

Evaluation of an online training for healthcare workers on the health information management system (HIMS) for screening of Non-Communicable Diseases (NCD)

Vindya Kumarapeli¹, Sinha De Silva² Casthuri Kandasamy¹
Dhanushka Abeygunathilake¹ Nimani de Lanerolle¹ Chithramali Rodrigo¹
Uthpala Muhandiram¹

¹Directorate of Non-Communicable Diseases, Ministry of Health, Sri Lanka

²Postgraduate Institute of Medicine, University of Colombo, Sri Lanka

Abstract:

Background: Rapid rise in non-communicable diseases (NCD) has become a major public health challenge in Sri Lanka. Healthy lifestyle centers (HLCs) were established in 2011 for screening of NCDs and risk factors with majority of them functioning at primary care institutions. A web based HIMS-HLC module was developed to gather screening data from HLCs. Objective of the study was to assess the post-training status of the Healthcare workers (HCW) conducting HLCs trained on HLC-HIMS module in Sri Lanka.

Materials and Methods: A descriptive cross-sectional study was carried out in June 2021 among 119 HCW attached to the HLC trained on HLC-HIMS module selected using simple random sampling. The questionnaire was formulated based on Kirkpatrick model covering four domains i.e., reaction, learning, behaviour and result. Data were collected by using a pre-tested self-administered questionnaire by the means of a google form shared via online platforms; e mail and WhatsApp and Viber after obtaining informed written consent. Data were analyzed by using descriptive statistics and associations were determined by using chi square test.

Results: The response rate was 87.3% (n=104). Mean age 40.4 years (SD = 8.0 years) with majority in 36-50 years group (52.9%, n=55). Of participants, females 73.1% (n=76), nursing officers 70.2% (n=73) good computer literacy 61.5% (n=64). Only one third had overall good knowledge (37.5%, n=39) regarding the HIMS-HLC module. However, 74.0% (n=77) had favourable reactions, 78.8% (n=82) had favourable behaviour and 83.7% (n=87) had favourable results following HIMS training. Younger age and good computer literacy were significantly ($P < 0.05$) associated with favourable reactions, behaviour and results.

Conclusion: HIMS training has given favourable outcomes in majority of the participants especially in reaction, behavior and results following training. The concept of e-training can be adopted for the in-service training of HCW including those working at PHC level to combat the difficulties in conducting physical trainings during a pandemic. A special emphasis should be added for participant's age and computer literacy when such trainings are designed.

Key Word: NCD; HIMS; Healthy Lifestyle Centres; post-training evaluation.

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I. Introduction

The rapid rise in non-communicable diseases (NCD) has become a major public health challenge in Sri Lanka accounting for more than 83 percent of deaths (WHO 2018b). The NCDs largely affect lower- and middle-income households by increasing their health care costs (WHO 2018a). Therefore, focusing on low-cost solutions such as risk factor reduction and early screening is more beneficial.

Healthy lifestyle centers (HLCs) were established in Sri Lanka in 2011 for screening of NCDs and risk factors thereby preventing the endpoint of cardiovascular Disease (CVD), through timely interventions. There are 1022 HLCs in Sri Lanka with majority of them functioning at primary care institutions. Personal medical records (PMR) are given to the clients who attend HLC in order to preserve patient history and improve data management.

Health Information system is one of the six core components that are essential for health system strengthening those analyses and protects both traditional and digital medical information essential for quality of care (WHO, 2010) ("Health information management - Wikipedia", n.d.). Hospital Information Management system (HIMS) is a core part of Health Information system. A web based HLC-HIMS module for NCDs and risk factors developed by the Health Information Unit (HIU) with the technical guidance of Directorate of NCD has been implemented in 2020 under Primary Healthcare System Strengthening Project (PSSP) to gather NCD

screening data from HLCs. Although training of healthcare staff has been conducted regularly in the past on paper based HLC formats, a fresh training was required at the introduction of the web based HLC-HIMS module and subsequently to refresh staff's knowledge, upgrade their competency and ensure data quality. The Strategic Information Management unit (SIM) of the Directorate of NCD along with HIU is responsible for training health staff conducting HLCs on the web based HLC-HIMS module. Training was given on client registration, PHN generation, entering client's details, CVD risk assessment, referral and follow up.

Training is considered an investment as it helps us acquire the required knowledge and skills which in turn plays a positive role in an institution or organization's efficient conduct (Karim, Huda & Khan, 2012). This COVID-19 era has made physical training impossible and gave rise to e-learning concept where participants can join training from their respective workstations. The Directorate of NCD and the HIU conducted consultative meetings to overcome the difficulties faced by HCW in continuing their training in the COVID19 pandemic and initiated the e-learning concept to train them on web based HLC-HIMS module.

Any form of training requires post-training evaluation to determine its' effectiveness (Srivastava & Agarwal, 2012). Post-training evaluation of e-learning is important as it's fairly new to our health staff and quite different from traditional classroom type leaning (Dolan, Hancock, & Wareing, 2015) (Sims, Dobbs, & Hand, 2010). Evaluation of training given on the HLC-HIMS module would ensure quality of services given at HLCs, increase the sustainability and get rid of shortages found among respondents on their knowledge. In addition to this, post-training evaluation would aid in identifying short comings of the training, methods to rectify that in the subsequent trainings and helps identify the success of the programme (WHO training evaluation guide, 2021). Assessment of participant's knowledge after training is the best way to know the effectiveness (Training Effectiveness | Training Development | CDC, 2021). In addition to learning aspect, it's essential to assess how participant feel about the training, and whether candidates are able to implement their learning in their workplaces (Topno, 2012). The objective of the study was to assess the post-training status of the healthcare workers (HCW) conducting HLCs trained on HLC-HIMS module in Sri Lanka

II. Material And Methods

A study was carried out during June 2021 among HCW i.e., Medical Officers, Nursing Officers, Public Health Nursing Officers, Development Officers, Health Management Assistants attached to the HLC trained on HLC-HIMS module

Study Design: A descriptive cross-sectional study

Study Location: Training on the HLC- HIMS module had been conducted covering all nine provinces of the country.

Study Duration: One month

Sample size: 119 participants.

Sample size calculation: The final sample size was calculated using formula $n = Z^2 P (1-P) / d^2$ (Lwanga and Lameshow, 1991). The expected proportion (P) of individuals with adequate knowledge was taken as 50% due to unavailability of data which gave the largest sample size, Z was taken as 1.96 corresponding to a confidence interval of 95%. As the trained number is known i.e 160, finite correction was done to obtain the required sample size using the formula $= SS / [1 + \{(SS - 1) / Pop\}]$ (Hansen and Hurwitz 1943). With consideration of 5% non-response rate, final sample size was 119.

Subjects & selection method: Simple random sampling technique was used to recruit the participants to the study. All the HCW who received training were listed in alphabetical order, each were given a unique identification number, and the required sample was identified by using computer generated random numbers. The recruited participants were contacted via online platforms such as e mail and WhatsApp and Viber.

Procedure methodology

The questionnaire was formulated based on Kirkpatrick model covering four domains i.e. reaction, learning, behaviour and result. Computer literacy was assessed on a Likert scale of 1-7. Responses for reaction, behaviour and result were assesses on a Likert scale of 1-5. The face, content and consensual validity of the questionnaire was ensured by reviewing it by a panel of experts. Data were collected by using a pre-tested self-administered questionnaire by the means of a google form after obtaining informed written consent.

Statistical analysis

The data was analyzed using descriptive statistics. SPSS version 21 package was used for data analysis. Scores for computer literacy: 1-4 were taken as poor, 5-7 were taken as good. Knowledge: every right response was given a score of 10 and total score was calculated out of 100 by using ten equally weighted question. Participants who scored 50 and above were considered to be having good knowledge. For reaction, behaviour and result: overall mean score 3.01-5.0 was taken as favourable and scores 1.00-3.00 were taken as unfavourable. The domain-wise results i.e. reaction, learning, behaviour and result were presented as numbers and percentages. The associations between the status of response to domains and selected factors were determined by using chi square statistics.

III. Result

The response rate was 87.3% (n=104). The study population had a mean age of 40.4 years (SD=8.0 years) with majority being in 36-50 years age group (52.9%, n=55), with 26-35 years 33.7% (n= 35) and 51-60 years 13.5% (n=14). Majority were females (73.1%, n=76) and nursing officers (70.2%, n=73). Other categories were: Medical Officer 15.4% (n=16), Public Health Nursing Officer 8.7% (n=9), Development Officers 3.8% (n=4) Public Health Midwife 1.9% (n=2). Of the participants, 95.2% of them were equally distributed among all three types of divisional hospitals: type A 34.6% (n=36), type B 33.7% (n=35), type C 26.9% (n=28) and PMCU 4.8% (n=5). Out of the participants, 61.5% (n=64) had good computer literacy.

The frequency distribution of the participants by correct response for the knowledge questions are as follows (Table 1).

Table 1: The frequency distribution of the participants by correct response for the knowledge questions (n=104)

Statement	N	%
1. Number of digits in the Personal Health Number	30	28.8
2. Specification of first 4 digits in the Personal Health Number	83	79.8
3. Importance of entering client's address	83	79.8
4. Sequence of entering GN division and DS area *	52	50.0
5. Importance of entering client's MOH area	33	31.7
6. Knowledge on retrieving client's profile in the absence of client's Personal Health Number	49	47.1
7. Knowledge on number of Personal Health Numbers that can be reserved	12	11.5
8. Importance of entering both RBS and FBS values to calculate CVD risk**	35	33.7
9. Importance of entering total cholesterol values to calculate CVD risk	94	90.4
1. Importance of details on client's unhealthy lifestyle behavior to calculate CVD risk	66	63.5

*GN – Grama Niladari division, DS- Divisional Secretariat

** RBS – Random Blood Sugar , FBS- Fasting Blood Sugar

Table 2 summarizes the distribution of participants by their reaction, behavior and result following HIMS training. More than 60% of the participants either agreed or strongly agreed that they were overall satisfied with the training including time spent, course material, style of training, motivation and would recommend HIMS training to a colleague. More than 60% of the participants either agreed or strongly agreed that they have used HIMH-HLC module, felt supported/motivated and was able to change the work environment following the training. Of them 66.3% (n=82) either agreed or strongly agreed that there are obstacles preventing them from using new skills gained. More than 70% of the participants either agreed or strongly agreed that they perform better, make less errors, data entry is quicker, efficient, and have reached the targets of NCD screening at HLC following the training.

Table 2 : Frequency distribution of participants by their reaction, behavior and result following HIMS training (n=104).

	Strongly disagree No. (%)	Disagree No. (%)	Neutral No.(%)	Agree No.(%)	Strongly agree No.(%)
Reaction					
I am overall satisfied with the HIMS training	06 (5.8)	20(19.2)	10 (9.6)	41(39.4)	27(26.0)
The HIMS training was an effective use of my time	05(4.8)	15(14.4)	17 (16.3)	30 (28.8)	37 (35.6)
The course covered enough materials	06 (5.8)	12 (11.5)	21(20.2)	39 (37.5)	26 (25.0)
The HIMS training addressed the needs in my role in the HLC	03 (2.9)	18 (17.3)	15 (14.4)	41(39.4)	27 (26.0)
The training style e.g pace, method of delivery worked for me	05 (4.8)	10 (9.6)	23 (22.1)	45 (43.3)	21 (20.2)
The training motivated me to use HIMS in the hospital	03 (2.9)	14 (13.5)	22(21.2)	29 (27.9)	36(34.6)
I will recommend this training to my colleagues as well	05 (4.8)	12 (11.5)	17(16.3)	37(35.6)	33(31.7)
Behaviour					
I use what I learnt in the HIMS training in my daily work	0(0.0)	12(11.5)	10(9.6)	46(44.2)	36(34.6)
There are obstacles preventing me from using my new skills gained through the HIMS training	12(11.5)	12(11.5)	12(11.5)	44(42.3)	24(23.1)
I felt supported and motivated to use the new skills that I have learnt from HIMS training	03 (2.9)	10(9.6)	22(21.2)	37(35.6)	32(30.8)
I was able to make my work environment supportive to use what I have learnt in the HIMS training	06(5.8)	13(12.5)	15(14.4)	44(42.3)	26(25.0)
Results					
I feel that I have performed better since training	0.0(0.0)	10(9.6)	12(11.5)	49(47.1)	33(31.7)
Now I am making less errors and getting the data entry done more quickly and efficiently	05(4.8)	09(8.7)	11(10.6)	30(28.8)	49(47.1)
Now the problems related to data entry due to less knowledge is minimal	03(2.9)	07(6.7)	17(16.3)	47(45.2)	30(28.8)
Health information unit of Ministry of health is pleased with our improvements	02(1.9)	08(7.7)	20(19.2)	50(48.1)	24(23.1)
This training helped us to reach our targets easily	01(1.0)	10(9.6)	12(11.5)	49(47.1)	32(30.8)

When categorized into good and poor knowledge, only one third of the participants had overall good knowledge (37.5%, n=39) regarding the HIMS-HLC module. When categorized into favourable and unfavourable categories based on the overall mean score obtained, 74.0% (n=77) had favourable reactions, 78.8% (n=82) had favourable behaviour and 83.7% (n=87) had favourable results following HIMS training.

Table 3 summarizes the association between participants' characteristics and their level of knowledge, reaction, behaviour and results. The association between type of the occupation and status of the knowledge was statistically significant. The MO/PHNO group has 0.14, or 14%, of the odds of having poor knowledge as the NO/DO/PHM group.

When the status of reaction was compared with groups of age and status of computer literacy, both were found to be statistically significant. The young age group had 0.06, or 6%, of the odds of having unfavourable reaction as older age group. Similarly, those who had good computer literacy had 0.009, or 0.9% of the odds of having unfavourable reactions as those who were with poor computer literacy.

The associations between the status of behaviour with group of age and status of computer literacy, were found to be statistically significant. The young, aged participants had 0.91, or 91% of the odds of having unfavourable reaction as older participants. So, young age participants had favourable behaviours. Also, those who are with good computer literacy had 0.054 or 5.4% of the odds of having unfavourable behaviour as those who are with poor computer literacy. Therefore, those who are with good computer literacy had favourable behaviours.

The associations between the status of reaction with group of age and status of computer literacy, were found to be statistically significant. The young, aged participants had 0.038, or 3.8% ,of the odds of having unfavourable results as older participants. So, young participants have favourable reactions. Also, those who are with good computer literacy had 0.024 or 2.4% of the odds of having unfavourable reactions as those who are with poor computer literacy. Therefore, those who are with good computer literacy had favourable reactions.

Table 4: Participants' characteristics and level of knowledge, reaction, behaviour and result following HIMS training.

Participants' characteristics	Good knowledge (n=39)		Poor knowledge (n=65)		Total (n=104)		Significance
	No.	%	No.	%	No.	%	
Designation**							OR= 0.14 95% CI= 0.05-0.38 X ² =16.71 df=1 P<0.001
*MO, PHNO	18	72.0	7	28.0	25	100	
**NO, DO, PHM	21	26.6	58	73.4	79	100	
	Favourable reaction (n=77)		Unfavourable reaction (n=27)		Total (n=104)		
Age (years)*							OR=0.06 95% CI= 0.02-0.22 X ² =25.5 df=1 p<0.001
26-40	52	94.5	03	5.5	55	100	
41-60	25	51.0	24	49.0	49	100	
Status of computer literacy							OR=0.009 95%CI=.001-0.068 X ² =51.54 df=1 p<0.001
Good	63	98.4	1	1.6	64	100	
Poor	14	35.0	26	65.0	40	100	
	Favourable behaviour (n=82)		Unfavourable behaviour (n=22)		Total (n=104)		
Age (years)*							OR=0.91 95%CI=0.025-0.334 X ² =17.25 df=1 p<0.001
26-40	52	94.5	3	5.5	55	100	
41-60	30	61.2	19	38.8	49	100	
Status of computer literacy							OR=0.054 95% CI= 0.015-0.202 X ² =27.05 df=1 p<0.001
Good	61	95.3	3	4.7	64	100	
Poor	21	52.5	19	47.5	40	100	
	Favourable results (n=87)		Unfavourable results (n=17)		Total (n=104)		
Age (years)*							OR=0.038 95% CI=0.005-0.302 X ² =19.018 df=1 p<0.001
26-40	54	98.2	01	1.8	55	100	
41-60	33	67.3	16	32.7	49	100	
Status of computer literacy							OR=0.024 95% CI=0.003-0.189 X ² =26.5 df=1 p<0.001
Good	63	98.4	1	1.6	64	100	
Poor	24	60.0	16	40.0	40	100	

(*The age was dichotomized in to two groups in order to reflect young and old participants.

**The Medical Officers and Public Health Nursing Officers were categorized into one group and Development Officers, Nursing Officers and Public Health Midwives into other group based on their level of skills).

IV. Discussion

The concept of e-training was introduced to healthcare workers (HCW) attached to Healthy Lifestyle Centers (HLC) to combat the difficulties in attending physical trainings due to ongoing Covid-19 pandemic in view of minimizing the difficulties in travelling, risk of being together in the same lecture hall, etc. The study was conducted to assess the post-training status of the HCW conducting HLCs trained on HLC-HIMS module in Sri Lanka in four domains namely, reaction, learning, behaviour and results.

Data was collected by using a self-administered questionnaire prepared by group of experts, judgmental validity was ensured by a group of experts and the questionnaire was applied on the sample proper after pretesting which minimized the information bias. A probability sampling technique was used in order to gather a representative sample of the HCW who has participated at the HIMS training. Questionnaire was administered via online platform in view of adhering to safety measures of Covid-19 as a self-administered questionnaire and higher response rate was achieved while minimizing interviewer bias.

Majority of the participants found to have good perceived computer literacy when assessed by using a seven-point Likert scale. Nearly three quarters of the participants showed favourable reaction, behaviour and results following HIMS training. but only one-third of had good knowledge. The discrepancy between learning outcomes and outcomes of reaction, behaviour and results could be due to their assessment being subjective than objective. In a pre-post exam conducted among 94 second year Doctor of Pharmacy students at the University of Arizona, although the student ability has significantly increased as a group, only one third students showed significant increase in knowledge which was assumed to have been due to the tests being unannounced and that the tests do not decide grades so that the students may not have performed to the best of their ability. (Augustine, Slack & Warholak, 2015). The same reason could be accounted for the results of the current study as well.

Medical officers and PHNOs showed significantly good knowledge than other categories of HCW. This could be due to their higher level education during basic training, and level of experience in service provision. This finding should be considered when training programmes are arranged in the future, to have homogenous groups of people in target audience in view of getting better outcomes.

The Participants with good computer literacy also had significantly favourable reaction, behaviour and results which mainly due to the fact that this training was on a computer-based data system. Therefore, when such training programmes are organized in the future, recruitment of participants with good computer literacy would result in good outcome of the training. These findings were further established by another study conducted among 250 graduate school of education students in Taiwan found that there is a significant positive association between computer literacy and online learning (Li & Lee, 2016).

Assessment of reaction, behaviour and results following HIMS training, showed significantly favourable outcomes among young participants compared to older which could be due to the fact that the younger generation being more familiar with technology and e-learning compared to older generation. A review conducted on prior training evaluation models and research conducted over 10 years found that there's no association found between affective reaction and learning but experience was associated with cognitive learning. This review further revealed that age was negatively associated with learning (Alvarez, Salas & Garofano, 2004). These findings are compatible with findings of this study.

V. Conclusion

HIMS training has given favorable outcomes in majority of the participants especially in reaction, behavior and results domains of Kirkpatrick modal. The concept of e-training can be adopted for the in-service training of HCW including those working at primary health care level to combat the difficulties in conducting physical trainings during a pandemic. Participant's age and computer literacy would be critical factors to be considered when they are being recruited for such trainings.

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