



Queen's University
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Knowledge, Skill and Attitude of NI DHSSPS Healthcare Professionals towards Information and Communication Technology:

Report of a Northern Ireland Survey

EXECUTIVE SUMMARY

*This research was funded by the Northern Ireland Health
and Personal Social Services ICT Training Group*

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Respondents for return and completion of the questionnaires

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Introduction

The presence of computer and information technologies in today's business and public sector organisations has expanded dramatically, (Venkatesh et al, 2003). Since the 1980s, about 50% of all new capital investment in organisations has been in information technology (Westland & Clark, 2000). Investment in emerging information technology applications can lead to productivity gains but only if they are accepted and used (Venkatesh, 1999). It is widely acknowledged that organisations increasingly depend on information communication technology (ICT) for the execution of a variety of operational, tactical and strategic processes (Applegate et al, 2003). However, although senior managers might make primary adoption decisions related to ICT, it is the individuals within organisations who are the ultimate users and consumers of the technology.

Thus the true benefits and impacts of information communication technology are contingent on the extent to which individual users appropriate and use ICT in their ongoing work activities that, in turn, contribute to organisational productivity (Lewis et al, 2003). Legris et al (2003) report that since 1970, researchers have concentrated their efforts on identifying the factors that could facilitate the integration of information systems in business.

The proliferation of innovative and exciting information technology applications has made the examination or re-examination of existing technology acceptance theories and models in a "professional" setting increasingly important (Cha & Hun, 2002). In the professional setting, the essential characteristics of user, technology, and context may differ from those in other settings.

The health service is becoming more dependent on technology to manage automated systems such as waiting lists and patient records. Electronically managed services demand a minimum level of competence from staff in order to ensure smooth, safe and effective functioning. Challenges lie ahead with the introduction of the electronic patient record and other automated services. Strategic planning is therefore required to ensure staff are adequately trained and ready for an increasingly technological role.

A key response to this ongoing and rapidly changing agenda has been the HPSS ICT Strategy 2003-2010, (DHSSPS, 2005). This sets out how ICT will support the developing needs of the HPSS. The strategy provides a clear exposition of the strategic context and changing environment of the HPSS, and the associated drivers for ICT development. It makes clear the need to develop an information-valuing culture in the service and emphasises the importance of continuing education and training initiatives to improving the ICT knowledge and skills of all staff in the pursuit of the provision of continuously developing and improving services to the population. The HPSS Strategy (2005) also recognises that while ICT offers opportunities to introduce new ways of planning and delivering care, it will deliver major benefits and financial savings only where ICT is fully integrated within the wider work environment and the HPSS processes it supports.

The strategy identifies key areas, where education and training initiatives will be required to support ICT developments. These include:

- recognition and acceptance by HPSS staff, particularly care professionals, of the value of ICT in supporting their work;
- more HPSS staff with the skills and knowledge to use computer-based training and electronic knowledge bases and the skills to pursue other electronic resources for self development – the key outcome being a better-trained and more effective workforce;
- changes in HPSS working practices resulting in efficiency and/or effectiveness gains, with staff comfortable using electronic data and information flows instead of paper;
- ongoing and effective use of ICT, as a matter of routine, by HPSS staff in the course of their work;
- improvements in the overall quality and efficacy of HPSS data, based on increased access and use by staff with the skills and knowledge to recognise errors, discrepancies and inaccuracies and the source of such problems.

A firm knowledge base that will underpin an understanding of the perceptions of professionals regarding ICT together with their knowledge, skills and training requirements is an imperative. The overall objectives of the HPSS Strategy including the facilitation of education and training, which is at the heart of the HPSS ICT Strategy, have underpinned this research study which is designed to inform ongoing developments in ICT and ultimately their effective operationalisation within service delivery.

Aim of the Study

The purpose of the study was to assess health and social care professionals' perceived knowledge, skill and attitude towards information and communication technology.

The health and social care professional groups targeted were:

Allied health professionals

Biomedical scientists

Doctors and Dentists

Midwives

Nurses

Pharmacists

Social Workers

The ambulance service

Methodology

Design

The study design was exploratory and descriptive. The objectives were best achieved through a survey approach using a self-completion postal questionnaire.

A valid and reliable questionnaire was developed incorporating selected questions designed by Mun et al (2005), Laerum & Faxvaage (2004), Kirshbawn (2004), and Sinclair & Gardner (1999) and from sources arising from an exploration of the research literature. This was designed to explore professionals' willingness to accept technology and was based on the Technology Acceptance Model (TAM) (Davis,

1986; Davis, 1989). This instrument has been validated for use by a focus group from medicine, nursing, dentistry, and allied health professionals. A five-point scale specific to perception of ICT and perception about EPR was adopted; a three-point scale was used specific to rating skill in ICT.

Sample

All Chief Executives and Heads of Human Resources Departments in Northern Ireland were advised of the research and invited to participate. (The sample was drawn therefore from the DHSSPS Workforce Database that holds records (including contact details) of every person working in the health and social services within NI). Staff currently working in the DHSSPS, either community or hospital based, and working full time were included in the sample. A proportionate, stratified, random, sample (3687 (16.6%)) was drawn that was representative of the current health and social services (professional) workforce at that time (approximately 22,130).

Administration of the survey

Employers in the NIHPSS received a letter informing them of the research and seeking their support to ensure that all staff members received a communication about the potential to be selected to receive a postal questionnaire.

All participants, subsequently randomly selected, received a postal self-completion questionnaire together with a prepaid return envelope and were invited to participate. The questionnaire included a covering letter explaining the nature of the study and confirmation that recipients retained full control over the decision to complete the questionnaire or not. It was emphasised that their response was entirely voluntary and due to financial and time restrictions only one mail shot was undertaken.

3687 questionnaires were distributed in January 2007. Details of the target population, sample size and attrition details are provided in figure 1.1. Information on the importance of the research project and the background to the study were provided together with assurances regarding anonymity. Follow up alerts were issued through all HSS Trust contacts in order to encourage a commitment within the staff groupings involved in the survey. In addition, an extension of time for the return of questionnaires was provided in order to maximise the number of returns. 1060

questionnaires were returned. The response rate was 29% and in the context of a survey of this nature this was acceptable.

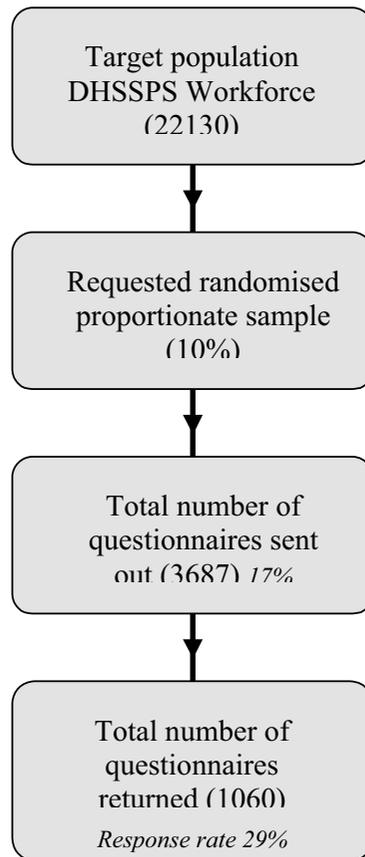


Figure 1.1 Flowchart of Target, Sample Population Size and Response Rate

Ethical considerations

The purpose of the research was to provide a Northern Ireland profile and not a comparative HSS Trust data set. The sample was therefore Northern Ireland based and not specific to any HSS Trust or Health Board.

Participants received a postal questionnaire with attached information about the study. Individuals within the sample population were free to choose to participate and therefore consent was implied if they returned the completed questionnaire.

Researchers did not have access to any personal or identifiable details of any of the participants selected as this aspect of the process was managed by a named person in the DHSSPS Workforce database team.

Access to the data generated by the study was restricted to the chief investigator and the research assistants associated with the study. Anonymous data from returned questionnaires was stored on a password protected university computer.

At no stage in the process were the names of the participants made available to anyone other than the officer at the DHSSPS responsible for information management at departmental level. Names of individuals did not appear on any documentation nor were they identified by HSS Trust or Health Board location.

Ethical approval was granted by the University of Ulster Ethical Approval Committee and by the Northern Ireland Research Ethics Committee and these procedures were completed in January 2007 (Ref No. 06/NIRO3/87).

Analysis of Data

Analysis of the data was undertaken using SPSS® Version 14.0 and Excel® Spreadsheets. Descriptive statistics including frequency tables and percentages were compiled. Non-parametric statistical analysis with Kruskal-Wallis and Mann-Whitney tests were used to test for differences between independent and multiple groups. Content analysis for free response qualitative data was undertaken employing NVivo Version 7® and Microsoft Word® software.

Summary of Main Findings

*Demographic profile of survey population- distribution and frequency*¹

1. Gender

A high proportion of females (83%, N= 883) were represented within the sample and this was influenced in particular by the gender configuration of the nursing (93%, female staff, N= 462) and midwifery (99% female staff, N= 85) professions who are well represented within the sample.

Figure 1.2 Gender – Total respondents

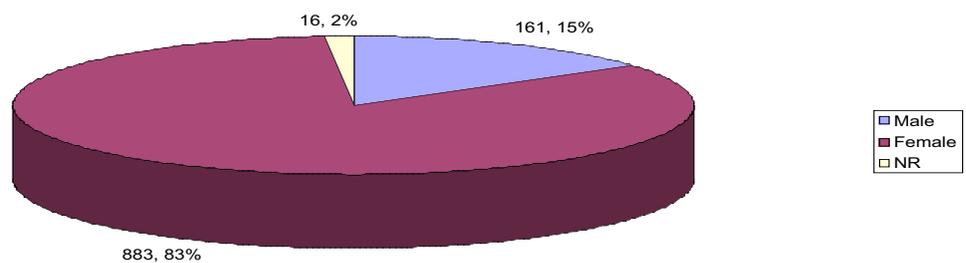


Table 1.1 Gender – Total respondents

Total	Male	Female	NR
1060	161	883	16
	15%	83%	2%

¹ Not all respondents replied to all questions resulting in differences in the number of responses recorded in tables.

NR = Non response

Table 1.2 Gender by professional group

Professional Group	Total		Males		Females	
Doctors & Dentists	107	100%	58	54%	49	46%
Ambulance Service	16	100%	14	87%	2	13%
Nurses	504	100%	42	8%	462	92%
Midwives	86	100%	1	1%	85	99%
Social Workers	105	100%	17	16%	88	84%
AHPPB ²	211	100%	184	87%	27	13%
Total	1029	100%	316	30.70%	713	69.30%

NR = 31

2. Professional Occupations

Nurses comprised the largest single group included in the survey (49%, N= 510) with the ambulance service numerically the smallest group (2%, N= 16).

Figure 2.1 Professional occupation profile

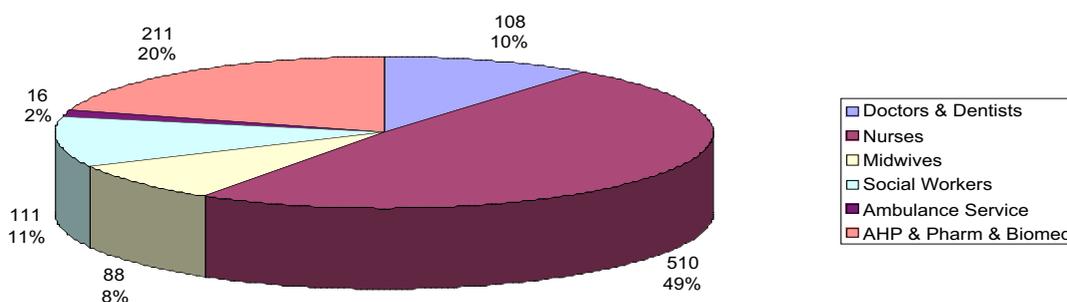


Table 2.1 Professional occupational profile

Total		Doctors & Dentists		Nurses		Midwives		Social Workers		Ambulance Service		AHP & Pharm & Biomed	
1044	100%	108	10%	510	49%	88	8%	111	11%	16	2%	211	20%

NR = 26

² AHPPB= Allied Health Professionals, Pharmacists and Biomedical Scientists

Figure 2.2 Occupational profile of Health Service staff in Northern Ireland (data from DHSSPS)

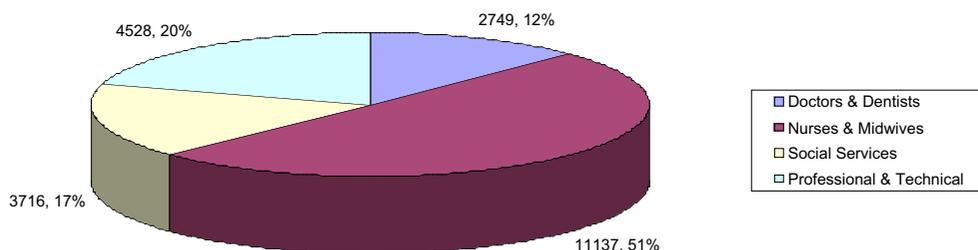


Table 2.2 Occupational profile of Health Service staff in Northern Ireland (data from DHSSPS)

Total		Doctors & Dentists		Nurses & Midwives		Social Services		Professional & Technical	
22130	100%	2749	12%	11137	50%	3716	17%	4528	20%

Comparison of figure 2.1 with 2.2, and table 2.1 with 2.2, suggest that the population studied were in proportion to the professional Health Service staff within Northern Ireland.

3. Age Distribution

Age ranges were well represented within the survey with the exception of the over 60's age group (2%, N= 26). The greater proportion of all grades fall within the age category of 30 to 49 years, (67%, N= 696). Only 12 % (N= 130) of the respondents were under 30.

Figure 3.1 Age Distribution

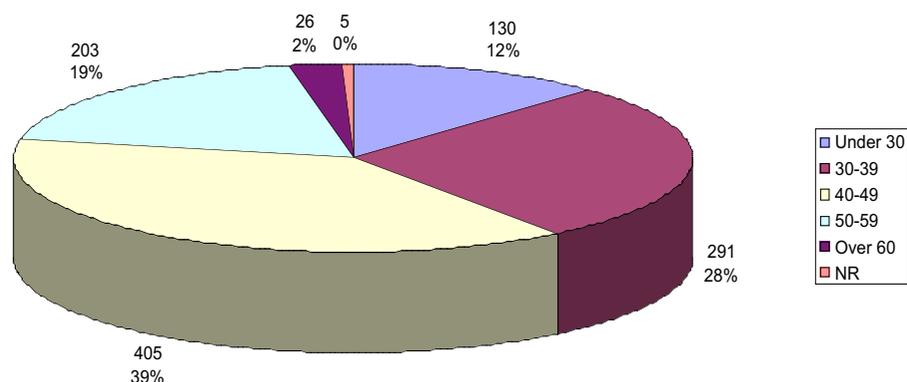


Table.3.1 Age profile

Total	Under 30	30-39	40-49	50-59	Over 60	NR
1060	130	291	405	203	26	5
	12%	28%	39%	19%	2%	0%

Table.3.2 Age profile by professional group

Professional Group	Total	Under 30	30-39	40-49	50-59	Over 60
Doctors & Dentists	108	28	25	28	22	5
Ambulance Service	16	0	4	8	4	0
Nurses	509	51	128	216	102	12
Midwives	87	4	19	46	17	1
Social Workers	109	8	38	36	25	2
AHPs P&B	211	39	74	64	28	6
Total	1040	130	288	398	198	26

4. Location of Workplace

A higher proportion of hospital staff (62%, N= 660) was represented within the survey compared with those who designated themselves as having a community workplace (32%, N= 339) or other location (6%, N= 61).

Figure 4.1 Location of workplace

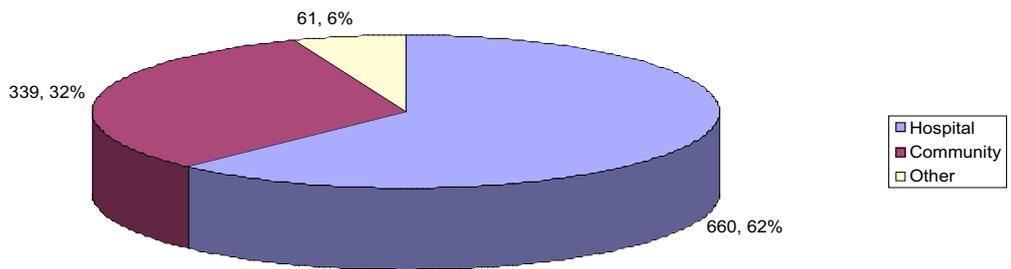


Table 4.1 Location of workplace

Total		Hospital		Community		Other	
1060	100%	660	62%	339	32%	61	6%

5. Length of Experience

More than half (51%, N= 536) of all respondents had more than 18 years professional experience and 12% (N= 131), had less than five years (see Figure 5.1, Table 5.1 and Table 5.2 below).

Figure 5.1 Length of Professional Experience in years

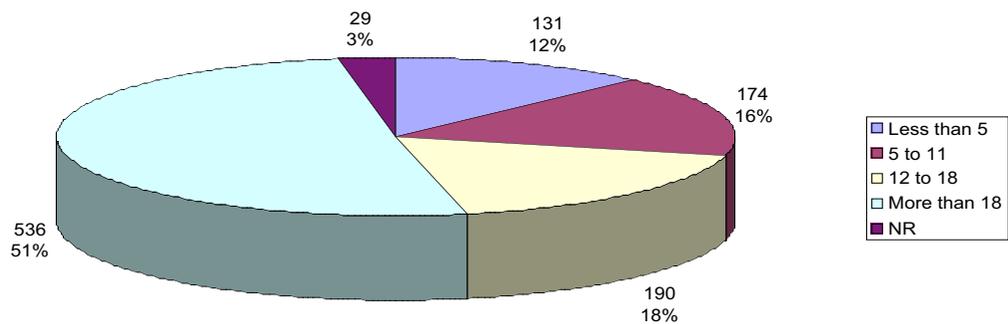


Table 5.1 Length of Professional Experience in years

Total		Less than 5		5 to 11		12 to 18		More than 18		NR	
1060	100%	131	12%	173	16%	190	18%	536	51%	29	3%

Table 5.2 Length of Professional Experience by profession

Professional Group	Years Experience									
	Total		Less than 5		5 to 11		12 to 18		More than 18	
Doctors & Dentists	107	100%	22	21%	21	20%	20	19%	44	40%
Ambulance Service	16	100%	2	13%	3	19%	3	19%	8	49%
Nurses	497	100%	48	10%	60	12%	83	17%	306	61%
Midwives	85	100%	3	4%	10	12%	16	19%	56	65%
Social Workers	105	100%	22	21%	27	26%	24	23%	32	30%
AHPs P&B	206	100%	34	17%	52	25%	40	19%	80	39%
Total	1016	100%	131	13%	173	17%	186	18%	526	52%

Overview of statistical analysis

A between groups analysis of the quantitative data was undertaken using the Kruskal-Wallis test to compare the scores recorded in relation to the following variables:

Perceptions about ICT

Skill rating in using ICT

Perceptions about electronic patient record (EPR)

Age

Workplace

Professional Experience

Gender (using Mann-Whitney test)

- Results showed that with regard to perceptions about ICT there were significant differences in perception between professional groups ($p < 0.01$).
- Significant differences were also recorded in respect of skills rating in using ICT ($p < 0.01$).
- However, there were no significant differences between the groups concerning perceptions about EPR ($p > 0.5$).
- With regard to age, the results indicate that there are significant differences between the age groups with regard to skills rating in using ICT ($p < 0.01$), and perceptions about EPR ($p < 0.01$) but no significant differences in respect of perceptions about ICT.
- Workplace – no significant differences exist in relation to the variables of perceptions about ICT, skills rating in using ICT and perceptions about EPR across the location of hospital, community or other location.
- With regard to years of experience significant differences were identified in respect of perceived ICT skills, ($p < 0.01$), and EPR, ($p < 0.05$).

Analysis of perceptions about Information and Communication Technology (ICT), Skill in using ICT, and Electronic Patient Records (EPR)³

³ This analysis is based on the mean scores achieved by allocating a numerical score to the Likert style questions.

- Skill ratings in ICT ratings decrease with increasing age. These ratings were highest in the under 30's category across the full spectrum of age ranges assessed and lowest in the higher age ranges particularly the 60's age group. Social and educational exposure to technological innovation outside the working environment may be a factor influencing this outcome and younger health care professionals will have had greater ICT exposure in school/college and university.
- However, this result needs to be contrasted with the overall ratings reported by all professional groups with regard to their perceptions about ICT and EPR. These rating scores were not appreciably different when all professional groups were compared.
- Attitudes toward ICT and EPR were therefore positive within all age groups and it is possible that skill rating is not greatly different between the groups but that perceptions held about personal ability may result in older individuals rating their skills as lower.
- The less than five years of experience group scored consistently better on all three of the variables of perceptions about ICT, skill in using ICT and perceptions about EPR.
- With regard to workplace there were no significant differences between the professional groups in their perceptions about ICT, skill rating regarding ICT, and perceptions about EPR.
- In the study population, the average score for the perception of the usefulness of ICT was 3.41 (out of 5). The average score for the self-reported skill in using ICT was 1.64 (out of 3), while the average score for the perception of EPR was 3.23 (out of 5). In each case a higher score is regarded as better.

Education and training

- The positive perceptions of the utility of ICT is reflected in the very high number of respondents who made use of a computer at home (93.7%, N= 993), at work (90.8%, N= 963), and in both locations (81.2%, N= 861). Sixty seven per cent (N= 707) of respondents use a computer on a daily basis; 58% (N= 605) claim to be aware of and knowledgeable about EPR.
- However, only 44% (N= 580), of all respondents have attended a computer training programme. In addition, only 5% (N= 51), indicated that they could design a web page and this may be a confirmation that such skills were considered to be at a level

of sophistication beyond what would be required as part of their normal professional activity.

- There was strong support from all professional groups for ICT education for health professionals, (93%, N= 997). Seventy nine per cent (N= 795) felt that ICT education should be multi-professional and the remaining 21% (N=210) supported a uni-professional approach.

Differences between professional groups⁴

Allied Health Professionals, Pharmacists and Biomedical Scientists

- The results show no significant difference in the perceptions about ICT held by AHPPB and the other professional groups but AHPPB rated their own skills significantly lower than doctors and dentists ($p < 0.001$).

Doctors and Dentists

- Significant differences regarding perceptions about ICT exist between doctors and dentists and nurses, ($p < 0.001$), midwives, ($p < 0.001$) and social workers, ($p < 0.001$). Doctors and dentists rated themselves higher than these professional groups.
- With regard to levels of ICT skill rating, doctors and dentists again rated themselves higher than other professional groups. Significant differences existed between doctors and dentists and social workers ($p < 0.001$), nurses ($p < 0.001$), midwives ($p < 0.001$) and AHPBP ($p < 0.001$).

⁴ Mann Whitney tests with Bonferroni correction were used to test for differences between independent and multiple groups.

Midwives

- Regarding midwives perceptions about ICT, there was no significant difference when compared with nurses, social workers, AHPPB or ambulance service personnel. Significant differences were found between the perceptions of midwives and that of doctors and dentists who rated their perceptions and skills (respectively) to be higher ($p < 0.001$ and $p < 0.001$).

Nurses

- Nurses did not differ in their perceptions about ICT when compared with midwives, AHPPB, social workers and the ambulance service. However nurses did rate their perception and skills lower than that of doctors and dentists ($p < 0.001$ and $p < 0.001$).
- No significant differences were found between nurses and the remaining groups in relation to their skill rating in using ICT.

Social Workers

- There were no significant differences between the perceptions of ICT reported by social workers and nurses, midwives, AHPBP and ambulance staff. As with other groups, social workers reported significant differences in perceptions and skills rating when compared with doctors/dentists who rated themselves higher ($p < 0.001$ for perceptions and $p < 0.001$ for skills).

Ambulance Service

- There were no significant differences in perceptions about ICT or rating of skills about ICT between the ambulance service and other professional groups.

Findings Related to the Demographic Details:

The sample did not differ in relation to their perceptions of ICT, skill rating and the use of EPR when the location of the workplace (hospital or community) was taken into account. This is an interesting finding given that there is a general acceptance that there has been a greater investment of ICT in the acute inpatient sector when compared with primary care locations. Despite these potential differences in the workplace availability of ICT and EPR, they are viewed positively within the healthcare populations operating in different locations. In addition, skill development is not wholly dependent on the application of ICT in the workplace setting. Rather ICT skills are widely incorporated into a range of social and personal activities and as a result personal rating of skill may be a reflection of a combination of personal and professional engagement with ICT. Perception of ICT and EPR were not significantly different in relation to gender. However, the following differences are noteworthy:

- Male respondents rated their skills at a higher level than their female counterparts and this was statistically significant ($p < 0.001$).
- Differences were also noted in relation to age; the younger age groups rated their skills higher than all their older counterparts ($p < 0.001$). Additionally when EPR rating scores were compared, the youngest group (<30 years) recorded statistically higher scores than both the 40-49 ($p = 0.002$), and the 50-59 ($p = 0.004$) age groups.
- Significant differences were noted in relation to years of experience. Higher skill rating scores were recorded by those with less than five years in the NHS.
- Significantly higher scores were noted when comparing those with under five years experience with those of 12-18 years experience ($p < 0.001$). Additionally those with under five years experience reported a higher score than those with more than 18 years experience ($p < 0.001$). Similarly those with 5-11 years experience rated their ICT skills higher than the more experienced categories ($p < 0.001$).

Qualitative commentary

Three questionnaire items provided the opportunity for participants to make qualitative comments in relation to ICT use in the workplace. Data was analysed using a qualitative management package (NVivo Version 7®) to identify recurring themes. It is important to note that comments were received from every professional group represented in the sample and a full and detailed discussion is available in the main report. Only a brief summary of the analysis is presented here:

Details of computer training

The majority of individuals who had received computer education identified the CLAIT course as being the main training programme undertaken. Most identified they were offered in-house training provided by the Trust and in most cases Power Point, Word and Email were the programmes listed. Some indicated training for their ICT role had been provided at university as part of their professional education. In addition, a very small number of individuals had taken university courses specific to ICT.

Support for individuals using ICT in everyday practice

This question provided a wide range of answers that demonstrated individual and corporate training issues such as the need to provide appropriate hardware and software, 24 hour access to ICT support and regular planned updates on new ICT developments.

Multi-professional and uni-professional training for ICT

This question received almost 100 responses with the majority indicating a favourable disposition towards multi-professional education for ICT. Positive statements identified repeated reference to the benefits of multi-professional education for all healthcare professionals and this is best illustrated by key phrases used such as “*necessary for effective team working*”, “*learning together ...learning from each other*”, “*the best way forward in modern practice* and “*the whole ethos is towards multi-professionalism*”.

Uni-professional statements indicated the need to express individualism and perceived needs identified were mainly from social workers, radiologists and radiographers who considered their ICT needs to be unique to their particular profession.

Conclusions and Recommendations

This study has encompassed a wide range of professional disciplines with good representation from health care workers across all age ranges. The findings of the survey have clear implications in a number of key areas for the HPSS Strategy for ICT (2005) and for its ongoing implementation. These areas are identified below with recommendations for future development:

1. Implications for education and training

The results (in particular the qualitative data) of this study support the importance of a training needs identification strategy. This would lead to the development of a standardised, efficient, and effective training initiative for ICT and EPR designed to:

- a. Meet the particular needs of the different professional groups.
- b. Incorporate a common core curriculum designed to meet the base line ICT skills required by all grades of practitioner, including where appropriate the particular needs of age groups who perceive themselves as being less familiar with ICT technology.
- c. Promote a ‘two-tier’ approach to training with multiprofessional approaches concentrating on basic training for all staff, with uni-professional training specific to meeting the needs of particular professional groups or specialties.
- d. Provide a range of skill development units of study from basic level to more complex ICT skills.
- e. Match skill training levels to specific role specifications.
- f. Implement annual updating in ICT skills training for all staff.
- g. Provide for ‘step on’ and ‘step off’ opportunities to enable individuals to enter at levels appropriate to the needs of the service, and to re-enter when role change and professional development needs would require it.
- h. Maximise online learning strategies for delivery of content.

2. Implications for professional practice

The results of the study indicate a generally positive disposition toward the use of ICT in health care including the EPR.

- a. This should be recognised and acknowledged, and built upon within a management of change strategy that is designed to capitalise on the existing perceptions and perceived levels of skill currently available within the service, and to address deficits through training where this is required.
- b. The effectiveness of support services for ICT provision which is necessary to maintain the commitment of practitioners to fully utilise the technology should be assessed and ensured within ICT development strategies.
- c. In particular there is evidence of a need to provide ICT support on a 24/7 basis in order to ensure the effective and efficient use of existing resources and services.

3. Implications for future research

This project highlights areas requiring further study; for example why differences exist between professional groups regarding their perceptions about ICT, their skill ratings and the use of the EPR, how accurate these perceptions are and then how best to address the differential needs of the various professions. Some professional groups have little access to ICT compared with others, therefore, studying the interplay between involvement with ICT in the workplace and attitudes to the utility of ICT in health care and to the EPR will be important. How can we best introduce increasingly sophisticated systems into the workplace without alienating staff? The answers to such questions will be vital to ensure the successful and efficient implementation of seamless and user friendly ICT systems integrated across the entire HPSS.

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