

Evaluation of a Training DVD on Pneumococcal Conjugate Vaccine for Kenyan EPI Healthcare Workers

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ABSTRACT

Background: The Kenyan Ministry of Public Health and Sanitation was the first in Africa to introduce the new 10-valent Pneumococcal Conjugate Vaccine, PCV-10, in 2011. For successful implementation and to avoid adverse events following immunisation, specific training on handling and storage of the PCV-10 vaccine was required. Therefore, a training DVD was recorded in English and partly in Kiswahili to be used in combination with in-classroom training. Since the Kenyan Immunisation Programme was the first to use a DVD for training healthcare workers, an evaluation was done to obtain feedback on content, format and use, and propose suggestions to improve quality and uptake of the DVD. **Methods:** Feedback was obtained from nurses and vaccinology course participants through the completion of a questionnaire. Nurses also participated in focus group discussions and trainers in key informant interviews. **Results:** Twelve trainers, 72 nurses and 26 international vaccinology course participants provided feedback, with some notable differences between the three study groups. The survey results confirmed the acceptability of the content and format, and the feasibility of using the DVD in combination with in-classroom teaching. To improve the quality and adoption of the DVD, key suggestions were: Inclusion of all EPI vaccines and other important health issues; broad geographic distribution of the DVD; and bilingual English/Kiswahili use of languages or subtitles. **Discussion:** The Kenyan DVD is appreciated by a heterogeneous and international audience rendering the DVD suitable for other Anglophone African countries. Differences between feedback from nurses and vaccinology course participants can be explained by the practical approach of the DVD and the higher education and service level of the latter. A drawback is the use of DVD players and televisions due to lack of electricity, but it is a matter of time before all rural health facilities in Africa will have access to electricity and modern technology.

Keywords: Expanded programme on immunisation, Kenya, pneumococcal conjugate vaccine, training DVD

Background

Introducing a new vaccine into the routine immunisation programme in Kenya can be an opportunity to refresh the knowledge of healthcare workers on all aspects of the Expanded Programme on Immunization (EPI) and emphasize topics related to the new vaccine: Details regarding the target

disease and aspects of the new vaccine (schedule, safety, efficacy and adverse events following immunisation); storage, handling and administration of the vaccine; registration and reporting the number of doses administered; handling of waste; etc.^[1] A common technique in low-income countries to train many healthcare workers within the available time and resources is cascade training.^[2] Core trainers at a national level are trained and are then responsible to train others at provincial/regional levels, which in turn provide training at the district level, and so on. A drawback of the cascade

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training approach is that the same training quality throughout the different training levels is not guaranteed; the lower on the cascade, the more diluted the message and the shorter the training period.^[2,3] Multimedia technology such as a DVD, in combination with in-classroom training, can help to deliver standardized undiluted messages to all levels of staff of the immunisation programme.

The Ministry of Public Health and Sanitation (MoPHS) of Kenya was the first in Africa to introduce the new 10-valent Pneumococcal Conjugate Vaccine, PCV-10, in 2011. The vaccine prevents thousands of children from dying due to meningitis, pneumonia and bacteraemia caused by the bacterium *Streptococcus pneumoniae*, also called “pneumococcus”. The vaccine is fully liquid and presented in a two-dose vial. As the vaccine does not contain a preservative, opened vaccine vials need to be discarded six hours after opening the vial or at the end of the immunisation session, whichever comes first. This is not in line with the standard practice that healthcare workers are accustomed to: Only the reconstituted vaccines are discarded after six hours or at the end of the immunisation session, while liquid multi-dose vials with preservative can be used in subsequent immunisation sessions for up to four weeks after opening the vial, if properly stored in the refrigerator, not expired and the Vaccine Vial Monitor (VVM) has not reached the discard point.^[4] As a consequence, specific training on handling and storage of the PCV-10 vaccine was required in order to avoid Adverse Events Following Immunisation (AEFIs).

In this context, the MoPHS in collaboration with the Network for Education and Support in Immunisation (NESI)/University of Antwerp (UAntwerp) and the World Health Organization (WHO) developed a training DVD [Figure 1] to be used in combination with in-classroom training. The ease of use, the possibility to playback and the ability to deliver important standard and consistent messages at all levels were seen as key benefits of this training DVD.

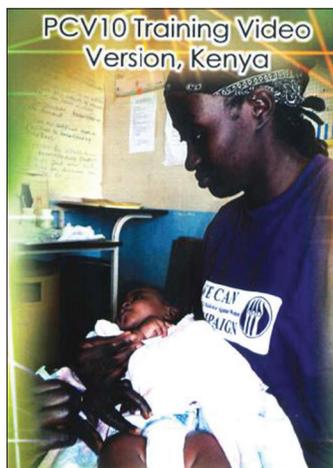


Figure 1: Cover of the training DVD on PCV-10 introduction in Kenya

The script of the training DVD was jointly developed by the MoPHS, NESI/University of Antwerp and WHO, in line with the Kenyan immunisation practices and global recommendations from WHO. The Kenyan authorities approved the filming locations and casting of individuals. Filming was done by the Audio-Visual Department of the University of Antwerp. At all times during the filming, two representatives of MoPHS and one representative of WHO Kenya were present, to facilitate entrance at the different locations and to ensure correctness of the immunisation practices filmed. Editing of the DVD was done at the University of Antwerp. The draft DVD was extensively reviewed during several training workshops at the national level in Kenya, after which the DVD was finalised taking all recommendations from facilitators and participants into consideration. As the DVD is filmed in Kenya, showing real-life examples of healthcare workers at work and putting procedures into context, healthcare workers can easily identify with the presentation.

The target audiences for this DVD are the healthcare workers who vaccinate, their supervisors, as well as other immunisation staff at district and national levels. The content of the DVD is outlined in Table 1. After each chapter, a quiz appears with questions and answers (Q/A) related to the previous chapter to summarize and emphasise the most important points. The DVD also provides the option to view the entire quiz after viewing the whole DVD, instead of after each chapter. The duration of the DVD is 40 minutes and is recorded in English, except for the communication part, where Kiswahili is used with English subtitles.

Prior to the introduction of PCV-10, Kenyan EPI healthcare workers were trained with a blend of in-classroom teaching (using supportive slides) and the DVD. Since the Kenyan EPI was the first to use a DVD for training healthcare workers, an evaluation was carried out by an independent expert in eight selected counties in Kenya to obtain feedback regarding the use and the perceived value of the DVD by trainees (nurses) and trainers working in the immunisation programme:^[5] Nairobi in Nairobi Province, Kirinyaga in Central

Table 1: Outline and duration of training digital versatile disc on pneumococcal conjugate vaccine, 10-valent pneumococcal conjugate vaccine, for training of healthcare workers in Kenya on the introduction of 10-valent pneumococcal conjugate vaccine into the national immunisation programme

Chapter	Duration
Introduction and opening statements	3 min, 10 s
Chapter 1: Pneumococcal diseases	6 min
Chapter 2: Pneumococcal vaccine	7 min, 30 s
Chapter 3: Storage and handling	6 min
Chapter 4: Immunisation session	6 min, 20 s
Chapter 5: Communication	9 min
Conclusion and key messages	2 min

Province, Mombasa in Coast Province, Narok and Kajiado in Rift Valley Province, Marsabit in Eastern Province, Kisumu in Nyanza Province, and Busia in Western Province [Figure 2].

In addition to feedback from nurses and trainers from EPI Kenya, results of a third study group are included in this analysis. A group of participants attending a one-week African regional Vaccinology course in Nairobi, Kenya (19-24 March 2012) provided feedback immediately after watching the DVD. Their opinion was valued because of their international background and expertise as EPI managers or teachers at nursing and medical schools.

The overall aim of the research was to evaluate the feasibility of using a DVD for training healthcare workers on PCV-10 vaccine, with specific objectives to: (1) Assess the acceptability of the content and format of the PCV-10 training DVD; (2) establish the feasibility of using a DVD for training of healthcare workers on introduction of new vaccines; and (3) suggest ways to improve the training DVD to increase its quality and adoption among healthcare workers.

Methods

A mixed methods approach was used to obtain feedback from the three selected study groups: Nurses, teachers and vaccinology course participants. Questionnaires, focus group discussions and interviews were used to collect quantitative

and qualitative data. The questionnaire was developed jointly by WHO, MoHPS and NESI, and after several revisions tested at the national level in Kenya.

Nurses

From each of the eight counties, 10 nurses who had previously attended the PCV-10 training using the training DVD were invited to participate in the evaluation. They were trained six months before the evaluation. Out of the 80 invitations, 72 nurses participated in the study. First, the nurses completed a structured questionnaire which was a combination of qualitative open-ended questions (e.g. aspects of the DVD remembered best, missing parts, advantages of the presentation, disadvantages, and suggestions for improvement) and quantitative close-ended questions (clarity of sound, clear visuals for vaccine administration, preference for English subtitles or not, Q/A after each chapter or at the end of the DVD, and relevance of communication scenes). Second, the nurses participated in Focus Group Discussions (FGDs) after watching the DVD a second time. There was one FGD conducted in each of the eight selected counties. FGDs often reveal more information than one-to-one interviews when group dynamics work well. People can give their opinion in their own words, using anecdotes and real life experiences, stimulated by the group atmosphere.^[6] This technique is very suitable in the African context, where oral traditions are highly valued.

Trainers

Managers and officers at the national, provincial and district levels from the selected counties were interviewed in their role as cascade trainers. In each of the eight counties, one officer at the management level participated in the study. In the county Nairobi, where the national level is housed, an additional four managers participated in the study. Semi-structured, face-to-face Key Informant Interviews (KII) were used to obtain feedback. KII are qualitative in-depth interviews with people who have a specialized knowledge about the topic.^[7]

Vaccinology course participants

These course participants watched the DVD (without face-to-face training) and completed the same structured questionnaire as described above for the nurses.

For all participants, questionnaire data were examined using SPSS version 15 (SPSS Inc., Chicago, IL, USA). The audio files of the focus group discussions and the key informant interviews were transcribed and coded using NVivo programme (QSR International Pty Ltd, Melbourne, Australia) by an independent expert.

Results

Seventy-two nurses, mainly Kenya enrolled community nurses, completed the questionnaire and participated in the FGDs.

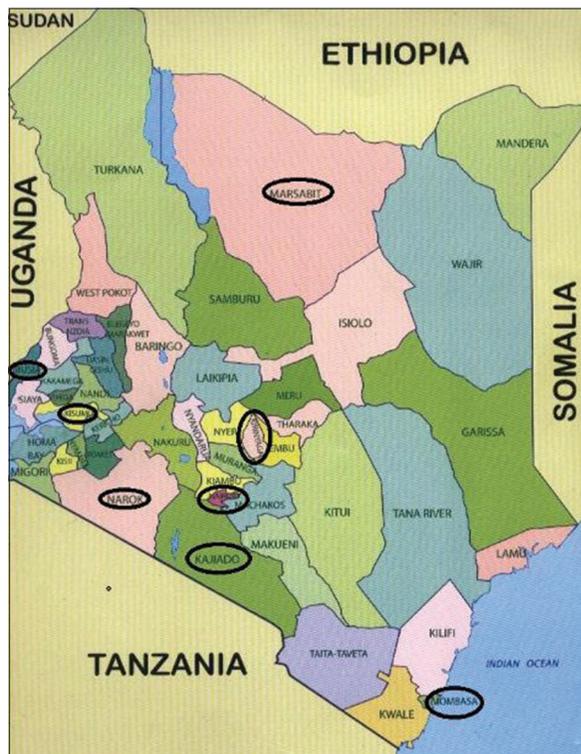


Figure 2: Map of all counties (47 in total) in Kenya; The 8 counties covered by the survey are encircled (map from softkenya.com)

One-half had been in service for at least 10 years. They came from 71 different health facilities spread across 19 districts in the eight selected counties. The mean age was 38 years, ranging from 23 to 57 years.

In total, 12 teachers who trained nurses on PCV-10 were interviewed: Five at the national level and seven at the provincial/district level. They used the DVD as a training tool in combination with training slides.

Twenty-six participants in the vaccinology course completed the questionnaire. Participants represented Ethiopia, Gambia, Ghana, Kenya, Liberia, Malawi, Nigeria, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

Following is a summary of results by each objective. The participants signed a consent form before the start of the study (except the vaccinology course participants).

DVD content and format

In response to the question “what do you remember best in the DVD?”, 29.4% of the 72 nurses responded “the communication part” (nurse informing caregiver about the vaccine). Other top-mentioned answers were vaccine administration (23.5%), vaccine presentation and storage (20.6%) and the opening interview with the professor (19.1%).

All nurses found the communication scene and the Questions/Answers (Q/A) section in the DVD relevant. Over three-quarters (77.9%) preferred the Q/A section appearing immediately after every chapter. Nine percent felt that there was something missing in the DVD. For example, they mentioned removal and return of the vaccine to the refrigerator, incorporation of other EPI vaccines and handling of adverse reactions. Most of the respondents (92.6%) found the visuals on vaccine administration clear, 91.3 % found the sound clear enough and 80.3 % preferred subtitles in English. A quote from the FGD summarizes this information:

“The DVD is well arranged, the questions after every chapter were good on reminding the trainees of what they have learned...Short and clear more practical, after every session asking questions was the main issue so it’s easy to absorb everything and motivates” (FGD, Kajiado District).

Trainers found the content and format of the DVD adequate: “The format was alright because there was not too much drama; it was well formatted, it looked like a serious topic and just relevant to the situation... The time was right because it was partitioned into segments and one didn’t have to sit through and watch all at once. It was partitioned into topics and was played after each topic for discussion; it

acted as a complementary tool to the training” (KII, Nairobi Province).

Trainers also appreciated that the DVD showed in detail how to store, transport, administer and discard waste: “the DVD showed how to withdraw the vaccine, even the angle with which to withdraw the vaccine. So we didn’t have many technical problems when we went to implement the new vaccine” (KII, Nairobi Province).

Of the vaccinology course participants, 41.7% most highly evaluated the administration of the vaccine, followed by the communication scene (37.5%), the Q/A part (16.7%), and the vaccine characteristics (two-dose, without preservative) and the summary at the end (both 12.5%). The majority of the course participants (96.2%) preferred Q/A after every chapter. All were satisfied with the sound and 80.3% found the duration of the DVD appropriate and the vaccine administration visuals clear enough. A total of 58.3% would have preferred English subtitles. All 26 participants found the scene of the nurse communicating with the mother and the Q/A part relevant and most of them (96.0%) would use the DVD to train their healthcare workers. One-third of the respondents found that something was missing. In this regard, they would have liked information on social mobilization activities (media, involvement of chiefs, political leaders, etc.) and tools (posters, banners, leaflets). They also suggested demonstration of the shake test instead of just mentioning performing the test, when freezing was suspected.

Feasibility of using a DVD for training healthcare workers on new vaccine introduction

The fact that audio-visuals make the subject and contents easy to remember was mentioned as an advantage by 40.6% of the nurses. Other reactions were: It is practical as one can see how things are done (30.4%), the DVD is available for later reference (23.2%), and the DVD is informative, clear and easy to understand (13.0%). Similar reactions were elicited in the FGDs:

“It is very relevant, very much educative and actually it is very receptive on the trainees and I feel it is very good. Yes, I think it’s a very good instrument for teaching, it is quite relevant and it shows and it is more or less like a practical session... so I think it’s a good tool of learning” (FGD, Marsabit District).

Nurses particularly liked the fact that the DVD was filmed in Kenya, so they could identify with it. This created a sense of ownership and made it more acceptable.

A number of disadvantages were reported in the questionnaire, some of them related to issues if the DVD is being used as a

stand-alone tool for self-training, rather than used during face-to-face training. Specific disadvantages included: Not able to play the DVD if the health centre has no DVD player and/or television (30.4%); lack of electricity in facilities (23.2%); no opportunity to ask questions and seek clarification if watched without face-to-face training (16.1%); and the language barrier for non-English speakers (8.9%).

All nurses found the DVD useful and reported that they would recommend the DVD to their colleagues. Other relevant feedback included that the DVD could be used as reference material, the audio-visual tool makes learning easy and the training session more interesting, and that they would like training DVDs for other vaccines as well.

The trainers agreed that a DVD can help standardize the content of the training. Previously, there were some challenges with consistency during cascade training, causing confusion among healthcare workers. The DVD was found to be novel, interesting and suitable in terms of accessibility and convenience. The trainers noticed that the DVD was well-received as an educational tool, especially because it was adapted to the Kenyan context. Many healthcare workers were able to identify themselves with the healthcare workers in the DVD. The information in the DVD was consistent and it could be used for reference in the future. Of concern was the lack of infrastructure, such as access to electricity, computer and DVD players, especially in rural facilities.

Fifty percent of the vaccinology course participants mentioned that it is easy to remember what one sees and hears. Other benefits mentioned were: Delivery of standardized messages with no variation from session to session (20.8%); use of the DVD outside formal teaching sessions and the possibility to playback the DVD to increase understanding of information (16.7%). Another 8.3% mentioned that the DVD addresses key issues (the correct injection site, discarding the vial six hours after opening, etc.) and is to the point. Specific disadvantages mentioned were: The DVD cannot stand on its own, where an expert/trainer has to be present each time (22.7%); concentration on the pictures/images instead of the intended message (18.2%); and the length of the training session can be prolonged by showing the DVD (13.6%). Eight respondents indicated "no disadvantages".

Suggestions to improve the quality and use of the DVD

Nurses had the following suggestions to improve the DVD: Make the DVD accessible to every healthcare facility; the DVD should include other issues of health importance, e.g. reproductive health; include more information and demonstration of injection procedures; and use both English and Kiswahili in narrations (or subtitles).

The trainers suggested expanding this technique for future new programmes, as it is very feasible to combine a DVD with classroom training.

Finally, vaccinology course participants gave similar suggestions as the nurses: Develop a Kiswahili version; send the DVD to all health centres, so new staff could watch the DVD; use the DVD to educate caregivers; and develop a comprehensive DVD which includes all EPI vaccines.

Discussion

Acceptability of the content and format of the PCV-10 training DVD

Content and format were considered adequate by all study groups. Important issues such as vaccine administration and the healthcare worker-caregiver communication are well-remembered. The Q/A sections are found relevant. Visuals, sound and duration scored high (more than 80% of the audience was satisfied with these features). Ninety-six percent of the vaccinology group would use this DVD to train healthcare workers.

Feasibility of using a DVD for training of healthcare workers on introduction of new vaccines

The Kenyan DVD was appreciated by a heterogeneous audience, and positive feedback was given not only by the Kenyan nurses and trainers but also by the international attendees of the vaccinology course (13 different countries from sub-Saharan Africa).

Moreover, the Madagascan EPI used the Kenyan DVD with a French voice-over. This translated version can be used for other Francophone African countries. Ethiopia and Mozambique completely re-filmed the DVD using the same script but translated in Amharic (main language in Ethiopia) and Portuguese (Mozambique) and adapted it to the local situation. These examples help confirm that the DVD is a suitable tool for training healthcare workers on new vaccine introduction. The DVD can be used in other African countries despite the Kenyan setting or with voice-over, or as in the case of Ethiopia and Mozambique be adapted to the local situation but keeping the same format and content.

Further advantages include effective teaching due to combined text and images, use of the DVD for later reference and standardization of teaching material. Together they outweigh disadvantages such as possible lack of electricity or DVD player which are to be overcome one way or the other.

Suggestions to improve the training DVD to increase its quality and adoption among healthcare workers

Useful suggestions, such as including other EPI vaccines and health issues, were given and can be considered for future

versions of the DVD. Both nurses and vaccinology course participants suggested widely distributing the DVD. Although lack of electricity, DVD players and televisions are considered by many people as a drawback (especially in rural areas), it is a matter of time before rural facilities in Africa will have access to electricity and modern technology. Data management will also be more digitalized in the future. Also, the increasing trend and interest in e-health, online distance learning programmes and audio-visual techniques in resource-limited settings makes investments in computers and other technology worthwhile.^[8-10] The adoption of smart phones should not be ignored.^[11] Mobile or m-learning is already evaluated as an appropriate training tool in resource-limited settings.^[12] Mobile phones could, in this case, be used to watch the training footage as a reference at any time.

Differences in feedback between nurses and vaccinology course participants

There were considerable differences in feedback from nurses and vaccinology course participants on two main issues. Nine percent of the nurses indicated that something was missing in the DVD, in comparison with one-third of vaccinology course participants. This can be explained by the practical approach of the DVD, which is mainly intended to train nurses and the higher service and education level of the vaccinology course participants. The other notable difference was the request for subtitles; 58.3% of the vaccinology course participants compared to 80.3% of the nurses. Vaccinology course participants are used to English as they often work in an international context; nurses use local language during their daily work. As suggested by both groups, subtitles or a version in the local language can be a solution.

Study strengths and weaknesses

The strength of the study is the feedback on the DVD by different groups (nurses, teachers, international course participants). This will assist to develop training DVDs taking the specific needs of each target group into consideration.

A limitation of this study is the fact that it did not examine the impact of the DVD on knowledge and attitudes of the healthcare workers regarding the new vaccine. A study measuring the impact of training with and without the use of the DVD could be of great interest and serve as a guide for future development of training DVDs.

At the onset, this study was primarily qualitative research, for which 72 interviewees in focus group discussions is an appropriate sample size. Therefore, a potential limitation of this study towards the quantitative interpretation of the questionnaire responses is the smaller sample size yielding not sufficient statistical power with respect to the 4500 nurses that, in total, were trained with the DVD.

Conclusion

Overall, surveys of three different groups (Nurses, Trainers, Vaccinology Course Participants) confirmed the appropriateness of the content and format of the DVD. Using a training DVD in combination with face-to-face classroom teaching when introducing new vaccines, such as PCV-10, was found feasible and very useful. Due to the appropriateness of this training technique, the inherent advantage of demonstration, rather than just teaching, ensured the consistency of the content passed onto the staff at different programme levels and supported the idea that the method could be used for other EPI vaccines in routine immunisation.

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Conflicts of interest

There are no conflicts of interest.

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