant burden COPD places on rural and remote local health care services with the average cost for each Australian hospital admission for a patient with COPD being $AU7472[42] and the provision of PR in an urban setting estimated at approximately $AU365 per patient.[6] The BEWE program resulted in the establishment of local PR programs without additional input of resources or health service expenditure. The significant improvement in patient outcomes of exercise capacity and quality of life achieved by patients in the local PR program demonstrates that the BEWE program supported the establishment of effective PR programs and a flow-on effect to reduced health care utilisation such as hospitalisations, would be expected. Future research should ensure that formal analyses of cost-effectiveness are performed.

CONCLUSION

To our knowledge, this is the first study to specifically examine the impact of a training program for health professionals on the delivery of pulmonary rehabilitation. This study has demonstrated that following the delivery of the BEWE program, Pulmonary rehabilitation was established in rural and remote regions and these programs resulted in improved outcomes for patients with chronic lung disease.

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TABLES

Table 1. Pulmonary rehabilitation (PR) for people with chronic lung disease in the Rural and Remote sites before the delivery of the Breathe Easy Walk Easy program.

Site	Current PR	Past PR	Description of past PR	Reasons for no PR	Closest PR	Is other PR accessed?	Why other PR not accessed
Rural 1	No	Yes	PR ran for several years, 3 blocks per year. Ceased >3 years ago	No staff/not enough staff trained in PR	190km distant	Not regularly	Distance, transport
Rural 2	No	No	N/A	No staff/not enough staff trained in PR	58km distant	Not regularly	Distance, transport, lack of referral
Remote 1	No	Yes	Sporadic PR in the past. Last program >5 years ago	No staff/not enough staff trained in PR. Inadequate financial resources. Lack of health service support.	None	N/A	N/A
Remote 2	No	No	N/A	No staff/not enough staff trained in PR. Inadequate financial resources. Environmental constraints. Patients unable to attend regularly.	No	N/A	N/A
Remote 3	No	No	N/A	No staff/not enough staff trained in PR. Environmental constraints. Patients not interested.	No	N/A	N/A
Remote 4	No	No	N/A	No staff/not enough staff trained in PR. Inadequate financial resources.	No	N/A	N/A
Remote 5	No	No	N/A	Unknown	No	N/A	N/A

Table 2: Pulmonary rehabilitation (PR) structure, content, referrals and pre and post-PR program patient assessment procedure for Rural sites 1 and 2 and Remote site 1.

Site	Components	Duration and structure	Session frequency	Referrals*	Pre-PR patient	Post- PR assessment
Rural 1	Exercise training. Group education. Individual self-management.	12 week block program**	Supervised Exercise x2/week Multi-professional group education x1/week	Hospital inpatients. Respiratory clinic. Local medical practitioners.	Patient history Spirometry 6MWT x 2 SGRQ HAD	6MWT x 1
Rural 2	Exercise training. Group education. Individual self-management.	8 week block program	Supervised Exercise x1/week Multi-professional group education x1/week	Local medical practitioners. Hospital inpatients.	Patient history Spirometry 6MWT x 1 SGRQ	6MWT x 1 SGRQ
Remote 1	Exercise training. Group education. Individual self-management.	8 week block program***	Supervised Exercise x2/week Multi-professional group education x1/week	Hospital inpatients. Respiratory clinic. Local medical practitioners.	Patient history Spirometry 6MWT x 2 SGRQ Nutritional status (BMI)	6MWT x 2 SGRQ Nutritional status (BMI)

6MWT = six minute walk test, SGRQ = St George's Respiratory Questionnaire, HAD = Hospital Anxiety and Depression Score, BMI = Body Mass Index.
* Ordered by number of referrals
** The 12 week block program at this site was followed by 4 weeks of once weekly exercise sessions.
** This program was lengthened to 12 week if patients could not attend all sessions

Table 3: Pulmonary rehabilitation exercise prescription and training procedures reported by Rural site 1, Rural site 2 and Remote site 1.

Site	Mode	Intensity	Comments
Rural 1	Walking (treadmill) Stationery cycle Upper limb endurance Upper and lower limb strength exercises	Walking component: 80% 6MWT average speed Other components: no basis	When further details of this program were provided it was indicated that patients were actually performing an exercise circuit with 2 minute cycles on various stations with intensity not formally calculated
Rural 2	General warm up 20 minute walk (ground) General flexibility and balance exercises	Walking component: 80% 6MWT average speed Other components: no basis	The 20 minute walk distance was reported to be a final goal rather than a starting prescription of intensity.
Remote 1	20 minute walk (ground) Stationery cycle Upper limb endurance Upper and lower limb strength exercises	Walking component: 80% 6MWT average speed Cycling component: symptom (Modified Borg Dyspnoea scale)	Upper and lower limb endurance and strength training was regularly incorporated into a circuit class of seven stations at this site

6MWT = six minute walk test.

TABLE 4: Patient outcomes following pulmonary rehabilitation for the Six Minute Walk Test (6MWT, n=22) and St George's Respiratory Questionnaire* (SGRQ, n=10)

Outcome	**Before PR Mean (SD)**	**After PR Mean (SD)**	**Change Mean (SD)**	**95% CI**	***p***
6MWT (metres)	332 (121)	381 (109)	48 (70)	18 to 79	0.04
SGRQ Total	50 (14)	44 (15)	-6 (6)	-11 to 2-	0.01
SGRQ Symptoms	60 (19)	54 (23)	-10 (21)	-25 to 5	0.15
SGRQ Impact	35 (15)	28 (13)	-6 (6)	-11 to -2	0.01
SGRQ Activity	69 (21)	66 (20)	3 (10)	-10 to 4	0.32

*An improvement in SGRQ is indicated by a lower score