«ΣΠΟΥΔΑΙ», Τόμος 60, Τεύχος 1ο-2ο, (2010) / «SPOUDAI», Vol. 60, No 1-2, (2010), University of Piraeus, pp. 82-96

ATTITUDES TOWARDS THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) AT WORK: FINDINGS FROM THE HEALTH CARE SECTOR IN GREECE

By

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Abstract

The aim of our study is to investigate the relationship between several demographic factors and the attitudes of personnel towards the use of Information and Communication Technologies (ICT) at work. Our random sample consisted of administrative, medical and nursing personnel from three Public Hospitals (total 223 employees), aged 39 (± 19). The data were collected using the following instruments: 1) Questionnaire of demographic elements and 2) Questionnaire «16-19 Computer Attitude's Scale» as they were adjusted to fit the needs of this study. The research findings indicate that the employees who use ICT show more positive attitudes towards new technologies, possibly due to the fact that they understand the benefits that will exist for their work through a computerized information system. The new employees are more familiar with ICT technologies, while the more complex specialties consider the use of computerized information systems important aid to make their work more effective, in contrast to older workers as well as employees who have received only primary education. JEL Classifications: I10, O32, C10.

Keywords: Information and Communication Technologies (ICT), Healthcare, Statistical Analysis.

1. Introduction

The health system can not be easily defined due to existence of many variables and boundaries which have been proposed to separate the health system from elements outside of them. Nevertheless, a simple definition is based on its elements which are utilized as policy instruments from the decision-makers. A health system consists of the resources, actors and institutions related to financing, regulation and provision of health actions that are any kind of activities whose primary intent is to improve or maintain health *(Murray, 2000; WHO, 2000a; WHO, 2000b)*. Apart from the health improvement, there exist two other main objectives: consumer satisfaction and financial risk (Table 1):

TABLE 1

Health System Goals

Health System Goals		
Health	Financial Risk Protection	Consumer satisfaction

The achievement of these goals is influenced by the level of accomplishment of intermediate objectives, which are: equity, effectiveness, efficiency and choice. It is however obvious that something else should exist so that the goals of heath system are attained. This is nothing else but the four elements, financing, organizational arrangement, resource allocation and provision, of health system (*Londono, 1997; Murray, 1995*).

An important characteristic of the health system is its dynamic nature. Many factors and elements within the health system lead it to change in order the targets to be attained. Furthermore, the health system is not in vacuum, but is influenced by environmental factors, such as political, economic, legal, demographic and epidemiological factors. Nowadays, the health systems face many problems. The demographic as well as epidemiological transitions are associated with the increase of health expenditures. The patterns of diseases, especially the presence of chronic diseases, also require the provision of diverse health services. Moreover, the health services consumers do not want the long waiting times and the poor communication from the health professionals, but many demand better quality of services as well as quick and effective treatments. The health services consumers are also characterized by greater knowledge and higher expectations for better services as well as they want to participate in the decision of their treatments. According to *Neuberger et. al. (2005)*, *«the educated patient is a reality from which no-one working in the health and social care can hide»* indicating that the health system should respond quickly so as to cope with the new challenges (*Collins, 1999; Atun, 2002; Neuberger, 2005;*). Therefore, the policy makers are faced with ever-increasing demands to make health systems more effective, to improve the quality of care and the access to care so that the goals of the health systems are achieved.

It is already known that a widely recognized source of inefficiencies is the fragmentation of the care delivery process and the poor transfer of information. Especially, the health system consists of groups of large and small medical practices and hospitals. Nothing really links these isolated structures into a system within which information is easily shared and compared. However, many studies noticed that the efficient sharing of health information is indispensable for the

effective delivery of care (*Bates, 2002; Gandhi, 2000; Schoen, 2009*). This can be achieved by information and communication technology (ICT), which has already been identified as a vehicle with the potential to achieve the goals and the objectives of health system (*Daim, 2008; Idowu, 2003*).

Information and communication technology is defined as the tools that facilitate communication, processing, transmission of information and the sharing of knowledge by electronic means. It encompasses the full range of electronic and digital information technology, from radio and television to telephone, computers, electronic media and internet (*Alpay, 2002; Papadimitriou, 2003*). It is also important to notice that information communication technology is different from health information technology. The first one is utilized when the use of health information technology has a strong networking and communication component, while the latter term is used to describe the application of computers and technology in health care (*Hersh, 2009*).

The application of information and communication technology in health care has grown exponentially over the last years due to the fact that it can drive improvements in the health system. First of all, it can increase patient safety, because information and communication technology can prevent medical errors from occurring in the first place as well as help the health professionals to acquire and share information important for their clinical practice. In addition, information and communication technology can improve the compliance of patients suffering from chronic diseases *(Chaundry, 2006; Scott, 2005)*. Another important benefit of information communication technology constitutes the improvement of efficiency. More effective information sharing through ICT at the point of care can reduce the uptake of health services and can provide effective treatments to the patients *(Ash, 2004; Dexter, 2001)*. ICT also contributes to the reduction of operating costs of clinical services through the changes in the way tasks are performed. These reductions is realized through improvements in quality of care, such as avoidance of redundant tests, avoidance of hospital admissions due to medication errors and reductions in time spent on administration *(Koppel, 2005; Carruth, 2008)*.

The problem, however, is the adoption and the successful utilization of this technology. Apart from the financial constraints, the adoption process is mainly affected by human factors *(Hubner, 2010; Poon, 2006)*. According to *Hobbs et. al. (2002)*, the health professionals, especially the nurses, resist to the use the new technologies in patient care due to the fact that they ignore the benefits of this technology. Moreover, training constitutes a major determinant of ICT adoption by health professionals and influences the integration of these technologies

into every day clinical practices (*Allen, 2000; Kronick, 2003; Johnson, 2001*). According to *Davis et. al*. (*1993*), no matter how sophisticated and effective is the technology; effective implementation depends on whether the users have a positive attitude towards it. The aim of this study is to investigate demographic factors in relation with the attitudes of hospital personnel in front of computers and to identify any potential conflict.

2. Research Methodology. Instruments and Data

2.1 Sample

The sample of this study consists of employees who work at three Public Hospitals in Attica area. As the entire personnel (permanent and fixed term staff in all specialities) were 1902 people, a random sample of 223 employees was selected. Their age was between 20-61 years old and the mean age was 39 years.

2.2 Instruments

The following measuring instruments were utilized during this research:

a) Demographic data as well as information about the use of information and communication technology were selected and are: gender, date of birth, marital status, number of children, level of education, kind of studies, year of first graduation, graduation from another school and which school, specialty in work field, field of work at the hospital, permanence at work, years of experience, category of employee, working at a position of high duty, demand on use of a computer for work, use a computer at work, willingness to use a computer at work, willingness to facilitate the task of work through the use of computer at work, knowledge and use of information communication technology, possession any kind of certification of knowledge of information communication technology and use a computer at home.

b) The questionnaire *«16-19 Computer Attitude Scale» (Selwyn, 1997; Antoniou et. al., 2006)* consists of four subscales. They included:

- six questions about «influence» (feelings about computers) such as using a computer does not scare me at all.
- five questions in relation with «knowledge» (ideas and information regarding computers) such as the computers help me to organize my work better.
- six questions for «behaviour» (intentions and actions in which there is shown a respect toward computers) and an example is: the computers help me to work with more interesting and inventive.
- four questions about «control» (perceived inactivity or difficulty in utilizing

computer) and an example constitutes: I can make the computer to do what I want.

The answers to 21 questions are in 5 degree scale type Likert, ranging from 1=strongly disagree to 5=strongly agree. The original questionnaire has been translated into Greek. It has also been checked for its structural validity and reliability and has been utilized in surveys of adolescents aged 15-19 years *(Antoniou et. al., 2006)*. In addition, the questionnaire has been slightly altered on some questions in order to correspond with the working environment for the purposes of this study.

2.3 Procedure

The questionnaires were handed to all participants. The filling process lasted 10-20 minutes and the participants returned them straight away. Researchers informed the participating personnel that their participation was completely voluntary and their responses would be treated strictly confidentially.

2.4 Statistical analysis

Using the Cronbach coefficient α internal consistency, the results showed that the internal consistency of questionnaire *«16-19 Computer Attitude Scale»* was 0.82. Therefore, the reliability is accepted since it is over 0.70.

Simple descriptive statistical analysis (descriptive analysis) was used for the data and the following tests were applied: analysis of variance for independent measurements on one factor (t-test for independent samples and one-way ANOVA). Regarding the detection of statistically significant differences between classes of factors, Bonferroni multiple comparison test was applied.

3. Research Findings

3.1 Statistical analysis

3.1.1 Descriptive statistical analysis

Analyzing our data, we found that 34,1% of our sample was men (76) and 65,9% were women (147). Among the hospital personnel who took part in the study, 14,3% was 20-30 years old (32), 39% was 31-40 years old (87), 34,1% was 41-50 years (76) and 12,6% was 51-61 years old (28). Regarding their marital status, 61,4% of the participants were married (137), 30,9% were single (69), 6,7% was divorced (15) and only 0,9% were widows (2). Moreover, 41,7% of the sample did not have any child (93), while 18,4% were parents of a single child

(41), 35,4% were parents of two children (79) and 4% were parents of 3 or more children (9).

The distribution for the education level gave was as follows: 5,4% of workers (12) were secondary school graduates, 31,8% (71) were high school graduates, 53,8% of employees (120) were technical institutes and universities graduates, 7,2% (16) hold a master's degree and 1,8% (4) had a doctoral degree. Regarding the year of their first graduation, 20,6% of the participants (46) graduated between the years 1969-1980, 27,4% (61) graduated between the years 1981-1990, 34,1% (76) graduated between the years 1991-2000 and 17,5% (39) were graduates between the years 2001-2008.

It is noteworthy that only 22,9% of health professionals in the sample (51) had received additional (continuing) training. Especially, 50% of them (26) had studied a two-years nursing course, 15,4% (8) graduated from the nursing schools of Technical Institutes and 7,7% (8) graduated from other schools of Technical Institutes and Universities (radiologists, accountants, graduates of computer parts, psychology) respectively, followed by 3,8% (2) graduates of the following departments (obstetrics, Early Childhood, social policy), and finally the graduates from administration departments and biology with 1,9% (1).

About the speciality in the work field, 25,1% (56) of participants are medical personnel, 29,6% (66) nursing personnel, 28,3% (63) administrative personnel, 4,5% (10) technical staff, 3,1% (7) IT staff and 9,4% (21) of other disciplines (chemists, psychologists, physiotherapists, social workers, biologists, technologists, manufacturers).

Another important parameter is the fact that only 63,7% (142) of the health personnel, work in specific positions at the hospital. Especially, 45,1% (64) employees from the sample work in the pathological department, 42,3% (60) in the surgical department, 7,7% (11) in the laboratory department and 4,9% (7) in intensive care units (ICU).

The permanence constitutes another factor and the results showed that 73,5% (164) of participants have a permanent contract employment relationship, while 26,5% (59) have fixed-term contract.

In relation with the experiences, 16,1% (36) of the employees in the sample have experience up to 2 years, 23,3% (52) up to 7 years, 17,5% (39) up to 15 years and 43% (96) more than 16 years.

On the employee category, 37,2% (83) employees of the sample serve as uni-

versity grades (IPs), 28,3% (63) in grades higher education (TE), 30% (67) in grades secondary education (DE) and 4,5% (10) grades of compulsory (primary) education (HR).

The analysis of the questionnaires also showed that 35% (78) of the participants responded that they serve in a position with increased responsibility. Especially, 24,4% (19) are managers, 3,8% (3) are head of sectors, 20,5% (16) are head of departments and 51,3% (40) responsible for covering the shortages of personnel or serve as heads of departments in the afternoon and night shift lots.

Regarding the requirement to use a computer at the work environment, 60,5% (135) of employees in the survey responded positively in contrast with 39,5% (88) who answered negatively. The important thing is that the same percentage of staff (60,5% (88)) answered that they use the computers during their work, while 39,5% of employees said that they do not utilize the computers in their every day practice. In addition, the results showed that 90,1% participants intend to use the computer (201), while 9,9% do not want to utilize it. Moreover, 91,5% (204) of the employee said that they intend to facilitate their work through the use of the computers in contrast with the people (8,5%, (19)) that they answered negatively to this question.

About their knowledge and use of computers, 73,5% (164) of the employees said that they know and handle e-mail (e-mail), 78% (174) said that they know and interact with the Internet, 56,5% (126) said that they know and handle ftp, 44,4% (99) mentioned that they know and handle chat and finally, 39,9% (89) know and manage videoconferences and teleconferences (net meeting). On possession and type of any certification of ICT knowledge, only 39,9% (89) employees of the sample said that it has satisfied the knowledge on ICT. Of these, the 38,6% (86) say they have certified their knowledge about the program Word, 35,4% (79) for the Excel, 25,1% (56) for the Power Point and 28,7% (64) for use of the Internet. Regarding the use of home computers, the 73,5% (164) employees of the sample say they use a PC at home, versus 26,5% (59) said they do not use.

3.1.2 ANOVA

Each factor in the questionnaire of attitudes towards the use of Information and Communication Technology (influence, knowledge, behaviour and control) was evaluated on the basis of gender (2 levels: male-female), age (4 levels from 20-30 years from 31-40 years from 41-50 years and 51-61 years), marital status (4 levels: single, married, divorced, or widowed by) the number of children (with four

levels: no children, one child, two children or three more children), level of education (5 levels: secondary school graduates, high school graduates, alumni Technical Institute and Universities, hold MSc and hold PhD), the first ten year of graduation (with four stages: 1969-1980, 1981-1990, 1991-2000 and 2001-2008), the possession of another degree (2 levels: yes, no), the specialty site work (with six levels: physician, nurse, administrator, official technical service, computer and other scientific disciplines), field work in the hospital (with four levels: pathologic, surgical, laboratory, ICU), the permanence (with two levels: yes, no), years of experience (with four levels: up to 2 years to 7 years to 15 years and 16 years and over), the employment group (with four levels: HR, DE, TE and IP), position of increased responsibility (with four levels: managers, head of sectors, head of departments and head other), the requirement to use computers in the workplace (on two levels: yes, no), the use of computer in the workplace (with two levels: yes, no), intended use of computer in the workplace (with two levels: yes, no), intended to facilitate their work through the use of computers (with two levels: yes, no), holding the certification of knowledge of ICT (with two levels: yes, no) and then use a PC at home (with two levels: yes, no) to identify potential differences. In all of these factors analysis of variance of the questionnaire of attitudes towards the use of ICT (influence, knowledge, behaviour and control) were used as dependent variables (Table 2).

TABLE 2.

Statistical significance interaction between various factors

(The statistical significant aremarked with *)

	Influence	**Knowledge**	**Behavior**	**Control**
Gender	—* t=3.488, p= 0.001 <0.05	* t=1.973, p= 0.05 =0.05	* t=3.003, p= 0.003 <0.05	t=1.417, p= 0.158 >0.05
Age	F (3, 219)=1.905, p=0.130 >0.05	F (3, 219)=0.131, p=0.942 >0.05	F (3, 219) =2.291, p=0.079 >0.05	F (3, 219)=1.902, p=0.130 >0.05
Marital status	*F (3, 219) =3.972, p=0.009<0.05	F (3, 219)=0.105, p=0.957>0.05	F (3, 219) =2.625, p=0.051>0.05	F (3, 219)=1.543, p=0.204>0.05
Number of children	F (3, 218)=1.528, p=0.208 >0.05	F (3, 218)=2.036, p=0.110 >0.05	F (3, 218) =1.644, p=0.180 >0.05	F (3, 218)=0.464, p=0.708 >0.05
Education level	* F (3, 219) =4.557, p=0.001<0.05	F (3, 219)=1.589, p=0.178 >0.05	* F (3, 219) =2.431, p=0.049 <0.05	* F (3, 219) =2.531, p=0.041 <0.05

(to be continued)

Year of first graduation	*F* (3, 218)=2.510, *p*=0.060 >0.05	*F* (3, 218)=1.076, *p*=0.360 >0.05	*F* (3, 218) =2.101, *p*=0.101 >0.05	* *F* (3, 218) =3.301, *p*=0.021 <0.05
Additional degree	*t*=0.670, *p*= 0.503 >0.05	*t*=1.927, *p*=0.055 >0.05	*t*=0.944, *p*= 0.346 >0.05	*t*=0.783, *p*= 0.434 >0.05
Type of additional degree	*F* (8, 43) =1.164, *p*=0.342 >0.05	*F* (8, 43) =0.469, *p*=0.871 >0.05	*F* (8, 43) =0.265, *p*=0.974 >0.05	*F* (8, 43) =0.887, *p*=0.535 >0.05
Specialty in the work field	* *F* (5, 217) =5.861, *p*=0.000<0.05	* *F* (5, 217) =4.743, *p*=0.000<0.05	* *F* (5, 217) =3.418, *p*=0.005<0.05	* *F* (5, 217) =4.988, *p*=0.000<0.05
Work position	*F* (3, 138)=0.828, *p*=0.480 >0.05	*F* (3, 138)=0.215, *p*=0.886 >0.05	*F* (3, 138) =0.411, *p*=0.745 >0.05	*F* (3, 138)=0.383, *p*=0.765 >0.05
Permanence	*t*=1.266, *p*= 0.207 >0.05	*t*=0.686, *p*=0.493 >0.05	*t*=1.133, *p*= 0.259 >0.05	*t*=1.657, *p*= 0.099 >0.05
Years of experience	*F* (3, 219)=1.627, *p*=0.184 >0.05	*F* (3, 219)=0.386, *p*=0.763 >0.05	*F* (3, 219) =2.364, *p*=0.072 >0.05	*F* (3, 219)=1.346, *p*=0.260 >0.05
Employee category	* *F* (3, 219) =2.891, *p*=0.036 <0.05	* *F* (3, 219) =4.901, *p*=0.003 <0.05	*F* (3, 219) =0.915, *p*=0.434 >0.05	* *F* (3, 219) =3.146, *p*=0.026 <0.05
Position with increased responsibility	*F* (3, 74) =0.711, *p*=0.549 >0.05	*F* (3, 74) =0.838, *p*=0.477 >0.05	*F* (3, 74) =0.736, *p*=0.534 >0.05	*F* (3, 74) =0.708, *p*=0.550 >0.05
Requirement to use a computer at work	* *t*=2.455, *p*=0.015 <0.05	* *t*=3.365, *p*=0.001 <0.05	* *t*=2.558, *p*= 0.011 <0.05	* *t*=3.680, *p*= 0.000 <0.05
Use a computer at work	* *t*=3.873, *p*= 0.000 <0.05	* *t*=2.417, *p*=0.017<0.05	*t*=1.312, *p*= 0.191 >0.05	* *t*=4.019, *p*=0.000 <0.05
Intent to use a computer	* *t*=5.540, *p*= 0.000 <0.05	* *t*=5.052, *p*=0.000 <0.05	* *t*=3.462, *p*= 0.001 <0.05	* *t*=5.510, *p*= 0.000 <0.05
Know that the computer help them in the work	* *t*=4.790, *p*= 0.000 <0.05	* *t*=7.603, *p*=0.000 <0.05	* *t*=4.031, *p*= 0.000 <0.05	* *t*=5.278, *p*= 0.000 <0.05
Possesion any kind of certification for computer knowldege	* *t*=3.153, *p*= 0.002 <0.05	*t*=1.510, *p*=0.132 >0.05	* *t*=3.399, *p*= 0.001 <0.05	* *t*=3.775, *p*= 0.000 <0.05
Use a computer at home	* *t*=6.657, *p*= 0.000 <0.05	* *t*=4.190, *p*=0.000 <0.05	* *t*=4.655, *p*= 0.000 <0.05	* *t*=7.134, *p*= 0.000 <0.05

** Statistical significant at 0.05 level*

4. Discussion

The results of our research lead to important conclusions about the attitudes and the use of computers by the hospital employees. First of all, the factors that are remained undifferentiated in relation to the attitudes of health professionals for the computer are: age, number of children, another degree and permanence in the work, years of experience and positions of responsibility.

Concerning the factor «age», there are not any differences. This is probably owed to the fact that the new employees and the older ones have realized the benefits that will have using information and communication technology at their work. They try to adapt this innovation in their every day practice, while the older people try to overcome any possible obstacle so as to learn and to use effectively. Moreover, the factor «number of children» does not seem to affect the attitudes of staff towards the utilization of information and communication technology. The factor «additional degree» did not also seem to influence the attitudes of participants towards the utilization of information and communication technology. Although the number of participants with another degree is small, it is easily understood that there is not any distinction in the results due to this factor.

In relation with the factor «permanence», it is found that it does not influence the attitude of staff towards the use of computers. Both the permanent and fixed-term staff can use new information and communication technology in their every day practice. This can be explained because the permanent employees want to improve their work environment, while the fixed-term employees are seeking ways to increase their skills and knowledge something that will help them to possess a permanent position in the near future.

Besides, the «work area in the hospital» did not appear to differentiate the attitudes of the subjects, as it is found that all the workers utilize information and communication technology in their common practice. The «years of service» does not alter the attitudes of staff. Especially, the young people have as an asset the knowledge around the new information and communication technology. The older personnel try to acquire this knowledge so that they can improve their every day practice. Furthermore, the attitude of workers is not affected by the factor «working in a position of increased responsibility», since all the employees independent of responsibility have understood how the information and communication technology can benefit their practice.

From the research, however, it was found that there are some factors which differentiate in relation to the attitudes towards the computers and these are:

- The *sex* (affect, perceived usefulness, perceived control = 3 factors): the men had higher rates on three above mentioned factors than the women. According to *McGregor et. al. (2006)*, males are less anxious about using the computers than females, who have difficulties in using a computer.
- The *marital Status* (affect = 1 factor): the single and married had higher values than the widowers.
- The *first decade of graduation* (behavioural = 1 factor): Graduates from 2001 to 1908 had higher rates than the graduates of the years 1969-80 & 1981-90.
- *The level of education* (affect, perceived usefulness, behavioural = 3 factors); affect: The high school graduates, Technical institutes' graduates and Master degree graduates had higher rates than the secondary school graduates. Behavioural: The Master degree graduates had higher rates than the secondary school graduates.
- *Specialty-Workplace* (influence, knowledge, instinct, control = 4 factors). Influence and Control: Administrative and Information Technology had higher rates of nurses. Knowledge: Administrative and physicians had higher rates than those of nurses. Urge that administration had higher rates of nurses.
- *The employment-Class* (influence, knowledge, control = 3 factors). Effect: The IP officers had higher rates of personnel YE. Knowledge: Employees had higher IP values than employees GF.
- *The requirement to use a computer at the work* (affect, perceived usefulness, perceived control and behavioural = 4 factors) with higher prices for those who use the place called PC.
- *Using a computer job* (influence, knowledge, control = 3 factors) with higher prices for those using the PC.
- *The intention to use a computer at the workplace* (affect, perceived usefulness, perceived control and behavioural = 4 factors): People who intent to use it had the highest values.
- *The belief in facilitating the work through the use of computers in the workplace* (affect, perceived usefulness, perceived control and behavioural = 4 factors): the employees who believe that the use of computers in their workplace facilitates their work had the highest values.
- *The possession of a certification verifying the knowledge of use of Information and Communication Technology* (affect, perceived control, behavioural = 3 factors): The people who have a certification had higher rates than the others.
- *Use a computer at home* (affect, perceived usefulness, perceived control and behavioural = 4 factors): The personnel who uses a computer at home has higher rates than they people who do not utilize it at home.

5. Proposals

From the findings of our research is clear that the use of computers and new technologies make acquaintance and bend the negative reactive attitudes that already exist on the staff, which they have not been adopted and adapted in the workplace (mainly nurses). Important initiatives in terms of administration and organization of the health services could be the equipment of all departments of the hospital with computer systems, the introduction of training procedures to nursing staff in the use of computers and new technologies general support of education through mutual learning programs, which rely on employees to know and be able to train colleagues in their daily practice and even staff training to use the Internet as an additional tool to facilitate daily life inside and outside work. Necessary is considered the training of lower educational levels personnel, while the search for knowledge areas ignore the introduction of strategic approach to introduction of information systems in health sector and the introduction of strategic management of the staff, which includes, besides the additional criteria for hiring and research on individual characteristics and preferences in order to perform more efficient and effective work. The barriers and denial in the use of ICT that exists at the nurses should not be evaluated negatively, and that group of personnel in health services is the one most wretched and burdened with the syndrome of burnout. If working conditions in the Greek health system improved (total hours and working environment), then a further research of potential modifications in the attitudes of health care personnel in public hospitals could be of added value.

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