Effectiveness of a targeted education module for healthcare professionals attending a diabetic retinopathy training session in Zimbabwe

R Woodward and A Matimba

Abstract

The Zimbabwe Diabetes Retinopathy Telemedicine Project (ZRTP) was created to develop a pilot programme to screen for diabetic retinopathy among patients attending a diabetes clinic in a public hospital. As part of the project, mid-level healthcare professionals (HCPs) attended one of four half-day training sessions in Harare, Zimbabwe; and took a five-question quiz before and after a 40-minute lecture reviewing the pathophysiology of diabetes and the detection and effects of diabetic retinopathy. Analysis of the pre- and post-lecture quiz results suggest that mid-level HCPs are deficient in some basic knowledge about diabetic retinopathy and diabetes, but this could be significantly improved by a relatively brief but focused lecture session.

Introduction

The International Diabetes Federation estimates the number of adults with diabetes in Africa will double in 20 years, from 19.8 million in 2013 to 41.5 million in 2035.[1] One complication in particular, diabetic retinopathy, is associated with disability and escalating costs to society when it leads to permanent visual impairment. The management of diabetic retinopathy in sub-Saharan Africa is hindered by a lack of awareness of the benefits of regular eye screening, as well as a lack of suitable systems for routinely screening patients.[2]

In order to address this problem, The Zimbabwe Diabetes Retinopathy Telemedicine Project (ZRTP) held training sessions for mid-level healthcare professionals (HCPs) to prepare them to assist patients participating in a pilot diabetic retinopathy-screening programme. Each training session included a 40-minute lecture reviewing diabetes and diabetic retinopathy. An identical five-question quiz was given to each attendee before and after the lecture. The purpose of this study was to analyse the pre- and post-lecture data to determine the effectiveness of the lecture in improving knowledge of diabetes and diabetes retinopathy among mid-level HCPs in Harare, Zimbabwe.

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Methods

A total of 56 HCPs attended one of four half-day training sessions that took place in 2014 at two different health facilities, one a large public hospital (Facility 1) and the other a private clinic (Facility 2). Most of the HCPs were general nurses (RGN), but nursing students, nursing tutors, hospital registrars, and junior doctors were among the attendees. Each attendee was asked to note their answers and not to write their name on the paper. The five questions (Appendix A) were presented as part of a PowerPoint presentation where each question was read out loud and shown on the screen. After the questions were given and answered, the quiz papers were collected from each participant. A lecture using PowerPoint slides as a visual aid was then given. Immediately after the lecture, the attendees were told, 'To reassess your basic knowledge after the lecture, we will ask the questions again.' The quiz was then administered again in an identical fashion to the pre-lecture quiz.

Each quiz was graded on a scale of 0–5, with zero indicating no correct answers and five indicating five correct answers. An independent sample t-test with pooled variance for the difference between two means was chosen to test the hypothesis that mid-level HCPs can achieve a better knowledge of diabetes and diabetic retinopathy though the targeted lecture. Pooled variance was applied because there were an unequal number of observations before and after the lecture (as a few individuals may have left the lecture early and did not complete the post-lecture quiz, or some individuals arrived after the first quiz was given but took the post-lecture quiz).

Results

A total of 42 participants completed the pre-lecture quiz and a total of 48 participants completed the post-lecture quiz. The maximum and minimum scores for each group

	Scores			
	Pre-lecture minimum	Pre-lecture maximum	Pre-lecture mean	Post-lecture mean
Facility 1				
Morning	1	5	2.7	5.0
Afternoon	2	5	3.6	3.7
Facility 2				
Morning	2	5	3.4	3.9
Afternoon	2	5	3.7	4.1

Table 1: Group minimum, maximum, and mean quiz scores sorted by session

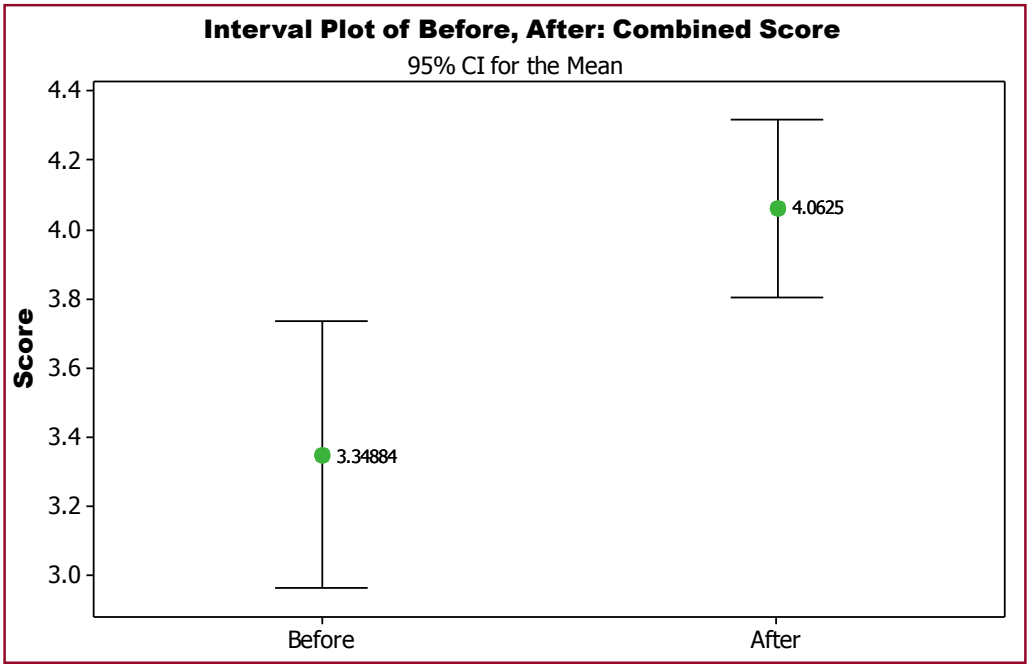

Figure 1: Mean (+ 95% confidence intervals) test scores before and after the lecture

and the means of the morning and afternoon session for each day are shown in Table 1. The results comparing the means of the pre- and post-lecture scores showed a significant difference in the mean pre-lecture scores (3.4+1.2) and post-lecture scores (4.1+0.9). This was statistically significant (p=0.001), and results are shown in Figure 1.

Discussion

Pre- and post-lecture exam testing as a tool to assess student learning has been studied in various areas of higher education. The differences between pre- and post-lecture test scores are considered to be a valid measure of student learning in many business schools.[3] The impact of pre- and post-testing on learning outcome has also been studied in the context of continuing medical education (CME) and has been found to have a positive effect.[4]

A review of the literature related to diabetes education for HCPs has shown instances where pre- and post-testing has been used to document effectiveness of educational programmes for physicians. Pre- and post-tests demonstrated the effectiveness of a web-based CME programme designed to improve the management of diabetic retinopathy,[5] and pre- and post-testing was used to show the benefit of a six-week course to train 11 general practitioners (GPs) in screening for diabetic retinopathy.[6]

Unlike other studies where pre- and post-tests were used to assess knowledge gain over an extended period of time among physicians, most of the attendees in our study population were mid-level HCPs and the study period was a single lecture. Our results show that the mean quiz score after the lecture was significantly higher than the mean score before the lecture, which suggests that we achieved the goals of increasing knowledge of diabetes facts and awareness of complications among attendees.

Possible limitations to our study results include the fact that the study design restricted outcome to knowledge gain, and not to outcome consisting of performance in a clinical setting. In addition, the results did not test if the knowledge gain endured over time. Our study did not account for the distinction between knowledge improvement enhanced by taking the quiz and listening and viewing the lecture compared with the impact of the lecture alone. The number of quiz questions, totalling five in our study, was intentionally kept brief to maintain focus on the lecture and keep the total lecture and pre- and post-lecture quiz time to no more than 1 hour. It is notable that a ceiling effect, manifested by a pre-test score that is too high and not allowing for finding change, did not occur. This suggests that even though the five-question quiz was brief, the selection of questions was appropriate for the participants' educational background and level of training.

In conclusion, we have shown that a single, short targeted lecture can produce noteworthy knowledge acquisition about diabetes and diabetic retinopathy among mid-level HCPs, and that the knowledge gain was unlikely to be a chance occurrence. The fact that scores went up also suggests mid-level HCPs are deficient in some basic knowledge about diabetic retinopathy and diabetes, but it is clearly open to improvement.

By incorporating pre- and post-lecture quizzes into curriculae targeted for nurses and mid-level health professionals in Zimbabwe, we can increase knowledge of diabetes and diabetes complications, and identify gaps in knowledge. In this way, our study is a first step in creating a standard for knowledge about diabetic retinopathy, and other areas of diabetes, that is applicable for nurses and mid-level HCPs in Zimbabwe and potentially in other countries in sub-Saharan Africa.

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Author declaration
Competing interests: none.

Any ethical issues involving humans or animals: none. Was informed consent required: yes - documentation on file.

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Appendix
The five quiz questions are shown below, with the correct choice in bold

Number	Questions	
1	Diabetes is:	A. A major pubic health problem B. Causes blindness in young adults C. Is due to the body's inability to handle carbohydrates D. Is best controlled by keeping on TRACK (Take medications prescribed by doctor, Reach a healthy weight, Add physical Activity, Control ABC's (A1C, blood pressure, cholesterol), Kick smoking habit) E. Is a silent killer **F.** All of the above
2	Diabetes control means:	A. Taking your tablets/medication B. Watching diet and exercise C. Knowing your blood sugar, blood pressure, and lipid levels D. Seeing your doctor regularly E. Having eyes and feet examined every year **F.** All of the above
3	Diabetic retinopathy	A. Causes permanent blindness B. Is preventable C. Is asymptomatic at first D. Is best detected by an ophthalmologist in a yearly exam E. Is best treated before permanent vision loss occurs **F.** All of the above
4	You can catch diabetes from someone else	A. True **B.** False
5	Eating too much sugar causes diabetes	A. True **B.** False