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The Study of Health Information System Performance from Managers and Experts' Viewpoints

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Abstract: Human resources comprise an important element in implementation of any successful health information system including any kind of information technology used. Our aim of study was to investigate some aspects of the current health information system in Tabraiz University of Medical Sciences and its different subdivisions and study attitudes of health managers and health experts regarding this system. In this cross-sectional study a total of 240 health system experts along with 32 health system managers working in different subdivisions of Tabriz University of Medical Sciences and Health Services through out the province were entered into the study. A structured questionnaire was used to collect the main data and some extra data were gathered checking the registers and available files. Data were entered into the computer and analyzed with SPSS 11 statistical package. We found in this study that Excel and Access were the main statistical software packages installed and used in information and statistics units. Data collection was commonly done in 71.2% of information and statistics units based on a given standard plan. The main procedures used for analyzing or interpreting the data were comparing with previous data in 59.4%. Planning and decision making were the most common purposes of using information as declared both by managers and experts. 61.9% of managers compared to 47.5% of health system experts said they commonly use available statistical data to evaluate services supplied by their own units. Nearly a quarter of both managers and health system experts said they commonly receive feedback from higher levels of organization regarding the statistical information sent by them.

Key words: Health information system, information technology, management information system, evaluation

INTRODUCTION

The function of information is to help us make better decisions (Wyatt, 1996). For information to influence management in an optimal way, it has to be used by decision makers at each point of the management spiral (Theo *et al.*, 2000). Progress in information processing methodology and in information and communication technology has significantly changed our societies. Today, we already speak of the 21st century as being the century of the information society (Haux, 2002). Health information is a major part in such society. The World Health Organization (WHO) has long identified health information systems as critical for achieving health for all by the year 2000 (Theo *et al.*, 2000). Either the National Health Information Infrastructure concept has evolved over several decades as medical informatics professionals implemented individual and enterprise-wide clinical information systems and explored the implications of extending such systems throughout the entire health care continuum.

The widespread application of computer-based records in health care was recommended as early as 1991 by the IOM, which called them an essential technology for patient care (Dick and Steen, 1991). Health information systems in most countries are inadequate in providing the needed management support. Most health care providers in developing countries equate information systems with filling endless registers with names and addresses of patients compiling information on diseases every week or every month and sending out reports without adequate feedback (Theo *et al.*, 2000). Many countries have got focused on implementing health information and EMR projects but despite the commitment of extensive resources, evidence of failure is repeatedly documented in the literature (Aarts *et al.*, 2004; van der Meijden *et al.*, 2003; Goddard, 2000; Southon, 1997; Lorenzi, 2000). At least one investigator conservatively estimated that as many as 50% of information systems projects fail (Keil and Daniel, 2001). Human resources comprise an important element in implementation of any successful health information system including any kind of

information technology used. Staff acceptance of and willingness to use the system have been found to be major determinants of system success (Ammenwerth, 2003; Goddard, 2000; Lorenzi, 2000; Amatayakul *et al.*, 2000).

Our aim of study was to investigate some aspects of the current health information system in Tabriz University of Medical Sciences and its different subdivisions and study attitudes of health managers and health experts regarding this system.

MATERIALS AND METHODS

Setting and study population: Tabriz University of Medical Sciences and Health Services based on a WHO recommendation is responsible for both medical education and delivering and supervising health services. Tabriz is the capital of East Azerbaijan province located in north-west of Iran with a population of 3500000 people and 19 districts.

In this cross-sectional study a total of 240 health system experts along with 32 health system managers working in different subdivisions of Tabriz University of Medical Sciences and Health Services through out the province were entered into the study. These centers included 19 health networks in different districts, 25 hospitals either specialty or general hospitals, seven faculties and seven university deputy offices.

Data collection and analysis: A structured questionnaire was used to collect the main data and some extra data were gathered checking the registers and available files. Questionnaires were designed by a research expert team led by an information technology scientist then questionnaires were tested and improved to be used for data collection.

Data were entered into the computer and analyzed with SPSS 11 statistical package. One-way ANOVA, t-test, Chi-square, Tukey and Scheffe tests were the main tests used to analyze data.

Ethical issues: The study project was approved by high degree research and ethics committee of Tabriz University of Medical Sciences. Verbal consent was taken from all the participants, letting them to know that there is no obligation in accepting or continuing their participation. All the individual information was considered as secret and were not delivered to any one even to the chancellor.

RESULTS

Findings regarding information and statistics units: Main responsibilities and official task sheets were available in only 15.6% of information and statistics units.

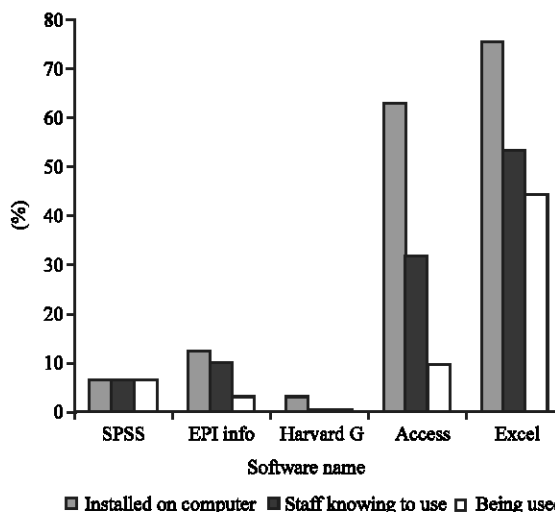


Fig. 1: Main statistical soft wares installed and used in information and statistics units

In 56.3% of these units printers were not available and 28.1% lacked even computers. Majority of units lacking printers or computers belonged to district health networks.

Excel and Access were the main statistical software packages installed and used in information and statistics units. Main statistical soft wares installed on computers of these units and status of their usage is given in Fig. 1.

Data collection was commonly done in 71.2% of information and statistics units based on a given standard plan and routine data validity checking was done in 78.2% of units. In 78.1% of units data sheets were commonly signed by the office head. In cases of encountering faults in data sheets in 31.3% of units they were corrected by the unit staff without any contact with or feedback to the centers which have completed them.

The main procedures used for analyzing or interpreting the data were comparing with previous data in 59.4%, comparing with other data in 53.1%, checking variations in 40.6%, calculating indices in 37.5% and a mixed approach in 34.4% of units. Data analysis time was immediately after receiving data in 21.9%, through a standard schedule in 25%, request based in 12.5% of units.

Findings regarding managers and health system experts: The mean for age of managers was 36.4±5 (Mean±SD) year and of health system experts was 36±0.9 years. Mean years of job experience for health system experts was 12.38±.92 and mean years and of managing experience for managers was 6±4.4 years. The entire managers had academic degrees. 75% of managers had a Ph.D or MD

degree and 9.4% had master degrees and only 15.6% of managers had academic degrees lower than master. 10.1% of experts had master or higher academic degrees.

Planning and decision making were the most common purposes of using information as declared both by managers and experts. A significantly higher proportion of managers rather than experts used information commonly for planning ($p < 0.001$), decision making ($p < 0.001$) and preparing reports ($p < 0.01$). Figures on other fields of using information showed no statistical difference between managers and experts (Table 1).

Only 3 managers (9.4%) said that they always use statistical information in decision making compared to 42 (17.5%) of health system experts. The ideas of Managers and health system experts about availability of documented and clear indices showing the function of their organization is given in Table 2.

Table 1: Proportions of using information in different fields compared between managers and experts

Information used for	Managers		Health system experts		p-value
	Frequency	(%)	Frequency	(%)	
Planning	30	93.8	174	72.5	0.001
Decision making	29	90.6	152	63.3	0.001
Preparing reports	26	81.3	145	60.4	0.01
Acquiring knowledge	17	53.1	114	47.5	NS
Educational activities	15	46.9	89	37.1	NS
Research activities	9	28.1	72	30.0	NS
Situation analysis	28	87.5	184	76.7	NS
Response to requests of others	19	59.4	104	43.3	NS

Table 2: The ideas of Managers and experts about availability of documented and clear indices of the organization functioning

Are documented and clear indices of the function of your organization available to you?	Managers		Health system experts	
	Frequency	(%)	Frequency	(%)
Quite available	4	12.5	6	2.5
Fairly available	9	28.1	46	19.2
Somehow available	16	50.0	108	45.0
Not available	2	6.3	47	19.6
I don't know	1	3.1	26	10.8

61.9% of managers compared to 47.5% of health system experts said they commonly use available statistical data to evaluate services supplied by their own units. Nearly a quarter of both managers and health system experts said they commonly receive feedback from higher levels of organization regarding the statistical information sent by them.

Some attitudes of managers and health system experts regarding health information system are given in Table 3.

DISCUSSION

Although all centers studied had established information and statistics units, but In 28.1% these units lacked even computers and in 56.3% of these units printers were not available. Professional statistical software packages such as SPSS or EPI-info were installed in less than 10% of information and statistics units and were used even lesser than that. In case of Access software although it was installed in more than 60% but it was used less than 10% of units. This maybe because of the fact that many people install all office programs totally, while they use only one or two programs like Microsoft word or PowerPoint. Finally Microsoft Excel was the only statistical software commonly used by study participants. Even in this case less than half of the information and statistics units used it. Considering this fact and the low rate of using professional statistical softwares, it may be concluded that computer based self initiated data analysis it not much common and using statistical tests in data analysis is quite rare in information and statistics units governed by Tabriz University of Medical Sciences and Health Services. This applies nearly to all state medical education and district health centers and hospitals through out Eastern Azerbaijan Province of Iran. Contrary to our findings an egyption study shows that SPSS and EPI-Info software packages were used by more than 85% in health information systems studied

Table 3: Attitudes of managers and health system experts regarding health information system

Field of attitude	CA		A		D		CD		NI	
	M	E	M	E	M	E	M	E	M	E
Data are registered correctly where they are produced in your organization	3.1	10.8	59.4	53.8	28.1	19.2	6.3	1.3	3.1	9.6
Data are summarized correctly where they are produced your organization	3.1	10.0	65.6	49.6	18.8	22.1	3.1	2.9	3.1	12.1
Statistics units in your center supplies your information needs completely	3.1	5.8	40.6	27.1	28.1	27.9	9.4	8.3	18.7	25.4
Decision making is information based in your organization	0.0	4.6	59.4	36.7	21.9	25.0	3.1	10.4	15.6	19.2
Required resources about information is easily accessible for you	0.0	4.2	53.1	34.6	31.3	30.8	0.0	9.2	15.6	17.5
Required information for decision making is easily accessible for you	0.0	2.9	50.0	32.9	31.3	28.8	0.0	9.6	18.7	20.8
You can completely rely on statistical information provided by your organization	0.0	2.9	56.3	31.3	18.8	25.0	0.0	8.3	25.0	27.9
Health information management office conducts its missions quite well	0.0	2.5	31.3	16.7	21.9	19.6	0.0	7.1	46.9	48.8
Managers orderly receive their required information by statistics units	0.0	4.6	25.0	34.2	56.3	17.5	3.1	5.4	15.6	32.5

CA: Completely Agree/A: Agree/D: Disagree/CD: Completely Disagree/NI: No Idea, M: Managers/E : health system experts

(Elgamry, 2002). Maybe this is because in our study area less attention is paid on staff empowerment rather than expanding the establishment of information and statistics units in health education or health service delivery centers.

In order to adequately pursue the goal of transforming health care through innovative use of ICT for the 21st century, health care professionals are needed, who are well-trained in medical informatics, respectively health informatics. Medical informatics must offer such educational programs and assure a sufficiently high quality of education (Haux, 2002). Highest self reported computer skills were in fields of windows and internet by managers and windows and Microsoft word by health system experts. Not an acceptable amount of managers or even experts showed to be skillful on required computer abilities. In a study on general practitioners and nurses in UK Sixty-nine per cent of GPs and 70% of Practice Nurses had looked the Internet for healthcare information. Time restraints (20%) and concerns that they lack the necessary skills (17%) were highlighted as the most common reasons for not accessing the Internet (Wilson, 1999). Describing the use of computing systems by primary care staff in Scotland, it was reported that 94% of general practitioners and 74% of practice nurses frequently used a computer. Most Scottish doctors made frequent use of computers for a variety of clinical and practice management activities while many other staff wanted to make greater use of computers, but were often unable to obtain access (Morris *et al.*, 2003). Considering our situation and previous studies, the key to discussion is the belief that people-based skills are just as important as--if not more important than--the actual technology (Ball and Lillis, 2000).

Public health administrators, charged with the responsibility of both leading and managing their agencies, those who are recognized as having significant management responsibility and influence over programs and hold positions of leadership, must be prepared. One of the critical skills identified is Informatics and ability to use information (Boedigheimer and Gebbie, 2001). This is the same for managers working in our setting. Although both health managers and health system experts were moderately acquainted with information technology and commonly used information for decision making, but in case of managers less than 10% used information for decision making at all occasions which is not a good figure for managers. It must also be taken into account that many managers have declared of not having quick and easy access to information

needed for decision making. In case of experts they are usually assumed to be more technically skillful than managers. Contrary to what we found it is also expected for experts to use information for preparing reports much more than managers. One explanation for this situation maybe to consider as in Morris's study that those with higher education have more access to computers than others (Morris *et al.*, 2003). Based on our experience in Iranian health system we are not much convinced to accept this as a sole explanation for the problem. Otherwise we think of either lower motivation or lower insight and ability among experts than managers. By the way further studies are needed to thoroughly explain the cause.

In our study more than two third of managers and health system experts believed that Data are registered and summarized correctly at the peripheral centers of organization where they are produced. As these are only attitudes of them we may think that real status of the quality of data collection and summarization can be different. There are many studies showing low quality of data collection specially in developing countries. Studying data collection process in Egyptian ministry of health showed a lower quality of data produced (Gaumer, 1998). A study in Ardabil a neighboring province of East Azerbaijan showed serious defaults in data collection process on family health information at rural and urban health centers (Arshi *et al.*, 2006).

It is stated that most health care providers in developing countries equate information systems with filling endless registers compiling information and sending out reports without adequate feedback. The received information received are often helpful for management decision making because they are incomplete, inaccurate, untimely and unrelated to the priority tasks and functions of local health personnel (Theo *et al.*, 2000).

CONCLUSIONS

- Quality information is not well available to managers to be used for decision making purposes.
- Any information system reform in this study setting is to be focused on staff empowerment and improving their attitudes towards health information system.
- Empowerment plans for information system staff should include and get focused on analysis skills and statistical methods through statistical software packages.

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