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ScienceDirect

Procedia Engineering 78 (2014) 299 – 305

Procedia Engineering

www.elsevier.com/locate/procedia

Humanitarian Technology: Science, Systems and Global Impact 2014, HumTech2014

Importance of interactive small group discussions to educate community health workers

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Abstract

Community health workers (CHWs) are an effective solution to address the double burden of chronic and infectious diseases in developing countries. Due to limited resources, CHWs seldom receive adequate training. A standardized training regimen with three educational methods was tested with CHWs in Kenya to identify the optimal method. CHWs were divided into three breakout groups each testing a different pedagogy. It was concluded that each method was equally effective. Interactive small group learning methods do not require additional resources and can be easily integrated into CHW training regimens to produce better-prepared health workers.

Selection and peer-review under responsibility of the Organizing Committee of HumTech2014

Keywords: CHW; training; interactive education; healthcare; small group discussion

1. Background

Hardships faced by health care systems in developing countries, particularly in Africa, include high child mortality rates and a double disease burden [1,2]. The focus of many health systems is on acute illnesses even though there has been a shift toward chronic and non-communicable diseases worldwide [3]. In 2010, non-communicable diseases were responsible for two of every three deaths globally [4]. For these diseases, early identification of risk factors and improved lifestyle choices can prevent worsening of the illnesses [5].

There is ample evidence that the double disease burden in developing countries can be mitigated with help from Community Health Workers (CHWs) [6]. CHWs are volunteers who close the gap between communities and health facilities that are often inaccessible to the general public [3]. The International Labour Organization defines CHWs

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Selection and peer-review under responsibility of the Organizing Committee of HumTech2014
doi:10.1016/j.proeng.2014.07.071

as community members selected by their communities to provide basic primary care [7]. The tasks normally performed by doctors can be shifted to local CHWs, who are able to make frequent home visits to aid people with health concerns. They provide their communities with education on basic public and environmental health and first aid treatment [6]. Since CHWs are part of the communities they serve, they share many characteristics with those they are helping, including language, socioeconomic status and ethnicity [8]. This enables CHWs to convey health information using the local language and value systems, putting it into the context of the community [6]. CHWs can be effectively employed to aid persons with chronic and non-communicable diseases [5]. Past CHW interventions among diabetes patients have demonstrated improvement in patient knowledge, self-care and positive behaviour [5]. CHWs can provide essential social support and be a key resource for people with chronic diseases [9]. However, to conduct all of these tasks successfully, CHWs must be properly trained [6].

1.1. Current CHW training

There are vast variations in the organization, length, complexity and approaches to CHW training, resulting in programs operating with varying degrees of success [6]. While conducting their duties CHWs face issues such as lack of resources and funding that affect their ability to conduct their duties. However, ineffectiveness of CHW programs is often rooted in inadequate training regimens [10]. CHWs are typically volunteers offering their services in their limited free time. Another issue is the relaxation of standards during training in rural areas where many CHWs may not meet education prerequisites [11].

The World Health Organization (WHO) suggests six months of initial training followed by six months of on-the-job training [12]. Curriculum can focus on topics like personal hygiene, nutrition and breast-feeding, and more complex issues such as diabetes and hypertension [13]. However, due to a lack of funds, resources and government support, it is often not possible for programs to carry out the suggested training sessions, leading to less-structured, informal training [14]. For example, in Kenya, the Ministry of Health requires CHWs to undergo two weeks of training, followed by regular refresher courses. Unfortunately, many CHWs have not received either of these and must rely only on informal training [14]. There is a distinct gap between what the government intends training to be, and the actual operation of these programs [6].

1.2. Ideal training

There is a need for simple and effective CHW training programs that can be customized and conducted wherever and whenever needed. Past programs have used approaches that were too theoretical for the education level of CHWs, while current ones use more competence-based approaches that are difficult to sustain with available resources [12]. An ideal program would be simple and use methods that require few resources and short implementation times. The WHO suggests that interactive sessions, such as group discussions, should be incorporated to effectively reach less-educated or illiterate CHWs [12]. Small group trainings utilizing multiple learning methods have also had better results [15]. The differing resources and roles at each CHW program location mean any program must be customizable enough to be applicable in different communities. Based on our survey of the literature, a program incorporating interactive education, simplicity and resource conservation has yet to be implemented.

There have been few documented attempts to restructure the way CHWs are trained by addressing current shortcomings. This article presents and analyses the results of a training regimen field-tested with CHWs in Nyeri, Kenya. Its structure was based on addressing the time and funding restrictions of current programs. The regimen tested three educational methods to determine the most successful one, with the goal of ascertaining whether a regimen meeting current program needs could feasibly teach CHWs the information they are required to know. This study was specifically conducted to identify opportunities for integrating cell phones or tablets into the educational regimen. Behavioural cognitive theory was the rationale behind the methods, with the reasoning that inadequate health worker performance comes from a lack of knowledge that can be corrected through teaching [10]. Section 2 of this article outlines the regimen used to conduct the training seminar at each location. Section 3 presents the data and Section 4 discusses the outcomes of the teaching regimen and practical recommendations.

2. Methodology

A training seminar was developed and field-tested with 104 CHWs from four locations around Nyeri, Kenya. The seminar was structured as a PowerPoint presentation on three non-communicable diseases: diabetes, cardiovascular disease and cancer. A PowerPoint presentation was chosen because it was the simplest way to educate large groups of people. There was reasonable access to computers and a majority of the health centres visited in Kenya had projectors. The presentation consisted of 77 slides that predominantly contained pictures to convey information. There were 36 slides on diabetes, 17 on cancer and 22 on cardiovascular disease. Symptoms, causes, risk factors and prevention methods were covered for each disease. The presentation also utilized cultural references, such as stories of how local food, drink and behaviour can increase the risk of diabetes. The presentation took an average of thirty minutes and was projected onto a screen or wall.

Before the presentation, an eight question pre-test was administered to the CHWs in order to gauge their prior knowledge on these diseases. After the presentation, CHWs were divided into three breakout groups to gauge the success of different educational methods at conveying health information. Each group tested a different method: demonstration (group I), hands-on participation (group II) and small group discussion (group III). The demonstration was meant to utilize visual aspects of learning. Small group discussion combined auditory and visual learning. Hands-on participation was intended to enforce kinesthetic aspects of learning. The subject of each breakout group was how plaque build-up in arteries causes cardiovascular disease.

Group I was shown a demonstration of plaque build-up by a presenter. A straw was used to represent an artery and a plastic cup was used to represent the heart. The straw was inserted into a hole cut into the bottom of the plastic cup. Water was used to represent blood. When it was poured into the cup it flowed out of the straw, demonstrating how blood flows through arteries. Next, a ball of putty-like moulding compound was inserted into the straw to represent the plaque that occurs in cardiovascular disease. Water was once again poured into the cup but did not flow out due to the blockage in the straw. This demonstrated how blood flow is restricted when there is plaque in arteries.

Group II also utilized the same resources to represent blood flowing from the heart to an artery. In this group, each person was given their own straw, cup, water and moulding compound. A presenter led the exercise by demonstrating the activity while CHWs performed it at the same time. Group III had small groups, each made up of 4-5 CHWs, that were given one set of supplies. A presenter demonstrated the activity while each small group performed it along with the presenter. However, instead of the presenter explaining what each item (straw, cup, water and moulding compound) represented, the small groups were asked to discuss what they thought each item and the overall demonstration represented. Subsequently, the presenter debriefed the objective of the presentation with the group.

Finally, a post-test was administered, containing the same questions as the pre-test. Scores from each test were compared within the overall sample and for each individual breakout method. The success of the training regimen tested in this experiment was gauged by measuring score differences between the pre and post-tests through a two-sample paired T-test and analysis of variance of breakout method and location.

Each training session was administered as uniformly as possible. However, caveats potentially affecting the data include language, presentation style and group size. The test scores could have been affected by language barriers because the training was given in English by native speakers. Most CHWs spoke English as a second language, with Kiswahili or tribal languages being their native language. Presenters spoke slowly and clearly to minimize this risk. The scores may have been skewed by different presentation styles, as there were six different presenters. They each tried to give the presentation the same way each time. It was not possible to form a uniformly-sized group for each method at every location due to uneven numbers of CHWs. However, groups were formed as evenly and randomly as possible based on the number of CHWs present.

3. Results

3.1. Pre and post-test score increase

The study found that, combining all breakout groups, the average pre-test score was 4.55 questions correct out of 8 questions. The average post-test score was 5.98 questions correct out of 8, which is an increase of 1.43 points. A

statistical paired t-test was performed on the data to ascertain whether the overall pre-test and post-test scores were significantly different from each other and not a matter of chance or error in the data set. The test produced a critical T-value of 3.291, meaning the P-value is $p < 0.0005$. This means the overall score increase between the two tests was not a matter of chance, indicating the scores are significantly different from each other.

3.2. Score change by breakout group

In addition to recording the overall pre and post-test scores, the score changes for each breakout group were measured. The average score increased for each method tested. Group I had the lowest increase, averaging 4.51 questions correct on the pre-test and 5.70 on the post-test for an overall increase of 1.19 points. Group II demonstrated the second highest increase, with an average pre-test score of 4.60 correct answers and a post-test score of 6.10 correct answers. The overall increase for the group was 1.50 points. Group III had the largest score increase. Average pre-test scores were 4.52 and the average post-test score was 6.19, for an overall score increase of 1.67 points. Figure 1 shows the distribution of correct answers for each question based on breakout group.

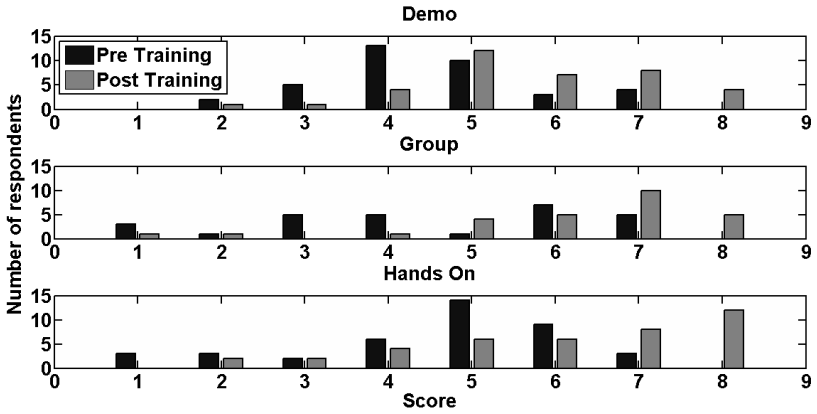

Fig. 1. Range of correct answers for each question on the pre and post-test based on educational method

A two-sample, paired t-test was performed for the pre-test and post-test scores of each breakout group. This was to confirm that the pre and post-test scores were significantly different from each other based on breakout group. Each group had a p-value of $p < 0.005$, meaning each group had post-test results significantly different from pre-test scores.

An analysis of variance test was performed to determine if there was a statistically significant difference between the mean post-test scores of the breakout groups. This test determined that the p-value is not low enough to indicate a statistically significant difference between the post-test scores of each group. While each group had a statistically significant improvement over their pre-test scores, no specific group performed significantly better than the others in the post-test, which is shown in a box plot (Figure 2).

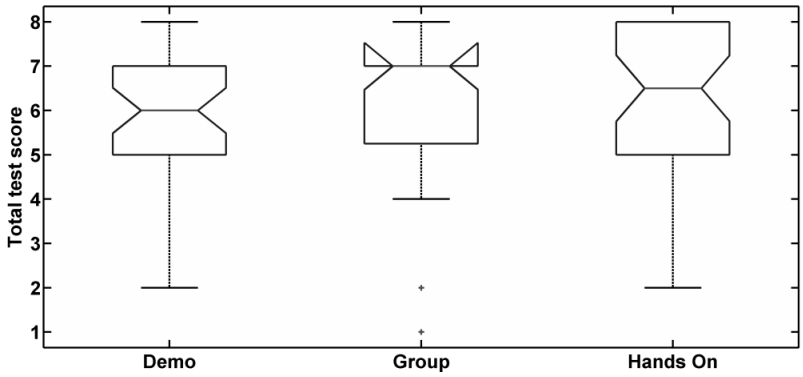

Fig. 2 Box plot of post-test scores based on break out educational method

3.3. Score change by location

The final variable analysed was mean test score based on location. This was conducted to test the effect of location, and indirectly different instructors and environments, on scores. An analysis of variance test was performed on the post-test scores of each location. The results are graphed in a box plot in figure 3. The results of the test indicated there is a statistically significant difference between the post-test scores of two locations, Gichiche and Kagonye.

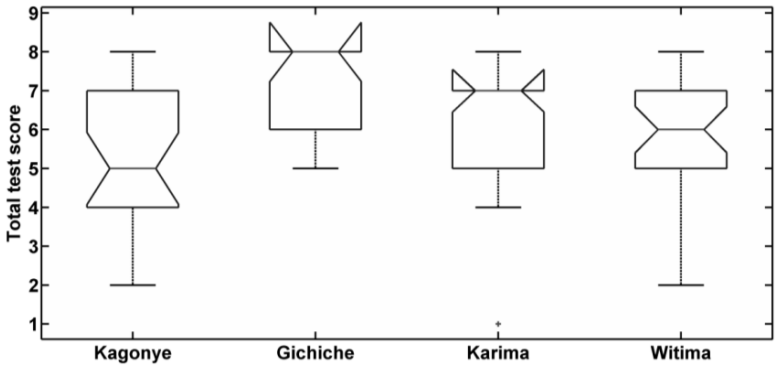

Fig. 3 Box plot of post-test scores based on location

4. Discussion

4.1 Breakout method

The overall increase between the pre and post-test scores indicates the training regimen successfully taught CHWs the presented information. The 1.43 average point increase between pre-test and post-test scores suggests that the structure of simple, picture-dominant presentations is viable for presenting the health information CHWs must learn to perform their tasks. This method is ideal for resource-constrained environments because the presentation itself requires few supplies, making it easy to incorporate so as to improve CHW job performance.

Each breakout group demonstrated an increase in scores between the pre and post-test. This indicates interactive breakout groups can be useful aids in the training process by highlighting important topics in detail. These techniques will be beneficial in communities where CHWs may be illiterate or less-educated. No significant score

difference was found between the breakout methods, meaning all were equally effective educational tools. When designing CHW training regimens any of these educational methods can be chosen to convey information more effectively.

Since no significant difference in score was found between the breakout methods, the demonstration method is the most effective tool in low resource environments because it requires the least amount of supplies. The presenter only requires one set of supplies to perform a demonstration on the topic being taught. The other two educational methods tested, group discussion and hands-on participation, are effective but not as easy to implement and standardize throughout communities. They use more resources than the demonstration because each individual or small group requires a set of supplies to complete the activity. Communities can choose whichever method they find the easiest to perform and their resources allow.

4.2 Location

This training program was tested at four different locations in Nyeri, Kenya. Between these locations there was a statistically significant difference in overall scores of two locations. The location of Gichiche was observed to have significantly better post-test scores than the location of Kagonye. This difference could be due to several variables. This may have occurred because of a difference in presentation style at each location, as it was not possible to be entirely uniform every time the regimen was tested. There was a different set of presenters at Kagonye than at Gichiche so they may not have presented the material as clearly as the presenters at Gichiche. It may also be because of the differing demographics of CHWs from each location. CHWs from Kagonye may have less education or struggle more with English than those at Gichiche.

4.3 Technology for future training

While CHW training can be improved through the use of interactive educational methods, it may also benefit from using new technologies like tablets and smartphones. Tablets could aid in creating an interactive, hands-on learning environment like the one tested in this study. In the early 20^{th} century, education was vastly more advanced than technology but the roles have reversed and education is falling behind [16]. It is essential for education to start embracing technology as a valuable tool. There has been constant progress in the field of educational technology and helpful tools now exist. It could be beneficial to pair the training regimen tested in this study with technological aids to further improve CHW learning.

Education that includes technology in the learning process has a number of advantages over traditional education. The key components of teaching are communication, content and feedback, and technology can improve each of these aspects [17]. The use of education technology yields a more interactive learning environment which creates more opportunities for teacher-student interaction [18]. Through these interactions, there is a higher level of communication and feedback between the teachers and the students. Technology could help educators achieve more advanced organization and clarity in their teachings, making content easier to understand for the students [18]. The qualities of communication, feedback and content are invaluable in CHW education because they are expected to learn many different topics during training. It is important for trainers to stay organized and listen to CHW trainees so they can clearly convey these many separate topics. Health information can be complex, making the job of the trainer difficult. If tablets and other educational technology are utilized in CHW training there will be less of a burden on the trainer. Educational technology could help streamline CHW training and make it more successful.

Technology is a valuable teaching tool because it engages multiple senses to create a more participatory experience [17]. For example, tablets can employ touch which may better engage CHWs and hold their attention longer. The ability to touch the screen and use a stylus to write is ideal for solving and analysing certain types of problems [19]. Because a tablet and stylus mimic paper and pencil it is more likely to be accepted in developing countries that may not be used to foreign forms of technology. Tablet technology would be a good partner to the regimen in this study because it utilizes multisensory methods to more effectively engage students. In the future, as we seek to develop the more effective CHW training regimens, it is important to consider the benefits educational technology can add to the teaching and learning process. These outcomes encompass better organization, effective and efficient training and, ultimately, more engaged CHWs.

5. Conclusion

There is ample evidence that CHWs can lessen the gap between health facilities and rural communities. However, many CHW programs cannot operate at their full potential due to unreliable training programs with low funding, resources and time. For patient care to improve, CHWs must be equipped with proper training, which can be achieved through the development of simple, visual teaching methods and interactive breakout groups delving further into key topics. This type of training program is simple enough to be implemented anywhere, and can be tailored to accommodate volunteer CHWs with limited time. By integrating learning methods that require few resources and utilizing techniques appropriate for varying education levels, this regimen successfully conveyed health information to CHWs, while addressing the shortcomings of previous programs.

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