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HIV/AIDS: Preliminary Health Promotion activity based on service-learning principles in Grahamstown, Eastern Cape, South Africa

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ABSTRACT

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Objectives To investigate the effects of a service-learning based health promotion elective on knowledge of HIV & AIDS and ways to prevent them.

Method A computer-based quiz, an information poster, an interactive board game and a take-home information leaflet on HIV/AIDS were developed by final year pharmacy students under supervision, as part of an exhibit during the 2009 National Festival of Science and Technology (SciFest) held in Grahamstown, South Africa. Predominantly school learners took part in the quiz and other educational activities.

Results The majority (53.1%) of the 179 junior quiz participants were male learners and the majority (63.6%) of the 253 senior quiz participants were female learners. Results of the pre-intervention scores demonstrate fair knowledge of HIV/AIDS with 64.5% and 71.3% for the junior and senior school participants, respectively. Educational interventions resulted in improvement in the number of correct answers to some of the questions. The results showed significant gender differences for the pre- and post-intervention mean percentage scores among the junior quiz participants and only in the pre-intervention scores of the senior quiz participants.

Conclusion The health promotion elective was successful in raising awareness of HIV/AIDS but continuous, concerted health promotion activities and advocacy by all health care professionals is needed to address the prevention of HIV/AIDS.

Keywords: HIV/AIDS; Health promotion; South Africa; Pharmacists; Chronic non-communicable diseases; Service-learning; School learners

INTRODUCTION

As the HIV/AIDS epidemic enters its fourth decade, better understanding of the disease has resulted in the transition to address prevention strategies instead of focusing only on the treatment aspects of HIV & AIDS.[1] According to the Joint United Nations Programme on HIV/AIDS (UNAIDS) 2011-2015 strategy, worldwide in 2009 there were an estimated 2.6 million new infections and 1.8 million deaths due to HIV/AIDS.[2] The most rapid and new infection rates have been linked to young people.[3] Globally, of the 15 million people currently living with HIV/AIDS, only a third have access to lifelong treatment.[2] Sub-Saharan Africa (SSA) faces the highest HIV/AIDS infection rates, with 85% of deaths due to HIV/AIDS occurring in this region which makes up 10% of the world population.[4] The HIV/AIDS epidemic in South Africa is a serious health crisis and is associated with high economic and social costs.[5] Of the estimated 49 million people in South Africa, approximately 5.7 million are infected with HIV/AIDS, with 15% in the 15-49 age group.[6] According to the South African 2008 Antenatal survey report, national HIV prevalence levels among antenatal women aged 15-49 was 29.3%, and at a provincial level, of the nine provinces, the Eastern Cape was ranked with the sixth highest prevalence level at 27.6%.[7]

Disease prevention programs targeting youth can lead to a reduction in HIV/AIDS infection rates.[8] While evidence exists that South Africans possess some awareness of the disease as fatal, aspects such as misunderstanding of the virus transmission, prevention methods, and differentiating between HIV and AIDS, indicate serious knowledge gaps.[9-12] With young people as an integral part of our society and future leaders against diseases such as HIV/AIDS, positively influencing their behaviours, opinions and attitudes are important in combating the disease. While interventions and campaigns may disseminate information about HIV/AIDS, HIV knowledge and awareness does not necessarily change behaviour patterns.[13]

In addressing community needs and fostering stronger community engagement relationships, tertiary institutions have begun preparing students for their roles as health professionals by using service-learning in creating public health awareness.[14] Service-learning as part of a curriculum focuses on health promotion and allows students not only to apply knowledge as a traditional approach but also to incorporate skills learnt from their classes in a setting that is "real life".[15,16]

Thus, to build on the concept of health promotion and address the challenge of HIV/AIDS faced in the Eastern Cape,

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members of the Faculty of Pharmacy, Rhodes University, South Africa, designed a final year elective based on service-learning principles for fourth year pharmacy students. This service-learning elective was used at the 2009 National Festival of Science and Technology (SciFest), in Grahamstown, South Africa, to create basic awareness of HIV/AIDS amongst the young attendees.

METHOD

The three final year pharmacy students who participated in the elective signed a confidentiality form and the activity was approved by the Faculty of Pharmacy's Ethics Committee. Under supervision, the pharmacy students designed a quiz aimed at senior school learners to create awareness of HIV/AIDS and how to prevent it. The quiz consisted of a series of questions with multiple-choice answers and was used to determine the pre-intervention level of knowledge of HIV/AIDS amongst SciFest attendees and was followed by an educational intervention which provided information regarding the questions asked in the pre-intervention quiz. The post-intervention quiz followed immediately after the intervention. Pilot-testing of the quiz took place in local schools, the feedback of which resulted in changes being made to the quiz.

As a result of collaboration with the Rhodes University Computer Science Department, the quiz was then adapted for use on a computer using a specially designed computer program known as BKnow®. This presenter software was used to integrate multiple-choice questions into a Microsoft PowerPoint presentation. Each question appeared on one slide and participants could then choose the option which they thought was correct from the multiple choice options available to them. For the post-intervention questions, participants received a response congratulating them if they had provided the correct answer. If they provided an incorrect response, they were automatically taken back to the intervention slide which provided the correct answer. The demographic data of the respondents as well as the responses to the quiz were captured and analysed statistically.

A poster, interactive models and a bilingual (English and isiXhosa, the predominant local language) take-home information leaflet on HIV/AIDS were also designed by the pharmacy students with inputs and supervision from the course facilitators. These above-mentioned resources, the quiz designed in 2009 and a quiz designed for junior school learners for SciFest 2007, were all incorporated at the SciFest exhibit. Anyone who attended the exhibit was given an information leaflet which served as a reminder of what was learnt from the exhibit, and the leaflets were also made available to other members of the community e.g. family and friends.

Use of computer keyboards at SciFest

Both children and adults visited the exhibit. Junior school learners were directed to the junior school quiz designed in 2007 and senior school learners and adults who had left school took part in the quizzes designed in 2009. Many of the attendees were from rural or township schools where access to computers is limited, hence, it was important to design a user-friendly method of entering responses. Different coloured stickers were placed on three keys on the computer keyboards: the stickers on the up and down arrows allowed navigation between the answer options while the enter key was used to indicate the participant's choice of answer.

Once the enter key was depressed, answers to previous questions could not be altered. If needed, assistance was provided by the pharmacy students or one of the lecturers involved in the course. An isiXhosa-speaking interpreter was available for participants who could not understand English.

RESULTS

Dependent t-tests on test percentage scores and McNemar χ^2 tests on the percentage of correct answers obtained for each question before and after intervention were used to assess whether the intervention made a difference in the understanding of HIV/AIDS. Independent t-tests and ANOVA procedures were performed to test for age, gender and type of school (independent or government-funded) effects on test percentage scores before and after the intervention. Means and standard errors were calculated for pre- and post-intervention scores. All tests were performed using the statistical programming language, R, and significance was set at the 0.05 level. A separate analysis has been done for the Junior and Senior school quizzes.

Junior School quiz

The demographics of the participants were captured in the first five questions of the quiz, in which 179 participants took part. The data obtained show that 11 participants (6.2%) were 9 years or younger, 57 participants (31.8%) were either 10 or 11 years old, 85 (47.5%) participants were either 12 or 13 years old, and 26 participants (14.5%) were 14 years or older. Of the total number, 84 (46.9%) were female and 95 (53.1%) were male. Regional distribution shows that 168 (93.9%) were from the Eastern Cape with the remainder from other South African provinces. The demographics show that 101 participants (56.4%) attended a government school, while the remaining 78 (43.6%) attended an independent school.

The first assessment regarding knowledge was to determine the number of participants who knew what a chronic disease is. Of these, 110 participants (61.5%) answered correctly while the remaining 69 (38.5%) answered incorrectly.

Pre-intervention results

The results from the pre-intervention questions are shown in Table 1.

The results of the pre-intervention study show that the participants had a fair prior knowledge of HIV/AIDS (overall percentage score 64.5%), its effects and how it can be prevented. The questions with the lowest correct percentage score were "Are there medicines available to cure HIV?" and "Which condition occurs most commonly when the immune system has been weakened by HIV?" – for which 47.5% and 44.1% of the participants respectively gave the correct answers, while the questions with the highest correct percentage score were "What is HIV?" and "Can you get AIDS from shaking hands or hugging someone who is HIV positive?" – for which 87.2% and 81.0% of the participants respectively answered correctly (Table 1).

Comparison of pre- versus post-intervention results

70.1% (n=127) of the participants who took part in the pre-intervention questions continued through to the post-intervention questions. A one-sided McNemar dependent χ^2 test was used and the results are shown in Table 2.

The intervention resulted in a significant increase in correct responses to Question 5 ("HIV is a virus that attacks and weakens which body system?") (P=0.011), but no significant improvement was observed in the number of correct answers given to all other questions except Question 5, or in the participants' overall percentage scores (P=0.102).

The results show significant gender differences for both the pre- and post-intervention mean percentage scores (pre: Male: 55.5 ± 2.6%, Female: 73.5 ± 2.6%, P< 0.001; post: Male: 62.7 ± 2.7%, Female: 73.7 ± 2.6%; P = 0.004). No significant differences in mean percentage scores were found between participants from government and independent schools either before (pre: Government: 64.9 ± 2.6%, Independent: 64.8 ± 3.3%; P=0.994) or after (post: Government: 69.0 ± 2.4%, Independent: 67.4 ± 3.1%; P= 0.688) the intervention. Both pre- and post-intervention mean percentage scores were significantly different for the different age groups. The mean ± s.e.% scores of the participants in the age groups are: '9 years or under' (pre: 64.6 ± 9.0%; post: 77.1 ± 8.2%), '10 or 11 years' (pre: 68.9 ± 3.5%; post: 73.8 ± 3.1%), '12 or 13 years' (pre: 65.5 ± 2.7%; post: 69.0 ± 2.4%), and '14 years or over' (pre: 49.0 ± 6.2%; post: 44.2 ± 5.6%) (ANOVA: pre: F=2.671, df =3, 123, P = 0.050; post: F=7.68, df =3, 123, P < 0.001). Interestingly the average scores for the younger groups are higher than those for the oldest group.

Senior School quiz

As in the junior quiz, the demographics of the 253 participants in the senior quiz were captured in the first five questions. The data obtained show that 3 participants (1.2%) were 13 years or younger, 56 participants (22.2%) were either 14 or 15 years old, 97 (38.3%) participants were either 16 or 17 years old and 97 participants (38.3%) were 18 years or older. Of the total number, 161 (63.6%) were female and 92 (36.4%) were male. Regional distribution shows that 230 (90.9%) attended or had attended a school in the Eastern Cape, while the remaining 23 (9.1%) did their schooling in the other South African

Table 1: Frequencies (count and %) of correct answers for Junior Quiz (n =179)

Question with correct answer	Frequency	Frequency %
1.What is HIV?	156	87.2
Answer: A virus		
2.What does AIDS stand for?	137	76.5
Answer: Acquired immune deficiency syndrome		
3.What is the difference between HIV and AIDS?	95	53.1
Answer: HIV is a virus that causes the AIDS disease		
4.True or False: You can you get AIDS from shaking hands or hugging someone who is HIV positive.	145	81.0
Answer: False		
5.HIV is a virus that attacks and weakens which body system?	110	61.5
Answer: The immune system		
6.Can HIV infection be prevented?	117	65.4
Answer: Yes		
7.Are there medicines available to cure HIV?	85	47.5
Answer: No		
8.Which condition occurs most commonly when the immune system has been weakened by HIV?	79	44.1
Answer: Tuberculosis		

Frequency: No. of junior school participants who answered the question correctly.

provinces. The demographics show that 185 participants (73.1%) attended or had attended a government school, while the remaining 68 (26.9%) attended or had attended an independent school.

The first assessment regarding knowledge was to determine the number of participants who knew what a chronic disease is. Of these, 161 participants (63.6%) answered correctly while the remaining 92 (36.4%) answered incorrectly.

Pre-intervention results

The results from the pre-intervention questions are shown in Table 3.

The results of the pre-intervention study show that the participants had a fair prior knowledge of HIV/AIDS (overall percentage score 71.3%), its effects and how it can be prevented. The question with the lowest correct percentage

Table 2: Junior Quiz observed frequencies (with percentages) of correct responses for the pre- and post-intervention questions, and the means ± standard errors of pre- and post-intervention percentage scores (n=127)

Question	Pre-intervention	Post-intervention	p-value (1-sided)
1. What is HIV?	110(86.6%)	114(89.8%)	0.211
2. What does AIDS stand for?	101(79.5%)	103 (81.1%)	0.415
3. What is the difference between HIV and AIDS?	68 (53.5%)	73(57.5%)	0.266
4. True or False: You can you get AIDS from shaking hands or hugging someone who is HIV positive.	105(82.7%)	109(85.8%)	0.275
5. HIV is a virus that attacks and weakens which body system?	77(60.6%)	91(71.7%)	0.011*
6. Can HIV infection be prevented?	82(64.6%)	84(66.1%)	-
7. Are there medicines available to cure HIV?	58(45.7%)	61(48.0%)	0.441
8. Which condition occurs most commonly when the immune system has been weakened by HIV?	58 (45.7%)	60 (47.2%)	0.355
Mean ± S.E.	64.9 ± 4.0%	68.4 ± 3.8%	0.102

* = Significant at 5%
Pre-intervention: No. of participants who answered the questions correctly during the pre-intervention quiz
Post-intervention: No. of participants who answered the questions correctly during the post-intervention quiz

Table 3: Frequencies (counts and %) of correct answers for Senior Quiz (n =253)

Question with correct answer	Frequency	Frequency %
1. What is HIV?	156	61.7
Answer: A viral infection that weakens the immune system.		
2.What is Acquired Immunodeficiency Syndrome (AIDS)?	204	80.6
Answer: The immune system of a person with HIV has become weaker and the person gets sick quickly.		
3. Who can get infected with HIV?	224	88.5
Answer: Anyone		
4. In which case is a person most likely to get infected with HIV?	240	94.9
Answer: Coming into contact with blood from a person who has HIV while playing sport.		
5. How can you reduce the risk of HIV Infection?	237	93.7
Answer: Abstain from sex or use condoms correctly.		
6. How effective are condoms in protecting you against HIV infection?	192	75.9
Answer: Very effective, but not 100%.		
7. In which case would it be possible to reduce the transmission of HIV from a mother to a child?	131	51.8
Answer: In all pregnancies.		
8.Do AntiRetroViral medicines (ARVs) cure HIV and AIDS?	206	81.4
Answer: No, they do not cure HIV and AIDS. When used correctly ARVs slow down the damage to the patient's immune system.		
9.Which condition occurs most commonly when the immune system has been weakened by HIV?	184	72.7
Answer: Tuberculosis		
10.How is pulmonary (lung) TB spread from person to person?	31	12.3
Answer: Sitting in the same room as a person with TB.		

Frequency: No. of senior school participants who answered the question correctly.

score was "How is pulmonary (lung) TB spread from person to person?" for which only 12.3% of the participants answered correctly, while "In which case would it be possible to reduce the transmission of HIV from a mother to a child?" had the second lowest number of correct answers at 51.8%. The questions with the highest correct percentage score were "In which case is a person most likely to get infected with HIV?" and "How can you reduce the risk of HIV Infection?" for which 94.9% and 93.7% of the participants respectively answered correctly (see Table 3).

Comparison of pre- versus post-intervention results

77.1% (n=195) of the senior quiz participants who took part in the pre-intervention questions continued through to the post intervention questions. McNemar's dependent one-sided χ^2 test was used and the results are shown in **Table 4.**

The intervention resulted in a significant increase in correct responses (at the 1% level) to Questions 7 ("In which case would it be possible to reduce the transmission of HIV from a mother to a child?"), 9 ("Which condition occurs most commonly when the immune system has been weakened by HIV?"), and 10 ("How is pulmonary (lung) TB spread from person to person?") (P=0.004, 0.004, and 0.006, respectively).

The results showed significant gender differences for the pre-intervention mean percentage scores (at the 1% level of significance), and for the post-intervention mean scores (at the 10% level of significance) (pre: Male: 68.5 ± 1.9%, Female: 75.2 ± 1.4%, P=0.009; post: Male: 71.8 ± 2.1%, Female: 76.7 ± 1.5%; P = 0.059). No significant differences in mean percentage scores were found between participants from government and independent schools either before or after intervention (pre: Government: 72.9 ± 1.4%, Independent: 72.9 ± 2.2%; P=0.994; post: Government: 74.4 ± 1.4%, Independent: 76.7 ± 2.3%; P= 0.3903). Pre-intervention mean percentage scores are significantly greater in the older participants, but there is no significant difference in the post-intervention mean scores. The mean ± s.e.% scores of the participants in the age groups are: '13 years or under' (pre: 60.0 ± 8.9%; post: 83.3 ± 9.7%), '14 or 15 years' (pre: 65.6 ± 2.2%; post: 69.8 ± 2.4%), '16 or 17 years' (pre: 74.7 ± 1.7%; post: 75.5 ± 1.8%), and '18 years or over (pre: 76.9 ± 2.0%; post: 78.0 ± 2.1%) (ANOVA: pre: F=6.003, df =3, 191, P < 0.001; post: F=2.481, df =3, 191, P = 0.062). Although there appears to be a large difference in the pre- and post-intervention mean scores for the '13 years or under' group, this is not the case, as the sample size was insufficient (n=3) for p value determination.

DISCUSSION

This service-learning activity assisted in raising the level of HIV/AIDS awareness and its prevention among attendees of SciFest. The larger number of senior school quiz participants (253 senior compared with 179 junior school participants) may be attributed to high school learners being keen to explore both subject and career choices as well. 93.9% of junior quiz participants and 90.9% senior quiz participants were from the Eastern Cape and the majority (56.4%) attended government schools. It was encouraging that the government schools, many of which lack health- and science-related resources, made an effort to expose their students to health promotion activities at SciFest. With both junior and senior participants, there were no significant differences in

Table 4: Senior Quiz observed frequencies (with percentages) of correct responses for the pre- and post-intervention questions, and the means ± standard errors of pre- and post-intervention percentage scores (n=195)

Question	Pre-intervention	Post-intervention	p-value (1-sided)
1. What is HIV?	120(61.5%)	120(61.5%)	0.5
2. What is Acquired Immunodeficiency Syndrome (AIDS)?	165(84.6%)	157(80.5%)	0.093
3. Who can get infected with HIV?	173(88.7%)	177(90.8%)	0.226
4. In which case is a person most likely to get infected with HIV?	188(96.4%)	184(94.4%)	0.193
5. How can you reduce the risk of HIV Infection?	185(94.9%)	182(93.3%)	0.289
6. How effective are condoms in protecting you against HIV infection?	156(80.0%)	157(80.5%)	0.5
7. In which case would it be possible to reduce the transmission of HIV from a mother to a child?	100 (51.3%)	122 (62.6%)	0.004**
8. Do AntiRetroViral medicines (ARVs) cure HIV and AIDS?	167 (85.6%)	165 (84.6%)	0.415
9. Which condition occurs most commonly when the immune system has been weakened by HIV?	145 (74.4%)	160 (82.1%)	0.004**
10. How is pulmonary (lung) TB spread from person to person?	23 (11.8%)	39 (20.0%)	0.006**
Mean ± s.e.	72.9 ± 2.3%	75.0 ± 2.4%	0.104

* = Significant at 1%
Pre-intervention: No. of participants who answered the questions correctly during the pre-intervention quiz
Post-intervention: No. of participants who answered the questions correctly during the post-intervention quiz

mean percentages between government and independent school attendees in the pre- and post intervention questions. It was also pleasing to note that the majority of attendees from government schools were willing to participate in the computer-based quiz despite having minimal or no computer access or proficiency at school. The novelty of using computers with a minimal number of coloured-coded keys following simple instructions and assistance from the exhibit facilitators, together with the educational intervention, may have resulted in the increase in the interest to participate in the educational intervention.

There were significant gender differences with the pre- (males: 55.5%; females: 73.5%) and post (males: 62.7%; females: 73.7%) intervention mean percentage scores amongst junior quiz participants while the gender difference was limited to the pre-intervention scores in the senior quiz participants. Just over half the people around the globe infected with HIV/AIDS are young girls and women. Women in Sub-Saharan Africa aged 15-24 years experience a risk eight times greater than males of contracting the virus.[1] It is heartening to know that female participants are aware of the methods of transmission and prevention of HIV/AIDS.

Regarding knowledge, in answering, "What a chronic disease is," the majority of junior (61.5%) and senior (63.6%) participants answered correctly, indicating they understood the terminology of chronic disease. Overall, junior (64.5%) and senior (71.3%) quiz participants had a fair prior knowledge of HIV/AIDS, its effects and prevention. Youth being aware of the disease, its transmission and prevention may assist in reducing future infection rates. It is heartening that junior quiz participants improved significantly after the intervention when asked "which system is attacked and weakened by HIV" (pre: 60.6%; post: 71.7%). Senior quiz participants displayed poor knowledge when asked in which cases it would be possible to reduce the transmission of HIV from a mother to child (pre: 51.3%; post: 62.6%) and "how pulmonary (lung) TB spreads from person to person" (pre:11.8%; post: 20%) but both improved significantly after the intervention.

While 70.1% of junior quiz participants completed the post-intervention questions, the intervention did not lead to a significant increase in participants' knowledge of HIV/AIDS. This trend was also noted in the senior quiz where 77.1% of participants completed the post-intervention questions. A health promotion exhibit does not facilitate "controlled" exposure to the educational interventions. It is left to the discretion and speed of the participants to read and understand the educational intervention slides on the computer and due to time pressures they may not be paying attention to or may not understand the information provided, despite having access to people who could provide the information. Based on the current HIV/AIDS prevalence and incidence statistics, especially amongst the youth, there is definitely a need for more effective HIV/AIDS awareness and prevention health-promoting activities. The use of computer-assisted instruction (CAI) and computer-delivered intervention activities has the potential to be successful to motivate and reach larger numbers of people, provide auditory and visual information, create opportunities for active learning and maintain confidentiality in addressing HIV/AIDS and the prevention thereof. It also creates a beneficial environment to deal with the sensitivity of HIV/AIDS compared to the traditional approach of didactic lecture delivery.[17,18]

Limitations of the study

SciFest was held five weeks after the beginning of the academic year thus there was limited time to develop and pilot test the quizzes. Pilot testing was directed at grade 10 and 12 learners only and did not include grade 8, 9 and 11 learners, which would have been more representative of all senior school learners. All members of the community were able to attend SciFest and therefore participation in the quizzes could not be restricted. SciFest attendees of all ages, including those who had already left school, who were eager to participate, could not be refused and thus the implementation of research-based controlled activities was not possible. Some of the post-intervention quizzes were not completed. Prior commitments e.g. attendance of other workshops/lectures and reliance on school transport were reasons given for not completing the quizzes. A further limitation is that the intervention only took place during a few days of SciFest and although this innovative and interactive health promotion activity generated interest regarding HIV/AIDS amongst various junior and senior quiz participants, ongoing health promotion activities are required to encourage changes in lifestyles which could reduce the incidence of HIV/AIDS.

CONCLUSION

This service-learning activity designed as health promotion exhibits at SciFest created opportunities not only to disseminate HIV/AIDS information in the community but also to increase awareness of the transmission, prevention, incidence and prevalence of this fatal epidemic. If health promotion activities such as these are further developed and implemented it may result in decreased rates of death and disability, especially in developing countries such as South Africa where the incidence of HIV infection is high. Service-learning activities provided future pharmacists an opportunity to interact with the community who benefited with new learning opportunities to prevent diseases such as HIV/AIDS.

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