The educational needs of health information managers in an electronic environment: what information technology and health informatics skills and knowledge are required?

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Abstract

The profile of health information managers (HIMs) employed within one metropolitan area health service in New South Wales (NSW) was identified, together with which information technology and health informatics knowledge and skills they possess, and which ones they require in their workplace. The subjects worked in a variety of roles: 26% were employed in the area's Information Systems Division developing and implementing point-of-care clinical systems. Health information managers perceived they needed further continuing and formal education in point-of-care clinical systems, decision support systems, the electronic health record, privacy and security, health data collections, and database applications.

Keywords: *continuing education; education, professional; medical informatics; medical record administrators; health information management*

Introduction

Background

The health information management profession, like a number of other professions, is undergoing rapid change due to the increasing use of information and communication technologies in the workplace. Traditionally, health information managers (HIMs) were based in hospital medical record departments and were responsible for managing clinical and administrative information contained within paper-based medical records and manual patient and disease indices. Health information systems, both administrative and clinical, are now increasingly in electronic form. With this technological advancement the role of the HIM has expanded and the demand for HIMs with skills in information technology and health informatics has increased. Rollins (2001) stated that HIMs' expertise in new technologies is increasingly valued and that they have an important role in easing the transition from paper-based to electronic health records (EHR).

The role of HIMs has expanded and their place of work is no longer confined to the medical record department of a hospital. Within area health services and hospitals, HIMs work in various roles, ranging from managers of health information systems and coders in medical record and patient information services departments, to system analysts, clinical information systems support specialists and information system managers in information services departments (Callen & Craig 2000). HIMs also work in the clinical areas of hospitals as data managers and research assistants, and outside hospitals their roles can be even more varied. The HIM no longer works with just paper-based health information systems. One of the most significant changes occurring in the health care system in the area of information technology is the implementation of the electronic health record. The National Electronic Health Records Taskforce (2000) stated that electronic health records could provide the tools that consumers could use to share their health information with their health care providers and thus improve the quality of their care. This technology will improve access to information so health care providers and consumers will be in a better position to make informed decisions regarding health care. The introduction of the EHR and clinical information systems within the health care sector is seen as a major reason for the changing role of HIMs.

University programs in health information management incorporate education in both information technology and health informatics; however, it is important to understand the current needs of HIMs in the workforce. With the development of the electronic health record and point-of-care clinical information systems, and the linkage of clinical and financial information to support casemix funding, it is imperative that health information managers increase their knowledge in information technology and health informatics (Roberts & Mitchell 1998; Callen 2001). Indeed, due to the increasing importance of information storage and processing in health care, it is evident that all health care professionals, not just HIMs, need to learn skills and gain knowledge in the field of health informatics (Haux et al 1998). Education in health informatics is essential for the appropriate and responsible application of information technology in health care (Haux et al 1998).

The competency standards for HIMs in Australia have been revised recently by the Health Information Management Association of Australia (HIMAA) to reflect the changing role of the HIM (HIMAA 2001). Box 1 shows the information technology and health information systems competency areas that HIMs should possess upon graduation (HIMAA 2001).

The implementation of information technology in health care organisations, particularly hospitals, has been slow, with the major reasons relating to the complexity of health information, health care organisations and the health care delivery process (Benson 2002; Berg 1998). The transition from a paper-based to an electronic health record began a number of years ago. It is seen as a constantly evolving process and as such will require HIMs to update their knowledge continually through further education. NSW Health (2002) has highlighted the necessity for undergraduate and ongoing postgraduate education and skill development in health informatics to ensure the future success of the EHR.

1: Categories of competencies for HIMs in the information technology and health information systems areas

Domain: Information Technology

- Computer Concepts
- Personal Computers

Domain: Health Information System Concepts and Processes

- Systems Analysis and Design
- System Selection Processes
- Human Factor Engineering and User Interface Design
- Information Systems Content *(includes both electronic and paper media)*
- Data Security and Integrity
- Healthcare Data and Exchange Standards *(HL7, etc.)*
- Computer-based Patient Record System *(Electronic Health Record)*
- Health Data Collections
- Health Information Dissemination and Security: Patient-Identifiable Data *(Confidentiality, access, release of information)*
- Information Dissemination and Security: Non-Identifiable Patient Data *(Human resources information, financial information, de-identified patient information, etc.)*
- Clinical Data Management
  Database Management
  Networks and Data Communications *(Local Area Network (LAN), Wide Area Network (WAN), ISDN, T1 lines, ATM technology, digital wireless, etc.)*

Source: Adapted from Health Information Management Association of Australia (2001). *HIM Competency Standards.* 1st ed. Sydney: Health Information Management Association of Australia: 14-18.

Lewis (1998) has suggested that all graduates have a professional responsibility to keep up to date with advances in the health information management field and that, therefore, there is a need for all health professionals to have highly developed learning skills. Quick (2001) has proposed that HIMs should undertake internal or skill-specific training in the workplace, in addition to gaining another formal qualification in information technology or health informatics to keep abreast of the changes occurring in the industry. Courses in health informatics and information technology should be provided for all health care workers (clinical and non-clinical), not only at tertiary level but also as part of continuing education programs in the workplace (NSW Health 2002).

It can be seen, therefore, that it is important to ascertain what information technology and health informatics skills HIMs need to keep up with the rapid advances in the EHR and the use of other electronic databases for storage of health information. This information is essential for planning future education and training of HIMs (Callen & Craig 2000). Some research has been undertaken previously on the information technology and health informatics skills of HIMs (Booker 1987; Mitchell & Allen 1993; Callen & Craig 2000). The purpose of the present study was to expand on what is known in this area and to gain a better understanding of the current roles of HIMs within area health services.

Research questions

The aim of this study was to establish a profile of health information managers working within an area health service, to determine what information technology and health informatics skills they already have and what additional skills in these areas they need to acquire. The research questions were as follows:

1. What are the work roles of HIMs within a metropolitan area health service?
2. What information technology and health informatics knowledge and skills do HIMs employed in a metropolitan area health service possess?
3. What additional information technology and health informatics skills do HIMs employed in a metropolitan area health service believe they require?
4. What do HIMs perceive as being appropriate education methods for gaining additional skills in information technology and health informatics?

Methodology

Research design, sample and site

The study design chosen for this research project was an exploratory survey design. The target population consisted of all known, qualified health information managers (n=38) employed within one major metropolitan area health service in Sydney, New South Wales. *Qualified* HIMs were defined as those with an undergraduate or postgraduate qualification in health information management from a tertiary educational facility accredited by the national professional association of the health information management profession in Australia.

Survey instrument

The survey instrument was a self-administered, structured questionnaire designed by the researcher. A pilot study was undertaken which included five HIMs employed in hospitals in other NSW area health services and one lecturer in the School of Health Information Management, The University of Sydney. The questionnaire was modified based on the feedback received from the pilot study. The questions concerned demographic details, the HIMs' roles in the workplace, their educational background, their current information technology and health informatics knowledge and skills, and the frequency of use of these skills in the workplace. Questions were also asked on the knowl-

edge and skill areas in which HIMs believed they required further education and what form they would like this education to take. The questions were a mix of multiple-choice, open-ended and five-point Likert scales. The data were collected between July and August 2002.

Procedure

The questionnaire was distributed via the internal mail service to all known health information managers within the area health service of the study. A letter included with the questionnaire described the purpose of the study, information regarding confidentiality, and the contact details of the researcher if further information was required. Subjects who had not returned the questionnaire after two weeks were sent a reminder letter by e-mail.

Data analysis

The results were entered into a Microsoft Excel® spreadsheet and are presented using descriptive statistics.

Limitations

One limitation of this research was that the sample population was from one metropolitan area health service and therefore may not be representative of area health services in general. A further limitation was that the subjects' responses represented their own perceptions of their knowledge and skills, and this subjectivity could bias the results.

Results

Profile of the study population

Thirty-four of the 38 HIMs (89%) responded; of the four non-respondents, one was on maternity leave, two had resigned and one returned a questionnaire that was subsequently lost in the mail. Sixteen HIMs (47%) in the area health service were in the 20–29 years age group. Twenty-one respondents (62%) were less than 40 years of age (Box 2). The majority of respondents were female (91%).

2: Age distribution of all qualified health information managers working in one metropolitan area health service in NSW

Age (years)	*n*	%
20-29	16	47
30-39	5	15
40-49	11	32
50-59	2	6
60+	0	0
Total	**34**	**100**

Twenty-nine (85%) respondents were employed full-time, four (12%) were employed part-time, and one (3%) was employed on a contract. The salary levels of the HIMs are shown in Box 3. Twenty-three of the respondent HIMs (69%) earned $50,000 or more per annum, including one who earned over $80,000.

Box 4 shows the HIM qualifications held by the respondents. The majority (59%) had completed the

3: Salary levels of health information managers in one metropolitan area health service in NSW

Salary ($A)	*n*	%
30,000 – 39,999	4	12
40,000 – 49,999	5	16
50,000 – 59,999	15	47
60,000 – 69,999	6	19
70,000 – 79,999	1	3
80,000+	1	3
Total	**32***	**100**

* Two values are missing, as two HIMs did not divulge their salary in the survey

Bachelor of Applied Science (Health Information Management) degree. All respondents completed their HIM qualifications between 1969 and 2002, the majority having done so between 1990 and 1999. Nine respondents (26%) were currently undertaking further study.

The respondents' employment base was distributed almost evenly between the area health service

4: Health information management qualifications of health information managers in one metropolitan area health service in NSW

Course	*n*	%
Certificate of Medical Record Librarianship	2	6
Associate Diploma (MRA)	6*	18
Bachelor of Applied Science (HIM)	20	59
Master of Health Information Management	3	9
Currently completing Master of HIM	2†	6
Total	**33^**	**100**

* Two of the 6 are currently upgrading this Associate Diploma to a Bachelor of Applied Science (HIM)
† These two respondents do not have undergraduate qualifications in health information management
^ One of the health information managers surveyed did not complete this question

administration and the hospitals: 44% were employed by the area health service administration and 53% by the hospitals. One HIM was employed by

5: Facility employing health information managers in one metropolitan area health service in NSW

Facility	*n*	%
Area Health Service	15	44
Hospitals*	18	53
Community Health	1	3
Total	**34**	**100**

* There are six public hospitals in the area health service

6: Job titles of the 34 health information managers employed in one metropolitan area health service in NSW

Facility	Department	Job Title
Area Health Service	Health Information Services	Database Collections Manager
		Health Information Manager
	Executive Unit	Manager Trainee/Project Officer
	Health Care Interpreters Service	Telephonist/Booking Clerk
	Area Casemix Unit	Area Casemix Coordinator
	Information Systems Division	Application Analyst
		Application Specialist
		CCIS* Coordinator
		Clinical Documentation Analyst
		Manager, EHR & Clinical Information Systems
		Person Management Coordinator
		Security & Issues Manager
		Systems Analyst
		Project Manager
	Medical Records	Child Protection Information & Medico-legal
Hospital	Casemix & Statistics	Casemix Data Manager
		Manager, Casemix & Statistics
		Statistics Officer
		Junior Project Officer
		Senior Project Officer
	Clinical Coding	Manager, Clinical Coding
		Deputy Clinical Coding Manager (2)
	Medical Records	Medical Record Manager (3)
		Deputy Manager, Medical Records
		Record Control & Discharge Desk
		Quality Improvement & Training
		Health Information Manager
	Patient Information Services	Manager, Patient Information Services
		Manager, Patient Services & Information
	Utilisation Review & Statistics	Information Requests Manager
Other	Community Health Services	Health Information Manager

Note: One person occupies each job title position unless stated otherwise in parentheses
*CCIS = Central Sydney Area Health Service Clinical Information System

community health services (Box 5). Box 6 shows the roles of HIMs employed in the area health service administration, six public hospitals and the community health service. It can be seen that HIMs have a variety of job titles, and nine of the 15 (60%) HIMs employed in the area health service administration were employed in the Information Systems Division.

Information technology and health informatics knowledge and skills

Box 7 shows that the majority of HIMs perceive they have very good to excellent skills in word processing and spreadsheet applications, internet/e-mail and patient administration systems (PAS), and limited or no skills in Microsoft (MS) Project® software, statistical

7: The information technology skill ratings given by health information managers in one NSW metropolitan area health service

	Skill Rating									
	Excellent		Very Good		Good		Limited		No Skills	
IT Skill	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Word processing	9	27	15	44	9	27	1	3	0	0
Spreadsheets	5	15	16	47	10	29	3	9	0	0
Database	3	9	6	18	8	23	13	38	4	12
Graphics	5	15	7	20	12	35	5	15	5	15
MS Project®*	0	0	2	6	6	18	8	24	17	52
Internet/email	11	32	16	47	5	15	2	6	0	0
PAS°	10	29	11	32	9	27	4	12	0	0
Encoder	7	20	5	15	6	18	10	29	6	18
PACS^	1	3	3	9	1	3	3	9	26	76
Statistical packages	0	0	1	3	6	18	11	32	16	47
Programming	2	6	0	0	6	18	9	26	17	50

*One respondent failed to rate
° PAS = Patient Administration System
^ PACS = Picture Archival and Communications System
Note: percentages for all rows do not necessarily equal 100% due to rounding

8: The frequency of use of information technology (IT) by health information managers employed in one metropolitan area health service in NSW

	IT Usage									
	Daily		Weekly		Monthly		*Ad hoc*		Never	
IT Skill	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Word processing	29	85	3	9	1	3	1	3	0	0
Spreadsheets	24	70	5	15	1	3	4	12	0	0
Database	10	29	8	24	3	9	7	20	6	18
Graphics	1	3	3	9	8	24	14	41	8	24
MS Project®*	1	3	2	6	0	0	9	27	21	64
Internet/e-mail	33	97	1	3	0	0	0	0	0	0
PAS°	25	73	2	6	0	0	6	18	1	3
Encoder	6	18	0	0	0	0	13	38	15	44
PACS^	1	3	2	6	1	3	1	3	29	85
Statistical packages	0	0	1	3	3	9	1	3	29	85
Programming	3	9	0	0	0	0	7	20	24	71

* One respondent failed to rate
° Patient Administration System
^ Picture Archival and Communications System
Note: percentages for all rows do not necessarily equal 100% due to rounding

9: The level of health informatics knowledge of the health information managers employed in one metropolitan area health service in NSW

	Skill Rating									
	Excellent		Very Good		Good		Limited		No Skills	
Health Informatics Area	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
EHR*	5	15	6	18	15	44	7	20	1	3
Privacy and security	8	24	10	29	10	29	5	15	1	3
UPI^	3	9	7	20	17	50	6	18	1	3
DSS°‡	1	3	4	12	6	18	13	40	9	27
POCCS†	2	6	3	9	15	44	10	29	4	12
Health data collections	2	6	5	15	17	50	10	29	0	0
HL7	1	3	1	3	4	12	14	41	14	41
Data dictionaries‡	1	3	4	12	7	21	19	58	2	6
Medical vocabulary	2	6	2	6	6	18	11	32	13	38
Change management‡	2	6	5	15	10	31	9	27	7	21

* Electronic Health Record
^ Unique Patient Identifier
° Decision Support System
† Point-of-Care Clinical System
‡ One respondent failed to rate

packages, programming, and the Picture Archival and Communications System (PACS). Fifty percent of the respondents stated that they had good to excellent database skills and 50% stated they had limited or no skills in this area.

Box 8 shows that the majority of HIMs use word processing, spreadsheets, internet/e-mail and the PAS on a daily basis. The majority of HIMs claimed they never used MS Project®, PACS, statistical packages or programming. Many use an encoder, database or graphics application either irregularly or not at all.

Box 9 shows that the majority of the HIMs studied believe they have good to excellent knowledge of the electronic health record, privacy and security, unique patient identifier, point-of-care clinical systems, and health data collections. They have limited or no knowledge of decision support systems, HL7 messaging, data dictionaries and medical vocabulary. Sixteen (48%) of the respondents stated they had limited knowledge, or no knowledge, of change management.

Further education of health information managers

Box 10 shows the areas where HIMs believe that they require further education. It can be seen that that the priority areas for further education (for over 70% of respondents) are point-of-care clinical systems, decision support systems, EHRs, privacy and security, health data collections, and database applications. It is evident that most HIMs do not require further education in word processing, internet/e-mail, the use of encoder software, or programming.

Box 11 shows that a variety of education methods were considered by HIMs to be appropriate for updating their skills and knowledge in information technology and health informatics.

Discussion

This study emphasised the great diversity of roles that HIMs assume. This diversity has been shown in other

10: The areas where the health information managers employed in one metropolitan area health service in NSW believe further education is required

	Yes		No		Total
Areas	*n*	%	*n*	%	*n*
POCCS†*	26	79	7	21	33
DSS∇*	25	76	8	24	33
EHRϕ	25	74	9	26	34
Privacy and security	25	74	9	26	34
Health data collections	24	71	10	29	34
Database	24	71	10	29	34
Change management*	23	70	10	30	33
Medical vocabulary*	22	67	11	33	33
UPI^	21	62	13	38	34
MS Project®	21	62	13	38	34
Data dictionaries*	19	58	14	42	33
HL7°	18	56	14	44	32
Statistical packages	18	53	16	47	34
Graphics	17	50	17	50	34
PAS∞	17	50	17	50	34
Spreadsheets	16	47	18	53	34
PACS‡	16	47	18	53	34
Programming	13	38	21	62	34
Encoder	9	26	25	74	34
Word processing	7	21	27	79	34
Internet/e-mail	6	18	28	82	34

* One respondent left item blank
° Two respondents left item blank
ϕ Electronic Health Record
^ Unique Patient Identifier
∇ Decision Support System
† Point-of-Care Clinical System
∞ Patient Administration System
‡ Picture Archival and Communications System

11: The methods of further education of health information managers deemed appropriate in one metropolitan area health service in NSW

	Yes		No	
Type of education	*n*	%	*n*	%
Hospital-run courses	29	85	5	15
On-the-job training	27	79	7	21
External training courses	23	68	11	32
Continuing education	19	56	15	44
Formal education	12	35	22	65
Other*	1	3	33	97

* Collaborative learning and peer discussion

studies (see, for example, Callen & Craig 2000). Within one area health service it can be seen that HIMs are employed in a variety of positions in many different locations throughout the hospital. An interesting finding of this study was the high number of HIMs employed directly in information technology areas, with nine (26%) of the respondents employed in the Information Systems Division, which is area-based rather than hospital-based. Most of the HIMs in this division were working on the development and implementation of clinical information systems throughout the area health service.

The majority of HIMs employed in the metropolitan area health service (including six public hospitals, area health service administration and community health services) were female (91%). These results are similar to those of previous research; however, there is a trend towards more males being attracted into the health information management profession. A study conducted in 1987 found that 98.8% of HIMs were female (Booker 1987); in 1991, 94.3% were female (Mitchell & Allen 1993) and in 2000, 94% were female (Callen & Craig 2000). The HIMs employed in this area health service were relatively young, with 47% aged 29 years or less. There could be many reasons for this, but it may indicate that HIMs often commence their career in health information management in a public hospital or area health service before moving to different areas of employment such as health funds, computer companies, private hospitals, government positions, or pharmaceutical companies.

A great majority of the respondents believed that they had very good to excellent skills in word processing and spreadsheet applications, internet/e-mail, and the use of patient administration systems; this might be expected because of the types of positions that they held. This finding can be linked directly to the frequency of use of these applications, with the majority of respondents using them on a daily basis. The areas in which HIMs perceived that they had limited information technology skills were those in which skills are in line with the level of usage, as the majority of HIMs stated that they never used MS Project®, statistical packages, PACS or programming.

In the context of health informatics, this study found that the majority of HIMs believed that they had a good to excellent level of knowledge of the electronic health record, unique patient identifier, point-of-care clinical systems, and health data collections. This level of knowledge could be reflective of the types of positions that the HIMs occupied or it may be due to the fact that these areas are all relevant to HIMs because of the changes currently occurring in information management within the health care system.

The HIMs' perceptions of lack of knowledge in the areas of decision support systems, HL7 messaging, data dictionaries, and medical vocabulary may again relate to the jobs held by the respondents. It is noted that these areas are relatively new and are only now becoming relevant within the health information management field.

The most frequently cited areas for further education were point-of-care clinical systems, decision support systems, electronic health records, privacy and security, health data collections, and database applications, reflecting the rapid advances in these technologies. If HIMs are to remain current in these areas, further education is essential.

In contrast, the areas in which most HIMs believed they did not require further education were word processing, internet/e-mail, the encoder, and programming. Most HIMs use word processing and internet/e-mail regularly and, as a result, are likely to be quite proficient in their use and would not require further training. The encoder and programming are tools that are perhaps not often used in the types of positions held by the respondents; therefore, it would be expected that no further education would be required in these areas.

Conclusion

There are few published studies that describe HIMs' perceptions of their knowledge and skills in the areas of information technology and health informatics. These constitute a common area of employment for HIMs as increasingly they are working directly on the development, implementation, and management of the EHR.

This study has outlined the information technology and health informatics areas in which HIMs believe their knowledge is lacking and the appropriate educational methods that could be used to update their knowledge and skills. Identifying the areas in which HIMs require further education can be useful in planning courses for HIMs in the workplace, and in curriculum development of undergraduate and postgraduate programs in health information management and health informatics. The diversity of roles that HIMs now hold makes it difficult to determine educational requirements of such positions. Callen (2001) found in a previous study that educators, the health information management professional association, and employers all have an interest in establishing what knowledge and skills HIMs require in their current and different roles.

This is a time of great change for HIMs. With the rapid advances in information technology and the implementation of the EHR, HIMs need to stay abreast of changes and to keep their knowledge and skill levels up to date. HIMs are an extremely valuable source of information to assist with the implementation of the EHR. It is essential that they receive not only a good grounding in information technology and health informatics in their university studies, but also undertake continuing education to keep up to date with the changes. Effective education programs in the areas of information technology and health informatics are a necessary requirement to provide HIMs with the level of knowledge and skills required to assist with the implementation of this new technology in the health care system.

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