

Computing Knowledge, Attitude And Skills Among Healthcare Professionals In Aminu Kano Teaching Hospital, Nigeria

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ABSTRACT

Background: Health care professionals can no longer ignore the application of information technology to health care. This study was carried out to assess computing knowledge, attitude and skills among health care professionals and identify associated factors.

Methods: A cross section of 200 health care professionals- consisting of 64 doctors, 90 nurses, 35 laboratory scientists and 11 pharmacists in Aminu Kano Teaching Hospital were interviewed using a pre-tested, structured, closed-ended self-administered questionnaire.

Results: Only 181 (90.5%) of the respondents returned the completed questionnaires. Twenty six percent of the respondents had formal computer training whereas 34.8% owned a personal computer. Overall, 84 (46.4%) of the respondents had good knowledge of computing. Specifically, 41(66.0%), 5(50.0%), 14(51.0%) and 24(30.0%) of these were doctors, pharmacists, laboratory scientists and nurses respectively. Computing knowledge was highest among doctors and lowest among nurses. These differences were statistically significant ($\chi^2=19.1$ df=3 $P< 0.01$). Age, gender, computer ownership and formal computer training significantly influenced computing knowledge. Most healthcare professionals 160 (88.4%) had positive attitude towards computing and this was significantly influenced by respondent's age and previous computer training. Only 41(22.7%) of the health care professionals had good computing skills and this was significantly associated with computer ownership ($P<0.01$) and formal computer training ($P<0.01$).

Conclusion: Half of the healthcare professionals had good computing knowledge, majority had a positive attitude while many were quite deficient in computer skills. Computer loans and in-house computing courses were recommended to prepare our healthcare

professionals for the challenges of the information technology age.

KEY WORDS: Computer; Knowledge; Attitude; Skills; Healthcare professionals

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INTRODUCTION

Until the mid-1970s computers were large and expensive machines. More recently, the microcomputer, which is essentially a miniaturized version of the mainframe computer, has become available in form of desktop, laptop and palmtop computers. The past decade has seen an explosive increase in the number of computers. For instance, there were over 364 million computers in use by the end of 1998 worldwide¹. Similarly, by the year 2000, the world had 414 million Internet users with increasing use from Africa, Asia, Latin America and parts of Europe². This increased availability and utilization of computers and the Internet are producing a changing climate in healthcare practice, communication and access to information. Health care workers are able to access and process a growing body of information in a manner that meets the urgent needs of day-to-day patient care.

Health practitioners in the developed world have been quick to spot the potential benefits of computerising their practices. Computer systems provide comprehensive medical records, issue repeat prescriptions and provide call and recall services among others³. These systems also serve as sources of epidemiological data that are eventually pooled for audit, disease surveillance and research purposes⁴. In addition, patients in one country can benefit from technological advances in a developed country through telemedicine. Computerization has improved the efficiency of

health care systems by reduction in clerical work required of professionals, reduction in printed forms and centralized patient record systems.

The computerization of healthcare systems is at best rudimentary in developing countries including Nigeria. The successful application of information and communication technology to healthcare is likely to be influenced by health professionals' computer knowledge, attitude and skills. Therefore, it is necessary to assess these attributes and identify factors that influence them. The information will provide baseline information for health planners and stimulate appropriate continuing education programmes that will improve the use of information and communication technology among healthcare professionals. Although similar studies have been done in some centres^{5,6} among various groups, we are not aware of any such study at our centre.

The aim of our study therefore, was to determine the computing knowledge, attitude and skills among health care professionals-doctors, pharmacists, laboratory scientists and nurses in our centre and identify factors that influence them

METHODS

Study area

Aminu Kano Teaching Hospital (AKTH), Kano was established in 1988. Clinical services commenced in 1994 at a temporary site in Murtala Mohammed Specialist Hospital, Kano and later moved to the permanent site in 1997. Situated in the largest commercial nerve centre of northern Nigeria, this 500 bed tertiary hospital receives clients from within Kano, the neighbouring states of Jigawa, Katsina, Kaduna, Bauchi and Zamfara states. The hospital has 17 clinical departments including a large laboratory complex. Although each department has at least one computer system, the centre is yet to have a central network and most of the computers are mainly used for clerical and administrative work. However, there is an Internet café with about fifteen sets of computer accessible to all staff members at a subsidised rate. In addition, the Faculty of

Medicine has a large computer laboratory located within the premises of the hospital with over thirty computer workstations linked to the Internet. The hospital serves as a training facility for resident doctors, medical students, health record officers and community health officers.

Study design

A descriptive cross-sectional study.

Sample size and sampling technique

The required sample size of 200 was obtained using an appropriate statistical formula for estimating minimum sample size in health studies [$n = Z^2pq/d^2$]⁷. Where Z is the standard normal deviate at 95% confidence level, d is the desired precision or margin of error tolerable (5%) and (p) represents the prevalence of computer literacy among health professionals in a previous study (13%)⁸.

The stratified sampling technique was used with proportionate allocation among doctors, pharmacists, laboratory scientists and nurses. Out of a total of 874 eligible respondents consisting of 280 doctors, 393 nurses, 153 laboratory scientists and 48 pharmacy staff, questionnaires were administered on 200 of them. This was allocated proportionately to include 64 doctors, 90 nurses, 35 laboratory workers and 11 pharmacists. The systematic sampling technique was then used to select respondents in each professional category based on the serial number of health care professionals.

Instruments/Data collection

A pre-tested, self-administered, structured questionnaire with closed ended questions was used after obtaining consent from participants. The questionnaire was in four parts. The first part obtained socio-demographic information such as age, sex, ethnic group, religion, professional group, duration of practice, computer ownership and whether or not the respondent had attended a formal computer training course. The second part had 10 items that inquired about knowledge of different types of computers (mainframe, microcomputer-desktop, laptop, palmtop etc.), computer hard

ware (monitor, CPU, keyboard, peripherals), Internet browsing and e-mails. One mark was given for correct responses, no mark was awarded for wrong answers. A score of 7-10 was considered as good knowledge, 4-6 as fair knowledge and 0-3 was considered as poor knowledge of computing. The third part assessed attitude of respondents towards computing and its application in patient care, research and communication. This section was designed with a five point Likert scale⁹ (a number of statements each scoring strongly agree [5 points], agree [4 points], don't know [3 points], disagree [2 points], strongly disagree [1 point]). It consisted of 10 statements equally divided into 5 positive and 5 negative statements. The negative statements were scored in the reverse direction. The maximum score was 50 and the minimum score was 10 for the ten items. Therefore, those that scored 30 and above were considered as having a positive attitude, whereas those who scored below 30 were considered as harbouring negative attitude towards computing. Finally, the fourth part assessed the respondent's computing skills. These include logging on and off a network, basic familiarity with a graphical user interface, elementary file handling and housekeeping, simple word-processing, use of electronic mail, basic familiarity with a spreadsheet, searching for information on the Internet, using Medline, ability to use Epi-Info, MINITAB, SPSS, STATA or SAS statistical programmes and integrating IT applications. Those who reported the ability to perform 7-10 of the listed tasks were considered as having good computing skills, whereas those who could perform 4-6 and 0-3 of the tasks had fair and poor skills respectively.

The study instrument was pre-tested on 15 randomly selected health care professionals in another health facility (Murtala Specialist Hospital, Kano). It was revised to enhance its clarity and comprehension in light of this experience.

Statistical analysis

Data was analysed using Epi-Info version 6.0 statistical software (CDC Atlanta, Georgia,

U.S.A). Absolute numbers and simple percentages were used to describe categorical variables. Similarly, quantitative variables were described using measures of central tendency (mean, median) and measures of dispersion (range, standard deviation) as appropriate. The Chi-square test was used in assessing the significance of associations between categorical groups. A p-value of 0.05 or less was considered statistically significant.

RESULTS

Socio-demographic characteristics

A total of 200 questionnaires were distributed to the health care professionals. Only 181 questionnaires were completed and returned giving a response rate of 90.5%. Sixty doctors, 81 nurses, 28 laboratory scientists and 10 pharmacists returned the completed questionnaires. There were 71 males and 110 females giving a sex ratio of 1:1.5 in favour of females. Their ages ranged between 21 to 59 years with a mean age (SD) of 31±3.8 years. The Hausa/Fulani ethnic groups constituted the majority (48.6%) followed by Yoruba (18.2%) and Igbo (8.8%). The remaining (24.4%) were from other tribes including Igala, Tiv, Nupe, Egbira and Kanuri. Most of the health care professionals (73.5%) were Muslims while the remaining (26.5%) were Christians as shown in Table I. Only 26.0% of the respondents had formal computer training whereas 34.8% owned a personal computer.

Computing Knowledge

Overall, 84 (46.4%) of the respondents had good knowledge of computing. Similarly, 66 (36.5%) and 31 (17.1%) had fair and poor knowledge of computing respectively. Taken separately, 41(66.0%), 5(50.0%), 14(51.0%) and 24(30.0%) of the doctors, pharmacists, laboratory scientists and nurses had good knowledge of computing respectively. Computing knowledge was highest among doctors and lowest among nurses. These differences were statistically significant ($\chi^2=19.1$ df=3 P-value < 0.01) as shown in Table II. Computing knowledge was significantly influenced by age whereby 78 out of 158

(49.4%) of the respondents under 40 years of age had good computing knowledge compared to only 6 (26.1%) out of 23 of their older colleagues [O.R=2.8 ($\chi^2=4.4$ df=1 P=0.03)]. Similarly, there was a significant gender gap with male dominance among those with good computer knowledge (81.7% vs. 28.1%) [O.R=11.4 ($\chi^2=49.4$ df=1 P<0.01)]. Furthermore, computer ownership (79.4% vs. 33.1%) [O.R=7.8 ($\chi^2=35.3$ df=1 P<0.01)] and formal computer training (83.0% vs. 37.3%) [O.R=8.2 ($\chi^2=29.0$ df=1 P<0.01)] significantly influenced knowledge.

Attitude towards computer applications

Most health professionals 160 (88.4%) had positive attitude towards computing. The remaining 21(11.6%) had negative attitude. Among the different professional groups, 60 (97.0%) doctors, 8(80.0%) pharmacist, 20(71.0%) laboratory scientists and 72 (89.0%) nurses had positive attitude towards computing respectively. Positive attitude was highest among doctors and lowest among laboratory scientists. These differences were statistically significant ($\chi^2=10.5$ df=2 P-value<0.01) as shown in Table III.

Attitude towards application of computing in healthcare and research were significantly influenced by respondents' age. Respondents under 40 years of age were more likely to harbour a positive attitude towards computing (86.3% vs. 40.5%) [O.R=9.3 ($\chi^2=36.9$ df=1 P<0.01)] compared to their older counterparts. Similarly, previous computer training had a significant positive effect on attitude (85.7% vs. 64.3%) [O.R=3.3 ($\chi^2=29.0$ df=1 P=0.02)].

Computing skills

Table IV shows that overall, only 41(22.7%) of the health care professionals had good computing skills. The highest proportion was found among doctors 26 (42.0%), followed by pharmacists 4 (40.0%), laboratory scientists 4 (14.3%) and nurses 7 (8.8%) in that order. These differences were also statistically significant ($\chi^2=25.1$ df=3 P<0.01). The skills of the respondents was significantly influenced by

computer ownership (52.3% vs. 9.3%) [O.R=10.7 ($\chi^2=41.4$ df=1 P<0.01)] and previous computer training (59.6% vs. 11.9%) [O.R=10.9 ($\chi^2=42.9$ df=1 P<0.01)].

Table I. Socio-demographic characteristics of respondents (n=181)

Variable	Frequency
<i>Age group (years)</i>	No. (%)
20-29	57 (31.5)
30-39	101 (55.8)
40-49	21 (11.6)
50-59	2 (1.1)
<i>Religion</i>	
Muslims	133 (73.5)
Christians	48 (26.5)
<i>Ethnicity</i>	
Hausa/Fulani	88 (48.6)
Yoruba	32 (17.7)
Igbo	17 (9.4)
Others	44 (24.3)
<i>Formal computer training</i>	
Trained	47 (26.0)
Not trained	134 (74.0)
<i>Computer ownership</i>	
Owned a personal computer	63 (34.8)
Did not own a Personal computer	118 (65.2)

Table II. Computing knowledge among health professionals in Aminu Kano Teaching Hospital, 2004

Knowledge	Frequency No. (%)				
	Doctors	Pharmacists	Laboratory Scientists	Nurses	All
Good	41 (66.0)	5 (50.0)	14 (51.0)	24 (30.0)	84 (46.4)
Fair	9 (14.5)	2 (20.0)	5 (17.8)	50 (61.3)	66 (36.5)
Poor	12 (19.5)	3 (30.0)	9 (31.2)	7 (8.7)	31 (17.1)
Total	62(100.0)	10(100.0)	28 (100.0)	81 (100.0)	181 (100.0)

$\chi^2=19.1$ df=3 P-value < 0.01 Significant

Table III. Attitude of health professionals towards computing in Aminu Kano Teaching Hospital, 2004

Attitude	Frequency				All
	Doctors	Pharmacists	Laboratory Scientists	Nurses	
Positive	60 (97.0)	8 (80.0)	20 (71.0)	72 (89.0)	160 (88.4)
Negative	2 (3.0)	2 (20.0)	8 (29.0)	9 (11.0)	21 (11.6)
Total	2 (100.0)	10 (100.0)	28 (100.0)	81 (100.0)	181 (100.0)

$\chi^2=10.5$ df=2 P -value<0.01 Significant

Table IV. Computing skills among health professionals in Aminu Kano Teaching Hospital, 2004

Attitude	Frequency				All
	Doctors	Pharmacists	Laboratory Scientists	Nurses	
Good	26 (42.0)	4 (40.0)	4 (14.3)	7 (8.8)	41 (22.7)
Fair	12 (19.4)	2 (20.0)	3 (10.7)	7 (8.8)	24 (13.3)
Poor	24 (38.7)	4 (40.0)	21 (75.0)	67 (82.4)	116 (64.0)
Total	62 (100.0)	10 (100.0)	28 (100.0)	81 (100.0)	181 (100.0)

$\chi^2=25.1$ df=3 P <0.01 Significant

DISCUSSION

Our assessment of knowledge, attitude and computing skills among health professionals at our centre showed that less than half of the professionals (46.4%) were knowledgeable about the subject. Nevertheless, majority (88.4%) had positive attitude towards the application of information technology to health care and research. Regarding skills, less than a quarter of respondents (22.7%) reported good computing skills. Only 34.8% of respondents owned a personal computer and 26.0% had formal computer training. Age, sex, computer ownership, formal computer training and the profession of the respondent significantly influenced computing knowledge.

Ajuwon⁵ found a higher level of computing knowledge (58%) among first year clinical and nursing students in Ibadan. She also observed that computing knowledge was influenced by professional inclination of the students, with medical students having better knowledge than student nurses. Similarly, Samuel *et al*¹⁰ found a higher level (60%) of computing knowledge among Tanzanian medical students at the Muhimbili University Hospital. These differences could be explained among others by the fact that the students were younger than our

respondents. Age has been found to influence computer knowledge in favour of the younger and more adventurous generation in this and earlier studies^{11,12}. Our findings are also similar to the level of knowledge (49%) reported among nurses in Beijing Medical University¹¹, but lower than the figures of 60% and 65% reported among residents doctors at University of Virginia¹³ and New Jersey¹⁴ respectively. The differences could be attributed to higher computer ownership of 95% among resident doctors at Virginia University compared to only 34.8% among our respondents. Computer ownership was found to influence computer literacy in our study and earlier studies^{13,14}. Furthermore, computer appreciation courses are part of the orientation programmes of newly recruited resident doctors at Virginia¹³ in contrast to our centre.

Majority of our respondents (88.4%) had positive attitude towards the application of computers in health care and research. These findings are similar to those of Raja and colleagues¹⁵, Scarpa *et al*¹⁶ and Simpson *et al*¹⁷ in which they all demonstrated a high level of positive attitude towards use of computers among health workers. But, it differs from those of Liu and co-workers¹¹ who observed a neutral attitude towards application of computers to health care among nurses at Beijing Medical University.

Respondent's age and formal computer training significantly influenced attitude towards application of computing in healthcare and research. Younger respondents were more likely to harbour positive attitudes. This corroborates the findings of Simpson *et al*¹⁷ who reported that younger health professionals in a British Hospital were more enthusiastic about the application of information technology to health care compared to their older colleagues. Formal computer training had a positive effect on attitude as earlier reported among nurses by Ball *et al*¹⁸. Although other researchers¹⁹ demonstrated a positive relationship between computer ownership and attitude, we did not observe such an association among our respondents. We also found that respondent's sex or profession had no significant influence on

attitude towards computing confirming earlier observations made by Raja *et al*¹⁵ and Scarpa