How nurses behave online? Nurses' online information needs and internet seeking behaviour

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Abstract—**Registered nurses constitute the largest group of healthcare professionals with a rather distinctive and crucial role in healthcare services provision. For keeping up with their professional advances and follow the rapid and multifaceted scientific advances of medical practices they constantly require high quality of information. Internet and the online information resources play an important role towards the satisfaction of continual online information needs of nurses. This paper aims to investigate the online information needs of nurses and their internet seeking behaviour. Moreover, their perceptions for the role of information in nursing profession are studied. A survey informed by the Wilson's macro-model for information seeking behaviour is developed and included 87 registered nurses working at a public hospital. Data analysis involves descriptive statistics and non-parametric tests of correlation and differences between groups.**

Keywords—information seeking behaviour, information needs, information sources, information seeking barriers, information effects, nurses

I.   Introduction

Registered nurses constitute the largest group of healthcare professionals. For example, in the U.K. according to The Nursing and Midwifery Council register, there are currently approximately 660,000 registered nurses and midwives, a number that is two and a half times larger than that of doctors listed in the UK medical register of the General Medical Council. Similarly, the Statistical Abstract of the United States for 2012 lists 2,583,770 registered nurses in 2009, which is more than three times as many as physicians (838,453) (United States Census Bureau, 2011).

In a recent large European cross-sectional survey of nurses' job satisfaction conducted in twelve countries, it was found that in all countries, nurse staffing was one of the elements (together with the quality of the hospital work environment) that was significantly associated with patient satisfaction and quality and safety of care. One of the variables that determined the quality of the hospital work environment was "nurse participation in decision making" (others included managerial support for nursing care, good doctor-nurse relations quality and safety of care). Hence, it is clear that nurses not only have regular contact with patients but they also have an important role to play in decision making. Nurses play multi-dimensional roles in clinical decision making on the level of "effective disease self management" as "therapist", educators, and counsellors in varied clinical settings and are critical members of multidisciplinary care teams (Rochedreux et al., 2008). As such, nurses are well positioned to engage and inform patients for clinical decision making and assist them to make personal clinical choices. However, before being in a position to assume these roles effectively, nurses require a wide range of information and an ability to search and effectively evaluate and select information that will be used as a basis for effectively carrying their roles.

This work initially provides a framework for modelling the online information needs and internet seeking behaviour of nurses and thereafter presents the results of a survey involving registered nurses working in a public hospital. The Wilson's theoretical framework is discussed and adapted appropriately (Wilson 2006) informing our survey for information needs and internet seeking behaviour of nurses. This concern the online information needs, their preferences towards online and offline information resources and the obstacles nurses encounter when seeking information online. To this end this paper is structured as follows: Section (2) provides the study motivation, theoretical model employed and a selected literature review. Section (3) presents the results of an empirical survey of nurses working in a public hospital, with analysis and results discussed in section (4). The paper concludes in section (5) with conclusions and issues for further research.

II.   Theoretical considerations and related research

A.   *Study motivation and research aims*

Information seeking behaviour in specialized contexts and especially in healthcare is an interdisciplinary field of study and is encouraged in the relevant literature (Wilson, 2006). Studies of this nature enlighten the way information and information resources are utilized within nurses' work roles and provide information for the development of specialized information systems. Therefore, the following issues are addressed:

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- Which professional-related information needs nurses sought online?
- Which online or offline information resources are employed by nurses in order to satisfy their information needs?
- Which are the obstacles nurses' faces when seeking information?
- Which is the perceived impact of information and the internet utilization in nursing profession?

This study employs the theoretical lenses of Wilson's model of information seeking behaviour for registered nurses in order to both study their online information needs and reveal the impact of information on care delivery. This includes the following main study dimensions for nurses' information seeking behaviour, i.e. the online information needs, the information resources and the obstacles when seeking information. The next two subsections provide an overview of Wilson's information seeking behaviour model as well as a selected literature review for nurses' information seeking behaviour.

B. Wilson's model for modeling information seeking behaviour of nurses

Wilson's macro model of information seeking behaviour (Wilson, 1999; 2006) is a person-centred framework within which an individual is seeking information in order to satisfy information needs generated by their work or life roles within specific socioeconomic and technological factors. Therefore, information seeking is conceptualized as a problem solving activity in an effort to satisfy a set of "needs" which are activated by the requirements created within a set of roles and contexts (Wilson, 2006; Bawden, 2006). Nurses for practicing their profession constantly require information from online information resources and encounter a variety of different obstacles when seeking information. These obstacles obstruct the progress towards satisfaction of their information needs through utilization of online and offline information resources. Although in many cases the Wilson's macro model for information seeking behaviour has not been directly mentioned (Clarke et al, 2013), several published papers do actually include different aspects related to its constructs.

On the whole nurses share many common characteristics regarding information seeking behaviour and needs with other medical professionals in the sense that their information needs are associated with different tasks and with several work roles and these may span beyond the roles that concern the care of patients directly to include continuous education and professional development, practice management and administration. Earlier research has found that nurses' information seeking is triggered by routine and task-oriented information needs centred on patient care and information that relates to the specific institutional setting (e.g. hospital regulations/policies, admission procedures). For example, nurses seek information very often for their patients' care (Mettler & Kemper, 2006), including information on prescribed drugs, drug dosage information and their adverse effects (Gosling et al. 2003). In other situations, information seeking is activated by specific questions made patients or their family members in regard to a specific disease or recovery (McKnight, 2006), especially during transportation to a ward or when the patient is discharged from the hospital (Paul et al., 2004). It is also not unusual for nurses to face requests from patients or caregivers for information which are not included in typical courses or material which are accessible via the hospital's intranet. Moreover, patients may need care that is not provided to the clinic (e.g. tracheostomy care) and this may create additional challenges for nurses' information seeking (Paul et al., 2004).

Nurses often employ easily accessible information sources such as social networks and search engines such as Google (Turner et al., 2005), other colleagues, clinical guidelines, handbooks and supervisors. On the other hand nurses appear to be unfamiliar with or make little use of the library services and online resources available to them (such as Medline or PubMed) (Morris-Docker et al., 2004). There at least two reasons reported in the literature that enlighten why nurses' use less formal medical sources: the first is that they may lack digital literacy skills, specifically in terms of when and how these sources should be used (Scott et al, 2008) so that they can apply evidence-based practice to the clinic (Penz & Bassendowski, 2006; Hoare et al, 2008). In Wilbright et al (2006), for example, 65% of registered nurses characterized their ability for searching keywords in databases CINAHL or MEDLINE as poor. In another more recent study, nurses appear not to have the necessary skills to evaluate the information they were found (Koivunen et al., 2010) and the authors suggested that "many nurses and nursing support staff may not have the minimum computer competencies to effectively and efficiently perform their work". Moreover, nurses prefer to consult either other knowledgeable colleagues with a priority placed on other nurses and doctors or use quick reference sources which are accessible within their work environment (e.g. the unit). For instance, Royle et al (2000) suggested that nurses often interrupted their searches for information in order to attend their patients' needs. Lack of time seems to be an important obstacle when nurses are using medical databases for information seeking (Gilmour et al., 2012, Gerrish et al., 2006, Morris-Docker et al., 2004, Estabrooks et al., 2003).

The questions asked by patients trigger information needs and many of them are quite complex involving consultation of the patient's personal medical record or listening to their narrative of symptoms and treatment rather than relying on scientific, objective information retrieved from medical journals and more formal sources (Case 2012). Other studies report the following obstacles nurses' face during information seeking: lack of time, lack of access to information, lack of seeking skills, the fact that the need for clinical information may occur at the free time of nurses and the lack of access to a library (Winters et al, 2007, McKnight, 2006). The utilization/integration of the best available scientific research in nursing practice and its importance for making clinical decisions has been a widely discussed issue (Squires et al, 2011). Evidence based practice incorporates information from

a combination of information resources, thus comprising of "clinical expertise, patient preference for alternative forms of care, clinical research evidence, and available resources" (Hoare, et al 2008). On the other hand, nurses are gradually expected to be aware of and be able to search effectively across a wide range of scholarly health online information sources (Gilmour, 2007) but also to help patients and their families address independently their own health care information needs in order to self-manage their condition more effectively (e.g. for ongoing chronic health problems) and improve health outcomes.

III. Data, Methods and Results

A. *Methodology and survey instrument*

The data of this study were collected by means of a questionnaire survey which was distributed to all 104 nurses employed in a 110 beds public hospital. From the 104 nurses took part in the survey half of them were Registered Nurses (RNs) and the rest were assistants. This survey was approved by the scientific committee of the hospital and the questionnaire was pilot tested by a group of experts consisting of hospital director of nursing staff, and four academics three of which from the University of Athens, Department of Nursing, and one from Ionian University, Department of Archive and Library Science. The questionnaire was informed by the theory developed by Wilson (Wilson, 2006) which is focusing on the "human aspects of use", information needs and the context, i.e. the situation in which information needs arise and the barriers which may influence information seeking behaviour (Kostagiolas et al., 2013; Argyri et al, 2014). The questionnaire has therefore included questions related to the information sources used, nurses' information needs, their needs/motives for seeking internet-based information and the barriers/enablers they encountered in this process. It also sought to examine the impact of health information on nurses' behaviors and attributes towards everyday work practices. Therefore, the questionnaire was composed of five sections:

- The first section includes questions about nurses' demographics (gender, age, nursing specialty, work position and professional experience) and internet usage.
- The second, the third and fourth sections of the questionnaire involves the main dimensions of Wilson's model of information seeking behaviour, i.e. the level of information needs utilization when seeking information, the level of specific information resources utilization and the importance of specific barriers when seeking information, correspondingly.
- The fifth section explores the perceived importance of impacts on issues related to the nursing practices and the quality of care.

The analysis consisted of descriptive statistics in order to summarize the data on reported information behaviour. Further analysis, centered on the differences in reported behaviour by the nurses and their characteristics (gender, nursing specialty, age groups, and work experience), was

performed. The Mann-Whitney U test was employed for assessing if two nurses' groups are the same against the alternative that one of them tends to have larger values; while the nonparametric Kruskal-Wallis one-way analysis of variance by ranks was employed for assessing when comparing if more than two groups are independent. The Kruskal-Wallis test lead to significant results if at least one of the population groups under consideration, is different from the others. The Mann-Whitney would then be employed in order to analyze the specific sample pairs for significant differences. Statistical data analysis was performed using the SPSS for Windows (version 20) statistical software (SPSS Inc., Chicago, IL).

TABLE I. SURVEY DEMOGRAPHICS

Variables	n (%)
Gender	
Male	12 (13.8)
Female	75 (86.2)
Age (years)	
<30	18 (20.7)
31-40	29 (33.3)
41-50	38 (43.7)
>51	2 (2.3)
Nursing Specialty	
Pathology	46 (52.9)
Surgical	21 (24.1)
Laboratory	20 (23)
Position	
Nurse	81 (93.1)
Supervisor/Head Nurse	9 (6.9)
Professional Experience (years)	
0-5	13 (14.9)
6-10	14 (16.1)
11-15	26 (29.9)
>16	34 (39.1)

B. *Results*

1) *Internal consistency of survey items*

A 5-point Likert scale was used to rate online information needs utilization (15-items), information resources utilization (8-items), the importance of the barriers involved in seeking information (5-items) and the impact of information on nursing practices and quality of care (8-items). The values assigned to the five item Likert scale were ranging from 1 which was indicating the lowest score to 5 which was assigned to the highest score. The 36-item questionnaire scales used had good internal consistency reliability with overall Cronbach alpha of 0.88 which is exceeding the minimum standard suggested for basic research (Nunnally & Berstein, 1994). The reliability of each subscale was as follows: "online information needs utilization" = 0.90; "information resources utilization"=0.71; "importance of the barriers involved when seeking information" = 0.70; "impacts of information on nursing practices and quality of care" = 0.90.

2) *Demographic data*

All 104 hospital registered nurses were conducted and asked to participate in the survey. Finally, the 87 of them responded positively and completed the questionnaire, i.e. a response rate of around 84%. Table 1 summarizes the demographic characteristics of nurses, i.e. gender, age, education level, specialty, position, and professional

experience. Furthermore, 82 (94.3%) of the respondents stated that had access to the Internet and only 5.7% did not have access to the Internet.

TABLE II.   NURSES' INFORMATION NEEDS WHEN SEEKING INFORMATION ONLINE

Online information needs	Level of utilization (the value 1 in the scale indicates low and 5 high utilization)			
	Low (1 & 2)	Medium (3)	High (4 & 5)	Median Value
Patient care	47.1%	26.4%	26.5%	3.00
Patient emotional support (e.g. depression, stress)	50.6%	24.1%	25.4%	2.00
For a healthcare provider	54.0%	24.1%	21.8%	2.00
For a healthcare unit/clinic	66.7%	20.7%	12.6%	2.00
For alternative treatments (e.g. aromatherapy)	78.2%	10.3%	11.7%	1.00
Experimental medicines (e.g. cytostatic)	81.6%	12.6%	5.8%	1.00
Prescription medicines	69.0%	11.5%	19.5%	1.00
Non-prescription medicines	73.6%	13.8%	12.6%	1.00
Diet/nutrition	21.8%	32.2%	46.0%	3.00
Physical exercise	34.5%	27.6%	37.9%	3.00
Weight control	42.5%	36.8%	20.7%	3.00
Smoking	70.1%	19.5%	10.4%	1.00
Research	42.5%	18.4%	39.1%	3.00
Developing education/training programs	67.8%	14.9%	17.3%	2.00
Informing patients	77.0%	16.1%	6.9%	2.00

3) Nurses' online information needs

Table 2 shows that diet-nutrition, research and physical exercise are the information needs with the highest level of utilization followed by patient care issues and patient's mental care, weight control; while others follow. The Mann-Whitney test suggest that men are motivated more than women is seeking information regarding prescription medicines (p=0.027); while head nurses seem to be more interested than the assistant nurses in seeking information for "patient medical issues" (p=0.034), "experimental medication" (p=0.002), "prescribed medicines" (p=0.007), "non prescribed medicines" (p=0.016), and "developing education/training programs" (p=0.012). Significant differences have been identified among the three nurses' specialties for the importance of searching information for "Healthcare unit/clinic" (H(2)=13.418, p=0.001 with mean rank values 51.86 for pathology nurses, 28.79 for surgery and 41.90 for laboratory), for "alternative treatments" (H(2)=8.592, p=0.014 with mean rank values 49.45 for pathology, 31.64 for surgery and 44.45 for laboratory), for "prescription medicines" (H(2)=8.216, p=0.016 with mean rank values 50.63 for pathology, 34.29 for surgery and 38.95 for laboratory), for "non prescription medicines" (H(2)=6.431, p=0.040 with mean rank values 49.95 for pathology, 38.50 for surgery and 36.10 for laboratory), and for "Developing education/training programs" (H(2)=11.997, p=0.002 with mean rank values 52.40 for pathology, 34.21 for surgery and 34.95 for laboratory). The

four age categories give different importance is searching information for "weight control" (H(3) = 8.776, p = 0.032 with mean ranks 28.97 for nurses less than 30 years of age, 47.59 for nurses between 31 and 40, 47.88 for 41 to 50 years of age and 53.50 for nurses older than 50 years of age), for "research" (H(3) = 8.594, p = 0.035 with mean ranks 31.47 for nurses less than 30 years of age, 51.40 for nurses between 31 and 40, 43.25 for 41 to 50 years of age and 63.75 for nurses older than 50 years of age). Finally, the four professional experience groups of nurses give different importance on information searching for "patient mental health issue" (H(3) = 8.581, p = 0.035 with mean values 26.69 for up to 5 years experience, 48.57 for 6 to 10 years, 49.87 for 11 to 15, and 44.25 for the group of nurses with more than 16 years of experience).

4) Information resources used by the nurses

Table 3 summarizes the survey results in relation to the employment of information resources. The interpersonal information resources, "other nurses" (33.3%) and "medical doctors" (35.6%) received the highest percentages of utilization together with the "conventional resources" (33.3%). Moreover, general search engines such as Google also received high percentages of utilization.

TABLE III.   NURSES' INFORMATION RESOURCES UTILIZATION

Information recourses	Level of utilization (the value 1 in the scale indicates low usage and 5 high usage)			
	Low (1 & 2)	Medium (3)	High (4 & 5)	Median Value
Search engines (e.g. Google)	54.1%	17.2%	28.7%	2.00
Conventional resources (e.g. printed material)	39,1%	27.6%	33.3%	3.00
Conferences	33.4%	42.5%	24.1%	3.00
Seminars	48.3%	24.1%	27.6%	3.00
Other Nurses	27.6%	24.1%	33.3%	3.00
Medical Doctors	28.8%	35.6%	35.6%	3.00
Scholar Databases (e.g. Pubmed)	63.2%	10.3%	26.4%	1.00
Web sites of nursing Organizations	73.5%	17.2%	9.2%	1.00

The differences of information resources utilization between genders and positions (head nurses and nurses) were compared using the Mann-Whitney U test: From the data it can be concluded that men use more the digital information material than women (p=0.036); while head nurses seem to use as information resources more the "seminars" (p=0.003), the "conferences" (p=0.004), the "medical doctors" (p=0.022) and the "nursing organizations" (p<001) than the other nurses. Moreover, the Kruskal-Wallis test showed that there is enough evidence that an information resources "other nurses" (H(2) = 14.57, p = 0.001), "doctors" (H(2) = 6.196, p = 0.045), and "scholar databases" (H(2) = 7.396, p = 0.025) are not utilized in the same way among nurses in the three specialties examined, with a mean ranks of 46.87, 45.76 and 50.09 for pathology, 27.21, 33.14 and 34.14 for surgery and 55.03, and 51.35 for laboratory nurses, respectively. Similarly, differences have been identified among the age groups for "digital resources" (H(3) = 12.794, p = 0.005) and "scholar

databases" (H(3) = 12.296, p = 0.006) with mean ranks 26.64 and 34.67, respectively, for nurses less than 30 years of age, 52.43 and 56.10 for nurses between 31 and 40, 45.53 and 39.57 for 41 to 50 and, finally, 49.00 and 36.75 for nurses older than 50 years of age. Similarly, statistically significant differences have been identified among the four professional experience groups for the utilization of "scholar databases" (H(3) = 13.744, p = 0.003 with mean values 32.54 for up to 5 years experience, 37.46 for 6 to 10 years, 57.56 for 11 to 15, and 40.71 for the group of nurses with more than 16 years of experience) and "conventional information material" (H(3) = 15.126, p = 0.002 with mean values 34.88 for up to 5 years experience, 57.75 for 6 to 10 years, 32.13 for 11 to 15, and 50.90 for the nurses with more than 16 years of experience).

TABLE IV.   NURSES' BARRIERS/OBSTACLES TO INFORMATION SEEKING

Barriers/obstacles to information seeking	Level of importance (the value 1 in the scale indicates low and 5 high importance)			
	Low (1 & 2)	Medium (3)	High (4 & 5)	Median Value
Cost	78.2%	5.7%	16%	1.00
Time	20.7%	35.6%	43.7%	3.00
Information in foreign language	51.7%	31.0%	17.3%	2.00
Computer skills	59.8%	23.0%	17.2%	2.00
Digital Literacy skills for using databases	65.5%	18.4%	16.1%	2.00

5) Nurses' obstacles to information seeking

Table 4 summarizes the results for the perceived importance in regard to the barriers/obstacles nurses' face when seeking information: lack of time was reported to be the most important barrier, followed by cost, information in foreign language, computer skills (59.8%), and digital literacy skills for using databases. The Mann-Whitney test identified that head nurses are considering "computer skills" (p=0.013) as a more important barrier when seeking information than assistant nurses.; while no significant differences have been identified among the nurses of different specialties for the importance given to the different obstacles when searching information. However, significant difference have been identified among the age groups of nurses for the "information in foreign language" (H(3) = 9.553, p = 0.023 with mean ranks 28.22 for nurses less than 30 years of age, 47.26 for nurses between 31 and 40, 48.76 for 41 to 50 years of age and 48.25 for nurses older than 50 years of age); and among the professional experience groups significant difference have been identified for the importance of "cost" (H(3) = 9.820, p = 0.020 with mean values 54.23 for up to 5 years experience, 48.36 for 6 to 10 years, 48.00 for 11 to 15, and 35.24 for nurses with more than 16 years of experience) and the "information in foreign language" (H(3) = 21.177, p < 0.001 with mean values 16.46 for up to 5 years experience, 45.00 for 6 to 10 years, 53.81 for 11 to 15, and 46.62 for nurses with more than 16 years of experience).

6) Perceived impact of information in nursing profession

Table 5 presents the perceived by the nurses' impact of information on various aspects of their profession. Overall the nurses gave high importance on the role of information to almost all the aspects reported. Indeed, the nurses perceive that information has a high impact on the quality of inpatient care (55.2%), nursing care practices (47.2%), management of chronic illnesses (50%), management of pain (36.7%), quality of healthcare (54.1%), and patient safety (48.3%). On the other hand, relationships with medical doctors (55.2%) and nurses (62.1%) had low impact of information in nursing profession.

TABLE V.   NURSES' IMPACT OF INFORMATION ON THEIR PROFESSIONAL PRACTICES AND QUALITY OF CARE

Information impact on nursing profession	Level of importance (the value 1 in the scale indicates low and 5 high importance)			
	Low (1 & 2)	Medium (3)	High (4 & 5)	Median Value
Quality of inpatient care	24.1%	20.7%	55.2%	4.00
Relationships with Medical Doctors	55.2%	19.5%	25.2%	2.00
Relationships among nurses	62.1%	12.6%	25.3%	2.00
Nursing care practices	28.7%	24.1%	47.2%	3.00
Management of chronic illnesses	24.1%	29.9%	50.0%	3.00
Management of pain	27.6%	35.6%	36.7%	3.00
Quality of healthcare	26.4%	19.5%	54.1%	4.00
Patient safety	34.5%	17.2%	48.3%	3.00

Mann-Whitney test suggested that men consider information more important in terms of its impact on "nursing care practices" (p=0.014), "managing chronic illnesses" (p=0.031), and "quality of healthcare" (p=0.05); while assistant nurses trust that information will have a significant impact on "relationships among nurses" (p=0.05). Significant differences have been identified among the three nurses' specialties for the impact of information on the "quality of inpatient care" (H(2)=7.290, p=0.026 with mean rank values 37.38 for pathology, 53.07 for surgery and 49.70 for laboratory), on "Nursing care practices" (H(2)=10.495, p=0.005 with mean rank values 39.29 for pathology, 59.14 for surgery and 38.93 for laboratory), on "Management of chronic illnesses" (H(2)= 9.861, p=0.007 with mean rank values 38.40 for pathology, 58.43 for surgery and 41.73 for laboratory), on "Management of pain" (H(2)= 10.414, p=0.005 with mean rank values 38.46 for pathology, 58.86 for surgery and 41.15 for laboratory), on "Quality of healthcare" (H(2)= 12.554, p=0.002 with mean rank values 38.12 for pathology, 60.43 for surgery and 40.28 for laboratory) and on "patient safety" (H(2)= 14.683, p=0.001 with mean rank values 36.11 for pathology, 60.93 for surgery and 44.38 for laboratory nurses). No statistically significant differences have been identified by the Kruskal-Wallis test among the nurses' age categories for the impact of information. On the other hand, among the professional experience groups of nurses, significant difference have been identified for the impact of information on "management of pain" (H(3) = 8.478, p = 0.037 with mean values 31.23 for up to 5 years experience, 39.07 for 6 to 10 years, 53.96 for 11 to 15, and 43.29 for nurses with more than 16 years of experience), and on "quality of healthcare" (H(3) = 8.405, p = 0.038 with mean values 36.69 for up to 5 years experience, 32.11 for 6 to 10 years, 53.54 for 11 to 15, and 44.40 for nurses with more than 16 years of experience).

IV.   **Discussion**

Our study is in agreement with other studies (Dee & Stanley, 2008) suggesting that nurses often seek online information at the internet for patient care and emotional support (Estabrookes, et al, 2003); while due to time and skill constrains often use their colleagues (other nurses and doctors) as a information resource. Our results further enlighten the perceived by nurses impact of information on their daily practices. The nurses included in our study report that information is positively affecting their professional role as well as the quality of care. However, nurses need to further develop their digital information literacy skills in order to incorporate research advances in their everyday practices, help patients with their queries and deliver high quality and safe care. It is also suggested (Liang, and Wu, 2010) that information management systems and internet access availability within their work environment (for example in supervisor`s office, nurse`s office, and/or doctor`s office) would drive nurses to be even more interested with scholarly information systems and services. It has been over a decade now that studies have indicated the importance of internet access in nurses' daily working practices (Morris-Docker et al., 2004); while more recent studies suggested an opportunity for nurses to get access to high quality evidence-based guidelines, regardless of time and place through the internet (Roy et al., 2006). Verhoeven et al. (2010) suggest that online availability of clinical guidelines make easier for nurses to employ them in everyday practice rather than if they are given in print (McCaughan, 2005).

> Our study is in agreement with other studies suggesting that nurses often seek online information for patient care and emotional support; while due to time constrains often use their colleagues as an important information resource.

Internet utilization for work-related information seeking is considered to be an expected "normal" activity for nurses (Gosling et al, 2004; Moody et al., 2004). Indeed, nurses employing the Internet in their everyday activities could use more efficiently the hospital electronic patient recodes. Overall, nurses use the Internet and online communication resources for clinical purposes (Pereira et al., 2001; McCaughan, 2005), for prescription drugs in order to check dosages and contraindications of drugs. Morris-Docker et al (2004) suggested that access to the Internet at the workplace made nurses use information to their clinical practices; while the study by Pereira et al. (2001) indicated that internet access improved nurses' pain management daily practices.

In a similar way to our survey results, literature suggest that nurses are seeking information on the Internet for work related issues (Younger, 2010) in scholarly information resources (Tannery et al., 2007, McKnight, 2006) and thus support clinical decisions (Wagner et al 2014) and patients' informed decisions (Elwyn et al., 2010). Nurses develop less reserved relations with patients and as a result they inform, emotionally support, guide and advice them. It is suggested that nurses using the internet often propose to patients specific reliable websites (Chen et al 2009) for further information in regard to their health issues (Morris-Docker et al., 2004). The ability of nurses to efficiently employ online information resources in order to satisfy their communication with patients and other healthcare professionals is rather important. Therefore, online information availability and employment positive impacts information exchange with other medical professionals and at the same time encourage their supportive, educational and informative role in all phases of patients' disease and recovery (Paul et al., 2004).

The nature of nurses' highly attentive work environment reduces the available time for seeking information via the Internet (Cogdill, 2003). Royle et al (2000) report that nurses often had to interrupt their online information seeking in order to attend the patients. For that reason, the nurses at night shifts are more likely to conduct online information seeking that those who work at the morning or evening shifts. Overall like many other healthcare professionals, the work environment reduces their available time for seeking online information (Atack, 2003). This worsens if the healthcare unit is understaffed and hence the workload of nurses for patient care increases. Lack of time is reported as the most important barrier for using the Internet to seek for information in their daily practices (Gilmour et al., 2012, Gerrish et al., 2006, Dee & Stanley, 2005, Morris-Docker et al, 2004). Moreover, Dee and Stanley (2005) suggest that 76% of nurses had not enough time or skills to seek scholarly information at databases (Dee & Stanley, 2008). Wilbright et al (2006) suggest that 65% of registered nurses can poorly or moderately use scholarly databases such as MEDLINE and CINAHL. A drawback for efficient queries formulation when nurses are using scholarly databases includes the complexity of medical terminology (Winters et al., 2007) and the "traditional" scholarly writing which can be rather intricate and difficult to directly relate the reported research results to real patient cases. Overall, nurses need to further develop their critical thinking and information evaluation skills in order to assess the available research results prior to using them in practice (Tannery et al., 2007). Nowadays, in many, if not all, nursing schools and departments around the world nurses are trained in computer skills, information literacy skills and usage of scholarly databases (Bond, 2010). As a result, the younger nurses are often better trained in terms of internet usage skills that the more senior.

> Adaptation to change and the ability to employ specific information services are two main skills that nurses need to further develop so as to utilize the available online information.

V.   **Conclusions**

The paper focuses on the investigation of the online information needs of registered nurses, providing a framework for understanding the role of the online information resources in their professional practices. The outcomes of this study revealed that nurses require online information for improving their work practices and communication. Nurses face

difficulties due to the demanding work conditions which are reducing significantly the available information seeking time. Adaptation to change and the ability to employ specific information services are two main skills that nurses need to further develop so as to utilize the available online information. As it is often the case with many survey outcomes the results should be generalized with caution in different circumstances due to the small sample size and the particular conditions of hospital where the research was conducted.

Acknowledgment

References

[1] E. Argyri, P.. Kostagiolas, and M. Diomidous, "A survey on Information Seeking Behaviour of Nurses of a private hospital in Greece." Integrating Information Technology and Management for Quality of Care, Ed. J. Mantas et al., pp. 127-130, IOS Press, July 2014.

[2] L. Atack, "Becoming a web-based learner: registered nurses' experiences," J Adv Nurs, vol. 44, pp. 289-297, Nov 2003.

[3] D. Bawden, "Users, user studies and human information behaviour: A three-decade perspective on Tom Wilson's On user studies and information needs, " J Docum vol.62, pp. 671-679, 2006.

[4] C.S. Bond, "Surfing or still drowning? Student nurses' Internet skills," Nurse Educ Today vol. 30, pp. 485-8, Jul 2010.

[5] D.O. Case, "Looking for information: A survey of research on information seeking, needs and behavior," Emerald Publishing, 2012

[6] C.Y. Chen, R.E. Chang, M.C. Hung, and M.H. Lin, "Assessing the quality of a webbased learning system for nurses," J Med Syst vol. 33, pp. 317–325, Aug 2009.

[7] M.A. Clarke, J.L. Belden, R.J. Koopman, L.M. Steege, J.L. Moore, S.M. Canfield, and M.S. Kim, "Information needs and information-seeking behaviour analysis of primary care physicians and nurses: a literature review," Health Info Libr J vol. 30, pp. 178-190, Sep 2013.

[8] K.W. Cogdill, "Information needs and information seeking in primary care: a study of nurse practitioners," J Med Libr Assoc vol. 91, pp. 203-215, Apr 2003.

[9] C.R. Dee, and E.E. Stanley, "Nurses' information needs: nurses' and hospital librarians' perspective," J Hosp Lib vol. 5, pp. 1–13, Sep 2008.

[10] C.P. Dee, and E.E. Stanley, "Information-seeking behavior of nursing students and clinical nurses: implications for health sciences librarians," J Med Libr Assoc vol. 93, pp. 213–222, Apr 2005.

[11] G. Elwyn, D. Frosch, A.E. Volandes, A. Edwards, and V.M. Montori, "Investing in deliberation: a definition and classification of decision support interventions for people facing difficult health decisions," Med Decis Making, vol. 30, pp. 701-711, Nov-Dec 2010.

[12] C.A. Estabrookes, , K.A. O'Leary, K.L. Ricker, and C.K. Humphrey, "The Internet and access to evidence: how are nurses positioned?" J Adv Nurs vol. 42, pp. 73–81, Apr 2003.

[13] K. Gerrish, L. Morgan, I. Mabbott, S. Debbage, B. Entwistle, M. Ireland, and C. Warnock, "Factors influencing use of information technology by nurses and midwives," Pract Devel Health Care, vol. 5, pp. 92-101, March 2006.

[14] J.A. Gilmour, "Reducing disparities in the access and use of Internet health information. A discussion paper," Int J Nurs Stud vol. 44, pp.1270-1278, Sep 2007.

[15] J.A. Gilmour, A. Huntington, R. Broadbent, A. Strong, and M. Hawkins, "Nurses' use of online health information in medical wards," J Adv Nurs vol.68, pp.1349-1358, Jun 2012.

[16] A.S. Gosling, J.I. Westbrook and E. Coiera, "Variation in the use of online clinical evidence: a qualitative analysis," Int J Med Inform vol69, pp. 1–16, Jan 2003.

[17] A.S. Gosling, J.I. Westbrook, and R. Spencer, "Nurses' use of online clinical evidence," J Adv Nurs vol. 47, pp. 201–211, Jul 2004.

[18] K.J. Hoare, J. Steele, F.S. Ram, and B. Arroll, "Evidence-based resources use by practice nurses in the Greater Auckland region of NewZealand," N Z Med J vol.121, pp.51–58, Oct 2008.

[19] M. Koivunen, M. Välimäki, and H. Hätönen, "Nurses' information retrieval skills in psychiatric hospitals–Are the requirements for evidence-based practice fulfilled?" Nurse educ pract vol.10, pp.27-31, Jan 2010.

[20] P. Kostagiolas, K. Martzoukou, G. Georgantzi, and D. Niakas, "Information seeking behaviour of parents of paediatric patients for clinical decision making: the central role of information literacy in a participatory setting," Inf Res vol.18, Sep 2013.

[21] J.C. Liang, and S.H. Wu, "Nurses' motivations for web-based learning and the role of Internet self-efficacy," Innov Educ Teach Intern vol.47, pp. 25–37, Feb 2010.

[22] D. McCaughan, C.A. Thompson, N.A. Cullum, T.A. Sheldon, and P. Raynor, "Nurse practitioner and practice nurses' use of research information in clinical decision making: qualitative findings from a national study," Fam Pract, vol.22, pp.490–497, Oct 2005.

[23] M. McKnight, "The information seeking of on-duty critical care nurses: evidence from participant observation and in-context interviews," J Med Libr Assoc vol.94, pp.145, Apr 2006.

[24] M. Mettler, and D.W. Kemper, "Information Therapy: the strategic role of prescribed information in disease self-management," Stud Health Technol Inform vol.121, pp.373-383, 2006.

[25] L.E. Moody, E. Slocomb, B. Berg, and D. Jackson, "Electronic health records documentation in nursing: nurses' perceptions, attitudes and preferences," Comput Inform Nurs vol.22, pp.337–344, Nov-Dec 2004.

[26] S.B. Morris-Docker, A. Tod, J.M. Harrison, D. Wolstenholme, and R. Black, "Nurses' use of the Internet in clinical ward settings,". J Adv Nurs vol.48, pp.157-166, Oct 2004.

[27] J.C. Nunnally, and I.H. Bernstein, "Psychometric Theory (3)" McGraw-Hill. New York, 1998.

[28] F. Paul, C. Hendry, and L. Cabrelli, "Meeting patient and relatives' information needs upon transfer from an intensive care unit: the development and evaluation of an information booklet," J Clin Nurs vol.13, pp.396-405, Mar 2004.

[29] K. Penz, and S. Bassendowski, "Evidence-based nursing in clinical practice: implications for nurse educators," J Contin Educ Nurs vol.37, pp.251-254, Nov-Dec 2006.

[30] J. Pereira, E. Bruera, and H. Quan, "Palliative care on the net: an online survey of health care professionals," J Palliat Care, vol.17, pp.41-45, Spring 2001.

[31] A. Roy, P. Kostkova, M. Catchpole, and E. Carson, "Web-based provision of information on infectious diseases: a systems study," Health informatics J vol.12, pp.274-292, Dec 2006.

[32] J.A. Royle, J. Blythe, A. DiCenso, S. Boblin-Cummings, R. Deber, and R. Hayward, "Evaluation of a system for providing information resources to nurses". Health Informatics J vol.6, pp.100-109, Jun 2000.

[33] S.D. Scott, J.A. Gilmour, and J. Felden, "Nursing Students and Internet health information," Nurs Educ Today vol.28, pp.994–1002, Jun 2008.

[34] J.E. Squires, C.A. Estabrooks, P. Gustavsson, and L. Wallin, "Individual determinants of research utilization by nurses: a systematic review update," Implement Sci vol.6, pp.1-20, Jan 2011.

[35] N.H. Tannery, C.B. Wessel, B.A. Epstein, and C.S. Gadd, "Hospital nurses' use of knowledge-based information resources," Nurs Outlook, vol.55, pp.15-19, Jan-Feb 2007.

[36] A.M. Turner, E.D. Liddy, J. Bradley, and J.A. Wheatley, "Modeling public health interventions for improved access to the gray literature," J Med Libr Assoc vol.93, pp.487-494, Oct 2005.

[37] F. Verhoeven, M.F. Steehouder, R.M. Hendrix, and J.E. Van Gemert-Pijnen, "From expert-driven to user-oriented communication of infection control guidelines," Inter J Human-comput studies vol.68, pp.328-343, Jun 2010.

[38] J.D. Wagner, M.C. Bezuidenhout, and J.H. Roos. "Communication satisfaction of professional nurses working in public hospitals," J Nurs Manag, Aug 2014.

[39] W.A. Wilbright, D.E. Haun, T. Romano, T. Krutzfeldt, C.E. Fontenot, and T.E. Nolan, "Computer use in an urban university hospital: technology ahead of literacy," Comput Inform Nurs vol.24, pp.37-43, Jan-Feb 2006.

[40] T.D. Wilson, "Models in information behaviour research," J docum vol.55, pp.249-270, Jun 1999.

[41] T.D. Wilson, "On user studies and information needs," J docum vol. 62, pp.658-670, Nov 2006.

[42] C.A. Winters, H.J. Lee, J. Besel, A. Strand, R. Echeverri, K.P. Jorgensen, and J.E. Dea, "Access to and use of research by rural nurses". Rural Remote Health vol.7, pp.758, Jul-Sep 2007.

[43] P. Younger, "Internet-based information-seeking behavior amongst doctors and nurses: a short review of the literature". Health Info Libr J vol.27, pp.2–10, Mar 2010.

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