

## Computer literacy among health care workers in District base hospitals in Kalutara District: A cross sectional descriptive study

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### Abstract

**Introduction:** In Sri Lanka, health is now at the era of e-hospitals. To get the maximum output from this e-hospital concept, it is vital to have computer literate health care workers but unfortunately literatures on computer literacy among healthcare workers were very little. General objective of this study was to assess the computer literacy among health care workers in District Base Hospitals of Panadura and Horana and to give them a comprehensive training on computer application.

**Method:** A total of 386 participants were selected which included 88 Specialists/Medical Officers(MOs), 177 Nursing Officers(NOs), 30 Paramedical staff and 91 Attendants/Laborers. A self-administered questionnaire was used to assess the computer literacy on following four sections, Basic Computer Vocabulary Knowledge (BCVK)(10 questions) and Basic Computer Skills(BCS) (09 questions), Knowledge on Hardware and Software Functions(KHSF)(06 questions), Use of Internet/e-mails(UIE)(07 questions) and attitudes on using computers(10 questions).

**Results:** Showed that the average BCVK and BCS for MOs were good. Paramedics and NOs were having satisfactory level of BCVK and BCS. The average BCVK and BCS for attendants/laborers were Weak. Majority 95.1% MOs, 66.3% NOs and 87% Paramedics can use a computer on their own but only 24.3% attendants can use a computer to perform a simple function.

More than 60% MOs can perform hardware functions, but their use of excel spread sheet was minimal (47.6%) and the most difficult software function to perform (35.4%) was to install a software program. 85.4% of MOs, 70% Paramedic and 46.2% NOs owned a computer, but less than half of them had internet connection and e-mail address of their own. The use of internet for educational purposes was low. There was a significant difference between gender in the use of internet and e-mail ( $P<0.01$ ) and use of computers ( $P<0.01$ ) with males using more. More males were computer literate than females in all categories of staff.

**Conclusion and Recommendation:** This study shows that more than two third of MOs, Paramedics and Nurses were computer literate. Less than one third of Attendants were computer literate. Majority of them have a positive attitude towards use of computers at their work place. However, the use of ICT was low. This emphasizes the need for computer knowledge development among healthcare staff in order to have a well-functioning e-hospital.

**Keywords:** Computer Literacy, Health care workers, cross sectional survey.

*Received 5 July 2015; Accepted 25 November 2015*

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## Introduction

Computer literacy is defined as one's ability to use a computer intelligently and efficiently and to use software packages to achieve practical tasks.<sup>1-3</sup> It has been emphasized that the computer literacy is a must for physicians and doctors to be a competent practitioner.<sup>4</sup> The computer literacy was assessed by the Shaker and Farook using a questionnaire contained questions on background knowledge of computers, i.e., Basic Computer Vocabulary Knowledge (BCVK), Basic Computer Skills (BCS) and Basic Communication and Internet Skills (BCIS).<sup>7</sup>

With the vast development of Information Technology (IT) and with the invasion of IT to the medical field specially on diagnosing diseases, patient management, disease control as well as in teaching not only the doctors but nurses and other paramedical staff have to develop good computer knowledge to carry out their duties optimally.<sup>4,5</sup>

Good management information system plays a vital role in providing quality health care effectively and efficiently to the patient. If a country does not build up a strong, reliable and timely health information network throughout the country then it will lead to under investment in systems for data collection and analysis. Dissemination of incorrect data and using unreliable data on resource allocation will lead to inefficient, obsolete decision making and ultimately the failure in health system. Implementation of electronic health information system would be a serious challenge. Literature on implementation of electronic hospital information system is scarce, especially with regard to developing countries.<sup>5-8</sup> On the other hand it is very costly to implement an electronic health information system in hospitals.<sup>9</sup>

Sri Lanka, an implementation of Electronic Hospital Information System (EHIS) in several hospitals failed while some have succeeded. A confidential inquiry by the management of these hospitals found that, most of the physicians, doctors, nurses and other healthcare staff were reluctant to use EHIS in their hospitals. One of the major issues raised was that they did not have required computer literacy.

Computer literacy of health care workers is of vital importance and also a prime need in implementing a good functioning electronic hospital information system.<sup>3,4</sup>

Objective of this study was to assess the knowledge on computers, knowledge on hardware and software functions, use of Internet and attitudes towards use of computers among health care workers in District Base Hospitals Panadura and Horana.

## Methods

This study was a cross sectional descriptive study which was conducted in two District Base Hospitals in Kalutara District, Sri Lanka. This study was conducted from 1<sup>st</sup> of May to 31<sup>st</sup> July 2013. The study population included four different clusters of health care workers, work in a District Base Hospital including Specialists/Medical Officers (MOs), Nursing Officers (NOs), Pharmacists/Medical Laboratory Technicians/Paramedical staff (Paramedics) and Attendants/Laborers. The Principal Investigator (PI) used simple random sampling method with daily attendance registry as a sampling frame to get the sample from NOs, Paramedics and Attendants/Laborers. As MOs did not have such a registry, names of all doctors from all the departments were collected and applied the same method to calculate the sample. In order to ensure 95% confidence interval, a sample size 386 was needed from the total population of health care workers including 88 MOs, 177 NOs, 30 Paramedics and 91 Attendants/Laborers calculated using the proportion calculation to the total population size of each cluster.

A validated paper-based self-administered questionnaire<sup>4-8</sup> was used to assess the computer literacy among health care workers. The first part of the questionnaire was designed to collect socio-demographic information of the participants. The second part was designed to assess comprehensive computer background knowledge on following four sections, Basic Computer Vocabulary Knowledge (BCVK) (10 questions) and Basic Computer Skills(BCS)

(09 questions), Knowledge on Hardware and Software Functions(KHSF)(6 questions), Use of Internet and E-mails(UIE)(07 questions) and their Attitudes on using computers(10 questions). The BCVK was categorized ( the percentage of correct answers to each statement) and the BCS, KHSF and UIE were categorized (ratio of answer "Yes") as "Weak" if the "0-25%", "Fair" if "26-50%", "Satisfactory" if "51-75", "Good" if "76-90%" and "Excellent" if ">90%". The SAQ was pre tested. Quantitative data was analyzed using Statistical Package of Social Sciences (SPSS). The appropriate statistical tests were used to describe

the significance of the tests. The PI obtained written informed consent from all the participants. Confidentiality of the collected data was ensured. The ethical approval was obtained from the Faculty of Medicine, University of Kelaniya.

## Results

The Response Rates (RR) were 0.93, 0.95, 0.77 and 0.77 for MOs, paramedics, NOs and attendants/laborers respectively. The Socio-demographic characteristics of the study sample were shown in **Table 1**.

**Table 1** Percentage distribution of socio-demographic characteristics of the study sample

Characteristics		MOs (%)	NOs (%)	Paramedics (%)	Attendants/Laborers (%)
Age	21 – 40 yrs.	54.9	30.5	53.3	71.4
	41 – 60 yrs.	45.1	69.5	46.7	28.6
Gender	Male	46.3	26.1	7.1	52.9
	Female	53.7	73.9	92.9	47.1
Maritalstatus	Unmarried	08.5	8.7	7.1	21.4
	Married	91.5	91.3	92.9	78.6
Place of Residence	Urban	72.0	60.9	29.6	24.3
	Rural	28.0	39.1	70.4	75.7
Working experience	<5 yrs.	31.7	26.1	10.1	44.2
	5 - <10 yrs.	24.4	26.1	21.3	22.9
	>= 10 yrs.	43.9	47.8	68.6	32.9
<b>Total</b>		100.0	100	100	100

## Computer literacy among healthcare workers

### Knowledge on computers (BCVK and BCS)

The overall BCVK and BCS level for MOs were good. i.e., 78(95.1%) can perform simple functions using computers. Sixty two of them 62(75.6%) can perform hard drive management, 61(74.4%) can perform file management and 59(72.0%) can print a document using a printer. More than 80% of them can perform all the functions inquired. Paramedics' BCVK and BCS were Satisfactory as 20(87.0%) of them can perform

simple functions using computers, more than 60% can perform all the functions inquired. From 169 NOs overall BCVK and BCS were at Satisfactory level, i.e. 112(66.3%) can perform simple functions using computers, but functions that most of them could not do were 125(74%), 126(74.6%) and 116(68.6%) perform hard drive management, file management and print a document respectively. The overall BCVK and

BCS for attendants/laborers were Weak. Most of them 53(75.7%) cannot perform simple functions using computers, 72% of They cannot perform the entire functions inquired (Table 2 and 3). There was a

significant difference between gender and age in the basic knowledge on computers (P<0.01) and knowledge on the vocabulary of computers with (P<0.01) young males were more knowledgeable.

**Table 2** Subjects' Basic Computer Vocabulary Knowledge (BCVK) stratified into healthcare workers four clusters

BCVK (N=10) Statement	MOs (n=82)	Paramedics (n=23)	NOs (n=169)	Attendants/ Laborers (n=70)
S1	95.1	52.2	44.8	17.1
S2	92.7	65.2	56.3	21.4
S3	63.4	39.1	22.4	11.4
S4	76.8	56.5	34.9	17.1
S5	88.2	69.6	48.7	21.4
S6	100.0	91.3	72.9	35.7
S7	100.0	95.6	82.8	45.7
S8	100.0	100.0	91.7	35.7
S9	69.5	34.8	33.6	11.4
S10	86.6	69.6	45.8	17.1
Overall	87.2(G)	67.4(S)	53.4(S)	23.4(W)

Data is expressed in percentage of correct answers for the statement, S1:A compact disc is hardware, S2: The CPU is hardware, S3:A file server has a very large hard disc, S4:Communication between PC by different manufacturers is impossible, S5: Networks allow the different PCs to access the same files, S6:The global communication network is called the internet, S7:WWW stands for World Wide Web, S8:e-mail is short for electronic mail, S9: Modem is short for modular demodulator, S10:A floppy disc has a larger capacity than compact disc, MOs: Medical Officers, NOs: Nursing Officers, G: Good, S: Satisfactory, W: Weak

Data is expressed in percentage of "Yes" for the statement, S1:Use a computer on your own, S2:Properly wire a computer, S3:properly turn on and off a computer, S4:Start and exit from a programme, S5:Use search command to locate a file, S6:Resize/maximize/minimize and move files/folders, S7:Hard drive management like creating/

renaming/moving and organizing folders S8:File management like creating/renaming/moving/deleting files, S9:Print a document using a printer, MOs: Medical Officers, NOs: Nursing Officers, G: Good, S: Satisfactory, W: Weak

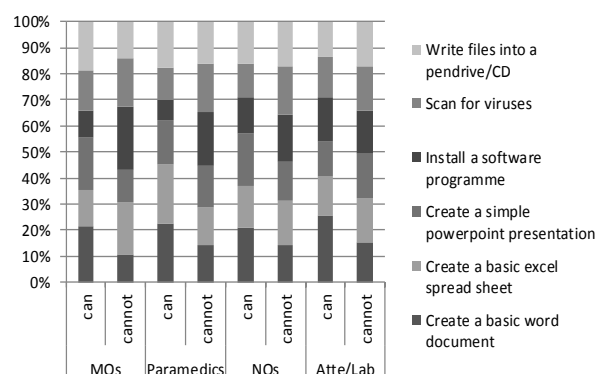
**Knowledge on hardware and software functions (KHSF)**

The MOs and NOs had a satisfactory level of KHSF. Among MOs, more than 60% can perform hardware functions, about 59(72%) can create a basic word document, but only 39(47.6%) can perform function using excel spread sheet. 55(67.1%) of them can prepare a Power point presentation. More than 50% of them can perform software functions. Only about 29(35.4%) can properly install a software programme to the computer and 42(51.2%) can scan disks for viruses but 52(63.4%) can write a file into a CD/pen drive. The paramedics had a Fair level of KHSF, more than 60% cannot perform hardware functions,

**Table 3** Subjects' Basic Computer Skills (BCS) stratified into healthcare workers four clusters

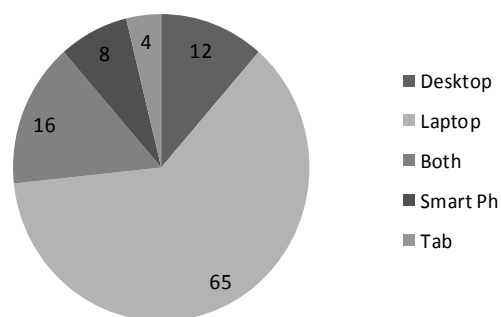
BCVK (N=10) Statement	MOs (n=82)	Paramedics (n=23)	NOs (n=169)	Attendants/ Laborers (n=70)
S1	95.1	87.0	66.3	24.3
S2	0.5	60.9	62.7	27.1
S3	97.6	91.3	79.3	30.0
S4	96.3	87.0	74.6	25.7
S5	79.3	52.2	55.0	17.1
S6	82.9	47.8	52.1	17.1
S7	75.6	26.1	26.0	15.7
S8	74.4	30.4	25.4	14.3
S9	72.0	69.6	31.4	15.7
Overall	83.7(G)	61.4(S)	52.5(S)	20.8(W)

and more than 70% of them cannot perform software functions. Among NOs, more than a half of them cannot perform hardware functions. More than 65% of them cannot perform software functions. Attendants/Laborers had a Weak level of KHSF; more than 78% cannot perform hardware functions, and more than 85% of them cannot perform software functions (Figure 1).



**Figure 1** The Percentage of MOs, Paramedics, NOs and Attendants/Laborers' performance of hardware and software functions

Attitude about the use of computers Out of total 82 MOs, only 27(32.9%) had a training on computers, mostly had undergone only a short course training on computers. Seventy (85.4%) of them owned a computer (Figure 2).



**Figure 2** Percentage of MOs having a computer on their own

Out of 23 paramedics, most of them 16(69.6%) not had a training on computers. Twenty one (70.0%) of them owned a computer. Out of total 169 NOs, only 71(42.0%) had a training on computers, out of which mostly had a short course training. Seventy eight (46.2%) of them owned a computer, out of which 58 owned a desktop. Out of total 70 attendants/laborers, only 14(20.0%) had a training on computers. Only 15(21.4%) of them owned a computer. Most of them in all categories of staff i.e., 72(87.8%) MOs, more than 68% paramedics, 76.3% NOs and 63.2% attendants/laborers had a positive attitude towards use of computers at their working place.

Use of Internet and e-mail and utilization of computers (UIE) Among MOs, their UIE was Excellent

i.e., 75(91.5%) of them were having an e-mail address on their own and 77(93.9%) of them had used internet, but 68(88.3%) used internet to watch films, videos, news and only 29(37.7%) used to search knowledge and 42(54.5%) for research purposes (Figure 3).

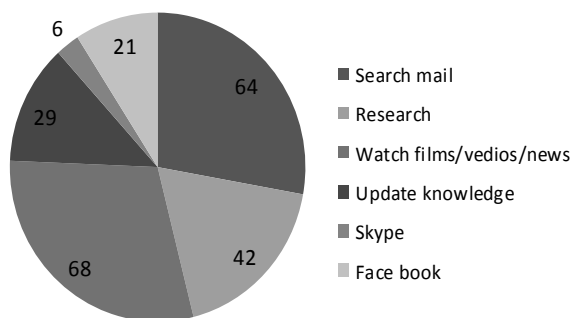


Figure 3 Percentage of MOs utilization of computers

Nearly half of them 39(50.7%) were access to the internet 4 or more times per week. Only 16 of them had participated in video conference. Most of them were used computers four or more times per week.

Among paramedics and NOs, even though more than 50% of paramedics and 46% NOs owned a computer or a smart phone the average UIE was at Satisfactory level for paramedics and Fair level for NOs, i.e., 16(53.3%) and 51(30.2%) of them have used internet mostly to watch film/videos/news but only very few used to search knowledge respectively. Only 7(23.3%) paramedics and 31(18.3%) NOs got their own e-mail address. Most of them were rarely access to the internet, rarely spent time using computer per week.

Attendants/laborers' UIE was Weak. Only 09(12.9%) of them used internet and e-mail. Most of them 48 (68.6%) rarely spent time using computer per week. There was a significant difference between gender and age in the use of internet and e-mail ( $P<0.01$ ) and use of computers ( $P<0.01$ ) with young males use more, more young males were computer literate than females in all categories of staff.

### Discussion

Masood et.al, showed that most of MOs had an access to the computers at their home as well as they

used computers at their working places to do different functions in their day today work unlike in our setup. On inquiring on their software use varied according to application, their use of e-mail and patient-care information software were common but use of spread sheet, statistical and presentations software's were negligible very much similar to our results. They commonly used internet specially to seek medical knowledge online. Many respondents rated that they were computer literate but majority liked to get computer training and to upgrade their knowledge. Their self-reported computer skills were moderate but most of them were not familiar with computer related terms.<sup>9</sup> Asangansi et.al, in their report of computer use among doctors in Africa showed that, out of 145, 37.9% could not use word processing software while 87% could not use any software for basic statistics analysis. Only 66.8% could use power point presentation, 79.3% use Medline/PUBMED but only 39.3% had published a paper. All of them had access to internet, most spent 1-5 hours weekly on the internet, only 51.7% had a own computer. Doctors who could use a word processing software were more likely to be able to use a statistics software ( $p=0.001$ ) and prepare presentations ( $p=0.00$ ).<sup>10</sup> Shaker and Farook in their study of computer literacy of physicians in Makkah region highlighted that; majority of them had good background knowledge on computers. They have assessed the literacy in three different sections, Basic Computer Vocabulary Knowledge (BCVK), Basic Computer Skills (BCS), and Basic Communication and Internet Skills (BCIS). Highest scored in BCS 91.4%, next was BCIS 87.7% and lowest was BCVK 71.3%<sup>7</sup> very much advanced than this study results.

In a study of computer literacy among Italian pharmacists, revealed that their computer skills and literacy were not satisfactory similar to our results. It also highlighted the importance of developing pharmacist's knowledge and skills on computers to cope up with new technologies especially in converting paper prescriptions into digital ones.<sup>8</sup> A study conducted by Thomas and Rutter in England

as well as a study conducted by Balen and Jewesson in Canada both showed that, even though pharmacists use of computers at their working places were satisfactory their computer skills, use of software packages, statistical packages and internet were low which suggested a training on medical databases and software applications.<sup>11,12</sup>

In a study of assessing nurses' computer literacy<sup>[13]</sup> and studies done on nursing students<sup>[14,15,16]</sup> showed that, nurses' level of computer literacy were very low especially in the area of basic computer hardware knowledge, software knowledge including databases and also excel spread sheet knowledge.

Unfortunately there was no single study about computer literacy among attendants/laborers found in the literature to compare results with this study.

## Conclusion

This study showed that more than two third of MOs, Paramedics and Nurses were computer literate. The majority of doctors had a level of computer background knowledge that was above satisfactory, which was a pointer to their lack of interest and attitude about EHIS. A heavy work load and busy schedules might be the reasons for their attitude. Only about less than one third of Attendants were computer literate. Most of the nurses and minor staff did not have required skills for using computers like perform basic functions using Microsoft Word, Print a document, scan for viruses which are the basic functions that they need to practice in their daily routine work using EHIS. Majority of them had a positive attitude towards use of computers at their working place. This emphasizes the need for computer knowledge development among healthcare workers in order to have good functioning e-hospitals in future. Therefore the authors recommended to the higher authorities of the Ministry of Health, Nutrition and Indigenous Medicine in Sri Lanka to organize in service training programmes to upgrade knowledge and skills on using computers for the health care workers before considering implementation of EHIS in hospitals. Limitations of the study

This study was conducted in District Base Hospitals only in one District in Sri Lanka is a major limitation. The results would be more generalizable if this study is designed as a survey of computer literacy among health care workers covering few more districts in the country.

## References

1. Wyatt JC. Hospital information management: the need for clinical leadership. *British Medical Journal* 1995; 311: 175-178.
2. Delpier C, et.al. A systematic review of computer-based patient record system and quality care: more randomized clinical trials or a broader approach? *International Journal for Quality in Health Care* 2004; 16(5): 407-416.
3. Malik MA, Khan HR. Understanding the implementation of An Electronic Hospital Information System in a developing country. A Case study from Pakistan. 32<sup>nd</sup> Australian Computer Science Conference (ACSC 2009).
4. Laerum H, Ellingsen G, Faxvaag A. Doctor's use of electronic medical records systems in hospitals: cross sectional survey. *British Medical Journal* 2001; 323(7325): 1344-1348.
5. Satharasinghe A. Computer literacy of Sri Lanka. Department of Census and Statistics, Sri Lanka. Online Referencing, [www.statistics.gov.lk/cls2004/index.htm](http://www.statistics.gov.lk/cls2004/index.htm) (2004, accessed 08th June 2013).
6. Satharasinghe, A. Computer literacy of Teachers. Department of Census and Statistics, Sri Lanka. Online Referencing, [www.statistics.gov.lk/education/article1.pdf](http://www.statistics.gov.lk/education/article1.pdf) (2006, accessed 10th June 2013).
7. Shaker HAS, Farooq MU. Computer literacy of physicians among the hospitals of Makkah region. *Journal of Family and Community Medicine* 2013; 20(3): 173-178.
8. Grappasonni I, Tatebati SK, Petrelli F, Amenta F. The pharmacist's knowledge and computer skills towards e-health. Results of a survey among Italian community pharmacists. *Journal of Bioinformatics and Diabetes* 2014; 1(1): 1-11.



9. Masood S, Khan RA, Waheed G. Computer literacy among the medical staff at Avicenna Medical college and Hospital. Online Referencing, [http://pjmhsonline.com/computer\\_literacy\\_among\\_the\\_medi.htm](http://pjmhsonline.com/computer_literacy_among_the_medi.htm) (accessed 10th June 2013).
10. Asangansi IE, Adejoro OO, Farri O, Makinde O. Computer use among doctors in Africa: survey of trainees in a Nigerian teaching hospital. *Journal of Health Informatics in Developing Countries* 2008; 2(1): 10-14.
11. Thomas P, Rutter PM. A computer literacy skills profile of pharmacist residing in two countries of England. *Health Informatics Library Journal* 2008; 25(4): 288-294.
12. Balen RM, Jewesson P. Pharmacist computer skills and needs assessment survey. *Journal of Medical Internet Research* 2004; 6(1): e11.
13. Campbell CJ, McDowell DE. Computer literacy of nurses in a community hospital: Where are we today? *The journal of Continuing Education in Nursing* 2011; 42(8): 365-370.
14. Saranto K, Leina-Kilpi H. Computer literacy in nursing; developing the information technology syllabus in nursing education. *Journal of Advanced Nursing* 1997; 25(2): 377-385.
15. Ternus MP, Shuster GF. Computer literacy in a traditional nursing programme: A 7 year study to identify computer based skills needed for success, *MERLOT journal of online learning and teaching* 2008; 4(1): 1-13.
16. Jones RB, Navin LM, Barrie J, Hillan E, Kinane D. Computer literacy among medical, nursing, dental and veterinary undergraduates 1991; 25(3): 191-195.