Original Article

Effectiveness of a community health worker (CHW) training in monitoring and care of patients with chronic obstructive pulmonary disease (COPD) in rural Gujarat, India

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Abstract

Context: Chronic obstructive pulmonary disease (COPD) is the second leading contributor to the disease burden of India. The current COPD burden cannot be managed effectively just through a physician-based approach. In a primary care setting, community health workers (CHWs) can play an effective role in making COPD care accessible and effective. **Aim:** Findings of an assessment of a training program for CHWs on COPD have been reported here. Methods: 90 CHWs working as a part of a noncommunicable disease prevention and care program in a rural primary care setting were exposed to a series of five training sessions. The sessions were designed and administered jointly by a team of public health experts and physiotherapists in the year 2017–18. Topics covered were basic clinical aspects of COPD, monitoring a patient with COPD, and basic aspects of pulmonary rehabilitation. The assessment comprised 12 MCQs and short questions, 7 video exercises, 2 case vignettes, and 5 skill assessments through objectively structured clinical examination (OSCE). **Statistical Analysis:** Mean percentage scores were calculated for each domain of assessment to make it comparable. **Results:** 70 CHWs with a mean age of 42.2 years completed all the training and underwent the assessment. Mean percentage score (SD) for knowledge was 62% (16.3). In OSCE assessment, scores were best in sputum clearance technique demonstration (92.1%) and the least in dyspnea relieving positions (59.2%). The CHWs had difficulties in identifying signs of respiratory distress (score - 55.1%). No statistically significant association was observed between performance scores and their sociodemographic profile. **Conclusion:** The results were encouraging and the program may be pilot tested in a government setting particularly using the health and wellness centers (HWC) platform.

Keywords: Chronic obstructive, community health workers, learning, primary healthcare, pulmonary disease

Introduction

Noncommunicable diseases (NCDs) contribute to 61.2% of deaths and 55.4% of Disability Adjusted Life Years (DALYs) lost in India.[1] As per the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2016, COPD is the second leading

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cause of disease burden in India after ischemic heart diseases, contributing to 8.7% and 4.8% of the total deaths and DALYs, respectively. There are an estimated 55·3 million COPD cases in India with a crude prevalence of 4.2%.[2]

COPD can be managed effectively through a multidimensional approach involving pharmacotherapy, exercise therapy, diet counseling, and psychosocial support. Such an approach leads to an improvement in dyspnea, exercise capacity, and quality of life.[3,4] Although guidelines for the management of COPD are available for more than a decade,[5] a recent study indicated that the practice pattern is significantly different among physicians.[6] In hospital settings, a nurse-led model of COPD management has been proposed.[7] However, the evidence on the effectiveness of such models is not promising.[8] In a resource-constrained setting like India, the availability of chest physicians and other health professionals is not adequate to meet the high burden of the disease. To address this burden, there is a strong need to integrate COPD care in the existing primary healthcare system through a task-sharing approach.[9] To strengthen the general practitioners in managing COPD and to standardize the management pathways, a capacity enhancing model has been designed in India which is a welcome step.[10] However, simultaneously other members of the health workforce also need to be empowered to deliver COPD prevention and care services in an integrated fashion. Community health workers (CHWs) supported by mid-level health workers and primary care physicians can form an appropriate care delivery system to manage COPD in the community. Such a model has been proposed in Nepal which focuses mainly on the integration of health system components.[11]

Bang successfully demonstrated the utility of CHWs in home-based newborn care and the model was replicated in other parts of India as well as in other developing economies.[12] Based on the learnings from that model, CHWs (known as Accredited Social Health Activist [ASHA]) have become a backbone of the Indian primary healthcare system. Government of India through the comprehensive primary healthcare (CPHC) initiative aims to provide NCD prevention and care services through the network of health and wellness centers (HWCs) across the country where ASHA workers have an important role to play.[13] Under this initiative, trained ASHA workers can form an important part of the service delivery framework for COPD prevention and care. SPARSH (Shree Krishna Hospital Program for Advancement of Rural and Social Health) is an initiative of Charutar Arogya Mandal to create a rural integrated model of NCD prevention and care. The initiative is implemented through a linkage between CHWs known as village health workers (VHWs), mobile health teams (MHTs), extension centers, and tertiary care teaching hospital. SPARSH is implemented in 150 villages across three districts of Gujarat located in western India. A training program was implemented under SPARSH to empower its CHWs in providing COPD prevention and care services at the community level. It was evaluated through a competency assessment focusing on cognitive and psychomotor domains of the CHWs. This paper reports the findings of the assessment.

Methods

It was an educational intervention without a control group. Since the CHWs had never received training in COPD in the past, baseline assessment of their knowledge and skills on COPD was not relevant. In the year 2017–2018, 90 CHWs of SPARSH were invited for the training through a series of five sessions conducted at monthly intervals. The training program was designed and delivered by a team of public health professionals and physiotherapists. The sessions were conducted in vernacular language (*Gujarati* or *Hindi*) through PowerPoint presentations, demonstrations, hands-on practice sessions, and screening of videos.

The topics covered were basic clinical aspects of COPD (risk factors, clinical features, diagnosis, and treatment), monitoring a patient with COPD and basic aspects of pulmonary rehabilitation (dyspnea relieving positions, sputum clearance technique, and chest mobility exercises). The concepts were explained in simple language through interactive PowerPoint slides and screening of video clips. While teaching a skill, the skill was first demonstrated live and/or through a video, followed by practicing the skill in pairs on each other in small groups of 5–10 under the guidance of a facilitator. They were also given an opportunity to practice the same in the presence of the program staff during camps organized in their respective villages. At the end of the training, CHWs were given a reading booklet providing information about the sessions. Two refresher sessions were conducted for all CHWs.

At the end of the training program, they were assessed in various domains through different techniques [Table 1]. The multiple-choice questions (MCQs), short questions, and different checklists were prepared in consultation with chest physicians and consensually validated. CHWs were assessed at each OSCE (objectively structured clinical examination) station by a trained assessor (not involved in training sessions) using a checklist of steps [Table 2]. The assessors (postgraduate students in physiotherapy) were sensitized to the entire training program conducted for the CHWs and the latter's role in the community. They were also oriented to the scoring pattern at the OSCE station. A pilot examination was carried out on 10 field supervisors and paramedical staff working in the program to standardize the assessment process.

Data analysis

Descriptive statistics (mean [SD] and frequency [%]) were used to depict the characteristics of the study population such as years of schooling, duration of work experience, and involvement in other community work (ASHA/Anganwadi worker (AWW)/working with another NGO). The raw scores in each domain were transformed into a percentage for easy understanding. Chi-square test/*t*-test was applied to determine the association

Table 1: Various domains and assessment techniques for the CHWs

Domain	Assessment technique	No. of questions	Marks (% weightage)
Basic clinical knowledge about COPD	Multiple choice questions (MCQs) about COPD	12 MCQs	20 marks (19.6%)
Ability to identify signs of respiratory distress	Identifying the signs by videos	Five videos	10 marks (9.8%)
Ability to assess the severity of breathlessness through the Medical Research Council (MRC) scale[14]	Applying the MRC scale by case scenarios	Two scenarios	14 marks (13.7%)
Counting respiratory rate	Counting respiratory rate through a video showing breathing movements for one minute	Two videos	8 marks (7.8%)
The ability to use and document PEFR (Peak Expiratory Flow Rate)	OSCE	One Station Ten steps	10 marks (9.8%)
The ability to demonstrate basic breathing and general mobility exercises to COPD patients	OSCE	Two Station with two skills at each station, each skill was of seven steps	40 marks (39.2%)

Table 2: Checklist of steps for the three stations with marks for each step shown in parenthesis

Station 1- Peak flow measurement	Station 2 - Pursed-lip breathing and Dyspnea relieving positions	Station 3 - Sputum clearance technique and thoracic mobility exercises
1. Set the dial to zero (1) 2. CHW should hold the peak flow meter correctly with both hands without placing any finger on the dial (1) 3. Sit up straight or stand (1) 4. Take as deep a breath as possible (1) 5. Put the mouthpiece of the PEFR machine in the mouth and seal it between the lips (1) 6. Exhale as hard and fast as possible. (1) 7. Record the reading (1) 8. The technique should be performed 3 times (1) 9. Ask the CHW the procedure to clean the PEFR machine 9aShe should mention about asking the patient to wash the mouthpiece with soap and water (1) 9b She should mention about washing the mouthpiece with clean water and spirit (1)	Station 2a - Demonstration of pursed-lip breathing 1. Inspiration through the nose (3) 2. Pursing the lips (4) 3. Expiration through pursed lips (3) Station 2b - Demonstrating the dyspnea relieving positions 1. Standing position with wall support and performing pursed-lip breathing (2.5) 2. In the sitting position, laying the head on the table and turning the face on one side and performing pursed-lip breathing (2.5) 3. In sitting position placing hands on the thighs and forward bending and performing pursed-lip breathing (2.5) 4. In the side-lying position, resting on 3-4 pillows and performing pursed-lip breathing (2.5)	Station 3a - Sputum clearance technique 1. CHW performs the procedure for humidification (2.5) 2. Demonstrates the first position for huffing (2.5) 3. Demonstrates the second position for huffing (2.5) 4. Demonstrates third position for huffing (2.5) Station 3b - Thoracic mobility exercises 1. Demonstrates 1st exercise (3) 2. Demonstrates 2nd exercise (3) 3. Demonstrates 3rd exercise (4)

between the CHWs performance scores with their age, education, and their involvement in other community work (ASHA/AW/NGO) at a univariate level depending on nature of the variables involved. Simple regression analysis was performed to find out important baseline characteristics that influence the performance of CHWs. Ethical clearance for the study was obtained from the Institutional Ethics Committee of the HM Patel Center for Medical Care and Education, Karamsad (Approval no. - IEC/HMPCMCE/87/Faculty/6/Dated 15/11/2017.) Since this study was undertaken as a part of a routine training assessment by the training team and the data was not shared with any third party, waiver of written consent was granted by the institutional ethics committee.

Results

A total of 90 CHWs village health workers were invited for the training. Eleven health workers could not complete the training program due to various personal reasons whereas nine health workers were not available during the evaluation process. Thus, the final analysis included 70 health workers. The mean (SD) [IQR] age of the participants was 42.2 (11.2) [17, 75] years. Most of them (71.4%) had 8–12 years of education and had involvement in some other community work) (57.1%). They were associated with SPARSH for an average of 3.5 years.

The mean percent score (SD) on basic knowledge of COPD was 62.0% (16.3). Sputum clearance 92.1% (18.9), using PEFR 82.1% (13.3)%, and pursed-lip breathing 81.3% (27.1) were best demonstrated by the trainees whereas thoracic mobility exercises 66.6% (33.2) and dyspnea relieving positions 59.2% (25.6) needed the most improvement [Table 3].

Most participants 56 (80%) could correctly count the respiratory rate from the two videos. Most of them 51 (73%) and 54 (77%) applied MRC scale satisfactorily in two scenarios provided. However, signs of respiratory distress were identified correctly by only 31 (44%), 17 (24%), 33 (47%), 43 (61%), and 15 (21%) participants from the five videos, respectively.

No statistically significant association was observed between the performance of the participants (theory as well as skills) and their sociodemographic profile such as age, experience, education level, and so on.

Table 3: Performance of participants in knowledge test and skills

Particulars	Mean (SD)% Score*
Skill performance - OSCE	
Sputum clearance techniques	92.14 (18.93)
Peak flow meter performance	82.14 (13.26)
Pursed-lip breathing	81.29 (27.12)
Thoracic Mobility	66.64 (33.20)
Dyspnea relieving positions	59.21 (25.57)
Skill performance - Video Exercises	
Respiratory rate counting	85.36 (27.08)
Identifying signs of respiratory distress	55.14 (19.47)
Applying MRC scale through case vignettes	
Case scenario score	63.83 (23.95)
Knowledge score	
MCQs and short questions	62.00 (16.26)

Discussion

Seventy CHWs were thus assessed for their knowledge and skills related to COPD prevention and care after undergoing an intensive training program. It is probably the first such rigorous attempt to train CHWs in multiple cognitive and psychomotor domains related to the prevention and care of COPD in the country. The results were encouraging and have implications for addressing the COPD burden through the government primary healthcare system. Their performance in demonstration of peak flow meter use, pursed-lip breathing, and sputum clearance technique were good. Thoracic mobility exercises and dyspnea relieving positions needed some improvement. Majority of them could count the respiratory rate appropriately while there were some issues in identifying the signs of respiratory distress. Mean percentage score for the knowledge domain was more than 60%. There was no significant difference in scores with respect to the experience of working with SPARSH, schooling, and involvement in work with other organizations.

There is considerable evidence on the effectiveness of CHW training for maternal and child health and communicable diseases in low and middle-income countries (LMICs).[15] However, there is relatively less literature available on the role of CHWs in addressing the burden of NCDs in LMICs, in spite of NCDs being the major disease burden. The evidence, whatever available, is mainly focused on addressing cardiovascular diseases and its risk factors such as diabetes, hypertension, and tobacco.[16-18] Evidence on the role of CHWs in managing chronic respiratory diseases in a primary care setting is hardly available. In a recent study done at the University of Massachusetts, a home care intervention involving CHWs was found to be effective in improving asthma control among adults.[19] In a systematic review for the effectiveness of CHW training for cardiovascular diseases, posttest scores in most of the studies were found to be 70–80% irrespective of the pretest scores.[20] In our study, the posttest knowledge score was found to be 64%. In one of the studies from the review, it was found that CHWs preferred interactive training, hands-on experience, and case scenarios over didactic training.[21] Our training also comprised of a combination of demonstrations, videos, case scenario discussions, and hands-on exercises in small groups with minimal didactic sessions.

As per the Kirkpatrick model, a training program needs to be evaluated at four levels.[22] Through this paper, we are reporting the findings of the assessment of the CHW performance post-training which reflects the second level of the model - learning level. However, more comprehensive evaluation would require an assessment of the reaction of the CHWs to the training, their change in behaviors and the health outcomes. Moreover, for the CHW to deliver the interventions based on the knowledge and skills gained by them, other program-level interventions such as supervision and feedback, materials management, and information systems are required to be in place.

Conclusions

Considering the encouraging results obtained in this paper, this intervention should be pilot tested in a government setting with ASHA workers. It will provide valuable learnings in scaling up the COPD prevention and care services across the network of 1.5 lakh health and wellness centers across the country under the comprehensive primary healthcare (CPHC) component of the Ayushman Bharat initiative.[23]

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Conflicts of interest

There are no conflicts of interest.

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