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Factors influencing nurses' attitudes towards the use of computerized health information systems in Kuwaiti hospitals

Habib Alquraini[1], Abdul Majeed Alhashem[2], Makhdoom A. Shah[3] & Rafiqul I. Chowdhury[4]

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[1]Habib Alquraini PhD
Assistant Professor
Department of Health Information Administration, Faculty of Allied Health Sciences,
Kuwait University,
Kuwait

[2]Abdul Majeed Alhashem PhD
Assistant Professor
Department of Health Information Administration, Faculty of Allied Health Sciences,
Kuwait University,
Kuwait

[3]Makhdoom A. Shah ScD
Associate Professor
Department of Health Information Administration, Faculty of Allied Health Sciences,
Kuwait University,
Kuwait

[4]Rafiqul I Chowdhury MSc
Senior Lecturer
Department of Health Information Administration, Faculty of Allied Health Sciences,
Kuwait University,
Kuwait

Correspondence to Habib Alquraini:
e-mail: hquraini@hsc.edu.kw

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Abstract

Title. Factors influencing nurses' attitudes towards the use of computerized health information systems in Kuwaiti hospitals

Aim. This paper reports a survey of nurses' attitudes towards computerized health information systems, the characteristics that influence these attitudes and the level of nurses' skills in computer use.

Background. The use of such systems in developed countries and in some developing countries has already become a reality. However, nurses as a group of care providers have been found to resist computerization, seeing computerized health information systems as dehumanizing, confusing and uncaring. Nurses with more computer experience tend to have more positive views; education and training positively influence attitudes; and younger and less experienced nurses may have more positive attitudes.

Methods. A structured questionnaire was used to measure the attitudes of nurses working in Kuwait towards computerization. A random sample of 574 nurses working in Ministry of Health hospitals were sent a questionnaire, and 530 replies were received (response rate 92·3%). The data were collected from November 2002 to January 2003.

Findings. Respondents generally had positive attitudes toward computerized health information systems. Analysis of variance revealed statistically significant differences in attitudes in relation to nationality, level of education, previous experience in computer use, and computer skills ($P < 0{\cdot}05$). Multiple regression analysis showed that gender, nationality, education levels, and duration of computer use were statistically significant predictors of attitudes toward computerized health information systems ($P < 0{\cdot}05$).

Conclusion. With adequate computerized health information system training, the implementation of computerized health information systems could be effective for nurses in providing quality health care, as found in other studies.

Keywords: nurses, computers, attitudes, skills, multi-cultural, Kuwait, questionnaire survey

Introduction

Computerized health information system (HIS) are expected to have a great impact on health care practice in the years to come (Goorman & Berg 2000). According to Dick and Steen (1991), HISs are 'essential technology for health care today and in the future', and will lead to a higher quality of health care, increase the scientific base of medicine and nursing, and reduce health care costs. The use of such systems in developed countries and in some developing countries has already become a reality. Nursing services is one area that has been greatly affected by computerization (Darbyshire 2004). Some degree of computer literacy is, therefore, becoming a job requirement in many health care facilities (Axford & Carter 1996, Lee *et al.* 2002).

Nurses as a group of care providers have been found to resist computerization (Bolt 1991, Timmons 2003). Doctors often dislike working with HISs and nurses frequently complain about increased workloads due to a loss of overview – slower working routines, and problems entering and locating information (Goorman & Berg 2000, Clarke *et al.* 2001). What has appeared reasonable to implementers of computerized HISs has often been viewed as dehumanizing, confusing and uncaring by nurses (Bongartz 1988). Several researchers have reported that a high proportion of nurses are uncomfortable and inexperienced with the use of computer technology to their work (Burkes 1991, Bradly 1993, Marasovic *et al.* 1997). However, nurses with more computer experience have more positive views; education and training positively influence attitudes; and younger and less experienced nurses may have more positive attitudes (Simpson & Kenrick 1997, Tornvall *et al.* 2004,).

The Kuwaiti context

The Ministry of Health, Kuwait is planning to implement a computerized HIS in all health care facilities. Most of the nurses working in Kuwaiti hospitals are recruited from 31 other, mostly developing, countries (Chang 1984, King 1999). By virtue of this diversity, these nurses are likely to have a wide range of educational and cultural backgrounds, and this diversity is reflected in the range of their experience and competence with the use of computerized HISs. Accommodating such diversity can make it difficult to plan appropriate training courses to develop and enhance their computer skills. However, in order to provide state-of-the-art health care services it is important that all nurses working in Kuwaiti hospitals know how to use computer systems proficiently and develop a positive attitude towards their use. At present, relatively little is known about how these nurses view computerized HISs and what basic skills they have.

The study

The study had two objectives: first, to analyse the background characteristics that influence nurses' attitudes towards the use of computerized HIS in Kuwaiti government hospitals and, secondly, to assess their level of skills in computer use.

Design

A survey design was adopted and the data were collected between November 2002 and January 2003.

Participants

The target population was nurses working in all Kuwaiti Ministry of Health hospitals. A stratified random sampling method was used to select the sample. The population of nurses (5472) was stratified by type of hospital – general or tertiary. General hospitals in Kuwait provide a secondary level of care. Each of the six general hospitals has outpatient, inpatient and emergency services for the following disciplines: Internal Medicine, General Surgery, Orthopedics, Pediatrics, and ENT. However, Obs. & Gyne. Services are provided only by three general hospitals. Tertiary care is devoted to the provision of specialized medical services. There are a number or specialized hospitals or tertiary care facilities. Each of these has outpatient and inpatient care services. Using a random number-generating procedure, a random sample size of 574 nurses was drawn.

Questionnaire

A questionnaire was developed to measure background characteristics and attitudes of nurses toward computerized HISs. The key variables were age, gender, nationality, level of education, years worked in nursing practice, years worked in current position, type of facility, job title, previous computer experience and computer skills. Stronge and Brodt (1985) questionnaire was used, with the addition of three background characteristics (Nationality, Job title and preferable computer learning mode).

The Stronge and Brodt questionnaire has been used by many researchers to study the impact of computers on nursing practice (Perry & Mornhinweg 1992, Scarpa *et al.* 1992, Newton 1995, Nagelkerk *et al.* 1998).

The instrument, called the Nurses' Attitudes Toward Computerization (NATC) questionnaire, consists of 20 questions related to computer systems. The statements were designed to reflect issues of computer usage in the nursing field (e.g. institutional benefit, capabilities of computers, job security, legal ramification, and quality of patient care) (Stronge &

Brodt 1985, Sultana 1990, Simpson & Kenrick 1997, Stricklin *et al.* 2003). A Likert scale is used to determine nurses' attitudes towards use of computers (strongly disagree = 1; disagree = 2; neither agree nor disagree = 3; agree = 4 and strongly agree = 5). Thus, a mean score higher than 3·0 represents a positive attitude, while a mean score lower than 3·0 represents a negative attitude. Permission to use the questionnaire in this study was obtained from the original authors.

The questionnaire's content validity and reliability have been found to be high (Schwirian *et al.* 1989, Simon & Christopher 1997). Cronbach's alpha (reliability coefficient) was used. Cronbach's alpha for the overall score in our sample was 0·78, which implies that the instrument is highly reliable. Using factor loadings, construct validity was assessed; the factor loading from our data set varies from 0·4 to 0·8.

Data collection

The population of this study was the nurses who worked in all the general public and four tertiary care hospitals of the Ministry of Health. The data collection period spanned from November 2002 to January 2003. A stratified random sampling method was used to select the sample. The population of nurses (5,472) was stratified by type of hospital (General and Tertiary). Using a random-number-generating procedure, a random sample size of 574 nurses was drawn. All the participating nurses were assured that their responses would be kept confidential. A very high proportion of respondents, (92·3%) returned completed questionnaires and were included in the statistical analysis. The response rate for such surveys is generally high in this part of the world – Gulf Cooperation Council (GCC) countries (e.g. Shah *et al.* 2001, Shah *et al.* 2004) had response rates of 90%. However, the nurses were told of the importance of this study to their future practice and were encouraged to respond. Furthermore, a follow up was made to those who did not respond.

Ethical considerations

Written permission was obtained from the authors to use the Stronge and Brodt questionnaire and from the Ethical Committee, Ministry of Health, Kuwait, to distribute the survey among the nurses. The respondents were informed that they had the freedom to respond or refuse to be a part of the study. All the participating nurses were assured that their responses would be kept confidential.

Data analysis

Data were analysed by using descriptive statistics and multivariate statistics. Bivariate analysis and analysis of variance were used to assess associations between outcome variables and predictors. Multiple regression was employed using total score as a dependent variable to identify which background variables were the best predictors of positive attitude toward computerized HISs in Kuwaiti hospitals.

Table 1 Respondent demographics.

Characteristics	*n*	%
Sex		
Male	75	14·2
Female	455	85·8
Nationality		
Kuwaiti	35	6·8
Non-Kuwaiti Arabs	36	7·0
Asians	442	86·2
Age		
≤30	195	36·9
31–40	185	35·0
41–50	108	20·5
51+	40	7·6
Education		
Diploma	318	60·1
Baccalaureate degree†	211	39·9
Years in nursing practice		
≤5	113	21·3
6–10	169	31·9
11–15	92	17·4
16–20	54	10·2
21–25	67	12·6
>25	35	6·6
Type of facility		
General hospital	319	60·3
Tertiary hospital	210	39·7
Years worked in current hospital		
≤5	226	42·6
6–10	114	21·5
11–15	66	12·5
16–20	46	8·7
21–25	63	11·9
>25	15	2·8
Job title		
Nursing Director/Assistant Director	24	4·5
Head Nurse of Unit	26	4·9
Nurse/Clinical Instructor	480	90·6
Computer experience		
Yes	268	50·7
No	261	49·3
Duration of computer use (years)		
<1	92	33·7
1–2	90	33·0
3–4	67	24·5
5–9	24	8·8
Place of use of computer		
At work only	21	7·6
At home only	178	64·7
Both home and at work	43	15·6
Not applicable	33	12·0

n may not equate to the total due to missing values.

Table 2 Descriptive statistics and ANOVA of total attitude by nurses background characteristics

Characteristics	Mean	SD	*n*	*F*-value	*P* value
Sex					
Male	3·6	0·5	75	0·456	> 0·05
Female	3·6	0·4	455		
Nationality					
Kuwaiti	3·4	0·5	35	2·302	> 0·05
Non-Kuwaiti Arabs	3·6	0·4	36		
Asians	3·6	0·4	442		
Age					
≤30	3·6	0·5	195	2·161	> 0·05
31–40	3·6	0·4	185		
41–50	3·5	0·5	108		
51+	3·5	0·5	40		
Education**					
Diploma	3·5	0·4	318	25·902	< 0·01**
Baccalaureate†	3·7	0·5	211		
Years in nursing practice					
≤5	3·6	0·4	113	1·944	> 0·05
6–10	3·7	0·4	169		
11–15	3·6	0·4	92		
16–20	3·5	0·4	54		
21–25	3·5	0·5	67		
> 25	3·5	0·6	35		
Type of Facility					
General hospital	3·6	0·4	319	2·389	> 0·05
Tertiary hospital	3·6	0·5	210		
Years worked in current hospital					
≤5	3·6	0·4	226·0	1·968	> 0·05
6–10	3·6	0·4	114		
11–15	3·6	0·5	66		
16–20	3·5	0·4	46·000		
21–25	3·5	0·5	63		
> 25	3·4	0·7	15·000		
Job title					
Nursing Director/AssistantDirector	3·5	0·5	24	1·194	> 0·05
Head Nurse of Unit	3·6	0·5	26		
Nurse/Clinical Instructor	3·6	0·4	480		
Computer experience**					
Yes	3·7	0·4	268	15·103	< 0·01**
No	3·5	0·5	261		
Duration of computer use (years)*					
< 1	3·6	0·4	92	2·928	< 0·05*
1–2	3·7	0·4	90		
3–4	3·7	0·4	67		
5–9	3·8	0·5	24		
Place of use of computer					
At work only	3·6	0·4	21	1·067	> 0·05
At home only	3·7	0·4	178		
Both home and at work	3·6	0·5	43		
Not applicable	3·6	0·4	33		
Overall score	3·6	0·5	530		

** < 0·01 Significant at 1% level, * < 0·05 Significant at 5% level.
n may not be added to the total because of missing values.

Results

Five hundred and thirty (92·3%) respondents returned completed questionnaires and were included in the statistical analysis. Table 1 gives data on their background characteristics. More than three quarters were female, and the majority were Asian (Indian, Philipino, etc.). There was a wide age distribution. Sixty per cent of respondents had a diploma-level qualification, while the rest had a baccalaureate degree. Work experience ranged from < 5 years to > 25 years. The

largest proportion (31·9%) of nurses had practiced 6–10 years, followed by ≤5 years (21·3%). The majority of respondents (60·3%) worked in general hospitals. Forty-three per cent of the respondents reported that they had 1–5 years work experience in the current hospital, followed by 22% who had 6–10 years of experience. Ninety-one per cent of the respondents were Nurse/Clinical instructors. Fifty-one percent indicated that they had experience of using computers, while 49·3%, indicated that they did not have any experience. Among the nurses who had previous experience of working with computers, 91·2% had <4 years of experience and 66·7% had <2 years of computer-use experience. Of the nurses who had experience, 7·6% had access to computer at work only, the majority (64·7%) had access to computers at home only. However, 15·6% had access at both work and home, and 12·0% did not use a computer.

Table 2 gives the descriptive statistics and analysis of variance of total scores by background characteristics of the respondents. The average score for all the background characteristics for all of the categories were higher than the neutral score (3·0), which showed the positive attitudes towards the computerizations. ANOVA showed a significant difference of attitudes for different categories of education, computer experience ($P < 0{\cdot}01$) and duration of computer use ($P < 0{\cdot}05$).

To assess the effect of background characteristics on the attitude towards computerization, multiple regressions analysis was used. Bivariate association between two variables does not necessarily imply a statistically significant causal relationship between them, while multivariate analysis allows the exploration of the effect of different explanatory variables on a dependent variable corrected for other explanatory variable. For regression analysis nurses' attitudes were used as the dependent variable and all the background characteristics were included in the model (Table 3). The adjusted R^2 was 0·09. The model was statistically significant ($F = 2{\cdot}415$, $P = 0{\cdot}009$). Among the 10 independent variables gender, nationality, education and duration of computer use were found as statistically significant predictors. Gender was significant ($P < 0{\cdot}05$) and female respondents showed more positive attitudes towards computerization compared with their male counterparts. Nationality was found to be a highly statistically significant predictor of the attitude towards computerization ($P < 0{\cdot}01$). Non-Kuwaiti nationals showed a higher rate of positive attitudes towards computerized HIS. Education was statistically significant ($P < 0{\cdot}10$) and baccalaureate degree showed a higher positive attitude compared with diploma-holders. Finally, duration of computer use also emerged as a statistically significant positive predictor for total attitudes ($P < 0{\cdot}05$).

Discussion

The mean score for general attitudes towards computerized HISs in Kuwaiti hospitals was 3·6 ±0··45 (range: 1–5) for all the respondents. This indicates that nurses had positive

Table 3 Results of the regression analysis of total attitude

Characteristics	Coefficient	SE	*t*-value	*P* value
Constant	3·25	0·162	20·07	<0·01**
Sex (0 = male, 1 = female)	0·19	0·090	2·08	<0·05*
Nationality (0 = Kuwaiti, 1 = non-Kuwaiti)	0·23	0·071	3·22	<0·01**
Age (in years)	0·02	0·061	0·37	>0·05
Education (diploma = 0, baccalaureate degree = 1)	0·10	0·055	1·86	>0·05
Nursing practice (in years)	−0·03	0·039	−0·84	>0·05
Type of facility (general = 0, tertiary = 1)	0·04	0·058	0·64	>0·05
Experience in current hospital (in years)	0·00	0·038	−0·05	>0·05
Job title (assistant nurse/clinical instructor/nurse = 1, head nurse = 2)	−0·02	0·108	−0·18	>0·05
Computer experience (yes = 0, no = 1)	0·00	0·187	0·01	>0·05
Duration of computer use (in years)	0·06	0·028	2·13	<0·05*
R^2	0·09			
ANOVA	*F*-value = 2·415	*P*-value < 0·01		

** < 0·01 Significant at 1% level, * < 0·05 Significant at 5% level.

What is already known about this topic

- Studies from developed countries report that nursing services have been greatly affected by computerization, but nurses tend to resist computerization.
- A high proportion of nurses is uncomfortable and inexperienced with the use of computer technology in their work.
- Nurses with more computer experience, education and training have more positive views toward computerization.

What this paper adds

- The attitudes towards computerized health information systems of nurses in Kuwait, who are hired from 31 different countries, reflect their different educational and cultural backgrounds.
- Respondents generally had positive attitudes towards computer use, but their attitudes were influenced by gender, nationality, education levels, and duration of computer use.
- With adequate training in computer use and applications the positive attitudes of nurses towards computerized health information systems can be further developed.

attitudes towards computerized HISs. These findings are consistent with those of other studies (Scarpa *et al.* 1992, Large 1994, McBride & Nagle 1996, Wood 2000, Ministry of Health 2002), suggesting that nurses in Kuwait are willing to use computerized HISs to improve the quality of patient care.

With regard to gender, the proportion of males (16·1%) was consistent with other studies (Chang 1984). Gender, nationality and duration of computer use emerged as statistically significant predictors of attitudes towards computer use. It should be noted that although education and computer experience were statistically significant in bivariate analysis these did not remain statistically significant in multivariate analysis. Other studies also found that a high proportion of nurses are still uncomfortable and inexperienced with the use of computer technology (Perry & Mornhinweg 1992, Simpson & Kenrick 1997, Purkis 1999). Female respondents showed a statistically significant positive attitude towards computer use. Regarding nationality, non-Kuwaiti respondents showed a statistically significant positive attitude towards computer use. This confirms the results from the bivariate analysis, where the mean score of attitude was higher for non-Kuwaitis than Kuwaitis. This might be due to the fact that the majority of the Philippino nurses (76·0%) reported previous computer-use experience. Also, most of the Philippino nurses (93·9%) and 74·1% of the Egyptian nurses had baccalaureate degrees. Chi-squared analysis showed a statistically significant association between nationality and level of education ($P < 0{\cdot}05$) and between nationality and previous computer use experience ($P < 0{\cdot}05$). These findings are consistent with those of other studies (Stronge & Brodt 1986, Burkes 1991) that nurses with higher education levels have more positive attitudes towards computers use.

In multivariate analysis, duration of computer use also showed a statistically significantly positive relationship with attitudes towards computer use. This was expected since longer duration of computer use improved the skill level and this leads to more positive attitudes. Burkes (1991) suggests that nurses with computer experience have a better understanding of their implications for practice and are therefore more able to evaluate critically the pros and cons of their use. The majority of respondents with previous computer experience had <4 years of computer experience. Experienced nurses will be better able to understand the potential benefits obtained from computer use, such as retrieving patient information in a timely manner, and communicating with other departments. As computerized HISs are implemented, it is important that more research is conducted to measure changes in attitudes and other factors related to negative attitudes in nurses, who have a key role in the successful implementation of computerized HISs.

Study limitations

As the Ministry of Health, Kuwait, already implemented the computerized system in Kuwait's public hospitals, further study is needed to compare and contrast any similarities and differences due to the computerization. Also, there is a need to examine other factors that may influence the differences in nurses' attitudes toward the computerized system. There are some limitations of the study. The sample included only the nurses from the public general hospitals and four tertiary care hospitals. We did not include any sample from primary healthcare centres and private hospitals. Lastly, although Strong and Brodt's instrument was used to measure the nurses' attitudes toward computerization in many other countries in different cultures and organizational settings, we used it for the first time in Kuwait. We could not compare it with other instruments as to how it measures the nurses' attitudes toward computerization in present cultural and organizational settings.

Conclusion

The growing emphasis on the use of computerized HISs has serious implications for health care delivery systems. First,

nurses are the frontline care providers and need to learn about the use of computer technology in their daily work. Our findings suggest that nurses who have had no previous experience of such systems should be provided with a carefully developed course on the use of computerized HISs. Secondly, those who have had previous computer use experience may be used as 'key professionals' within respective to units to assist in the orientation of their inexperienced colleagues.

When recruiting nurses, their exposure to and ability to use computer technology in nursing practice should be made assessed and appropriate induction training given, followed by a performance deficiency analysis related to the HIS in operation at the designated workplace. Our findings also have implications for pre-registration nursing curricula, in which training in information technology applications should be part of the curriculum.

Author contributions

HQ and AM were responsible for the study conception and design of the manuscript. HQ, AM, MAS and RIC were responsible for the drafting of the manuscript. AM performed the data collection. and RIC performed the data analysis. HQ, AM and MAS provided administrative support. RIC provided statistical expertise. MAS and RIC made critical revisions to the paper. HQ and MAS supervised the study.

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