

Nursing Informatics: A Delphi Study

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Abstract. A two round Delphi study was undertaken to answer the questions, "What information systems (IS) should nurses be using in the next 5-10 years to support their work?" and "What issues need to be addressed to ensure their successful usage?" The study identified that the advantages of existing hospital nursing information systems (NIS) were consistent with those generally associated with computerisation and that few benefits from information usage were realised. A computerised multidisciplinary, multiagency patient record was identified as the top priority system to support hospital nurses in the future. Sixty eight issues were identified for successful usage of existing and future NIS. They covered a wide range of topics including: management of change; procurement issues; hardware and software issues; training and support; information issues; and evaluation. Sixty two of these issues received a consensus of 80% or more.

1. Introduction

The recent interest in computerised NIS in the UK has been stimulated significantly by the provision of government funds [2]. Yet few benefits have been reported from these systems and few studies have examined the key success factors associated with the implementation of a NIS. A recent survey concluded that 128 of the 248 acute hospitals surveyed in England and Wales claimed to have a computerised NIS, mainly rostering and care planning systems. The acceptance level of these systems was not high, with only 32% of sites describing their system as either minimally or partially acceptable [7]. An Audit Commission study concluded that the promised benefits of NIS were proving elusive and many problems were being encountered [2].

Ball et al. suggest that in the future nurses will benefit from expert systems, decision support systems, modelling systems, and artificial intelligence. It is stressed that the benefits will not come from the tool itself, but from the information that these new technologies make available [3]. Certainly the rapid evolution of computer technology promises to provide future NIS with new possibilities at a reasonable cost. However if the experiences from the past are not evaluated then these future systems may not be designed, implemented or used appropriately.

2. The Delphi Method

The Delphi method aims to obtain the most reliable consensus of opinion from a group of experts or appropriately experienced individuals without bringing them together in a meeting. This is achieved by conducting a series of intensive questionnaires interspersed with the feedback of summarised opinions derived from earlier responses [6].

This study used a two round conventional Delphi method. It was undertaken between February and November 1994 and addressed NIS in the UK for all nursing and midwifery specialties. The membership list of Nursing Specialist Group of the British Computer Society was used to select the sample. Membership includes nurses who are interested in NIS as both users and experts, from a range of specialties and health care settings. A total of 90 names, from a possible 296, were chosen to make up the sample. This would provide a possible 18 respondents per specialty. Ten to fifteen being identified as the ideal range of respondent's required for a homogeneous group [6].

A postal questionnaire designed by the researcher was used for round 1 of the survey. Open questions were asked to encourage respondents to express their own ideas on three key areas: What IS are nurses, midwives, and health visitors presently using to support their work? What IS should nurses, midwives, and health visitors be using in the future to support their work? and What key issues require to be addressed to ensure the successful usage of existing and future IS? In order to set future systems into context the questionnaire also sought to identify: existing NIS in use; activities and information needs these systems support; their benefits and disadvantages. The same issues were explored for future NIS.

Respondents were given six weeks to respond. The responses to existing and future NIS were summarised and a number of responses excluded. Reasons for exclusion were: responses not providing adequate information to indicate the purpose or benefits of the system; and locally developed systems. In total 255 statements were identified by respondents as issues that required to be addressed to ensure the successful usage of existing and future NIS. These statements were collated into 68 issues. The process was validated by a panel of experts.

Round 2 fed back to the respondents the results of round 1. They were asked to: comment on existing and future NIS; agree or disagree with advantages and disadvantages; rank-order the top three existing and future systems they believed should be made more widely available or developed. They were also asked to agree, disagree or comment on the 68 issues that needed to be addressed to ensure successful usage of existing and future NIS and rank order the ten most important issues.

3. Results

Round 1 received a response rate of 29 (32.2%) from the total sample of 90. The response rate for round 2 was 23 (79%) - 26% of the total sample. Sixteen of the respondents referred to hospital nursing, all other specialties had 4 or fewer respondents. Only the hospital nursing responses were considered valid. All 23 respondents completed the section that related to successful usage issues.

The top priority systems for hospital nursing are listed in Table 1. Overall 4 manual and 9 computerised systems were reported to exist and 11 future computerised systems were identified. Existing manual systems included those for: quality assurance and audit; rostering; care planning; and patient dependency. Existing computerised systems included: the latter three manual systems; systems listed in table 1; patient administration; office automation; theatre; pathology results reporting; and accident and emergency. In addition to table 1, future computerised NIS included: research database and patient information. Other future systems correlated with potential features of the multidisciplinary, multiagency patient record including: expert systems; smart cards; critical pathways; links to GP's; audit; and ward management systems.

Table 1: The top priority systems for Hospital Nurses.

<i>Existing Systems That Should Be Made More Widely Available.</i>	<i>Future Information Systems That Should Be Developed</i>
1st Computerised Care Planning	1st Computerised Multidisciplinary, Multiagency Patient Record.
2nd Computerised Patient Dependency	2nd Automatic Rostering
3rd Computerised Order Communications	2nd Improved Computerised Patient Administration

Of the 145 advantages and disadvantages highlighted, 102 had a consensus of 80% or more. The top ten priority issues required for successful usage of NIS are listed in Table 2. Five of the top ten priority issues had 100% consensus, the remainder received between 90% and 99% consensus. Of the total 68 issues: 27 had 100% consensus; 25 of the issues had between 99% and 90% consensus; and 10 issues had between 80% and 89% consensus. Only 6 of the issues had below 80% consensus, one produced a consensus of only 52%.

4. Discussion

The positive effect of the 41 benefits of existing computerised NIS would be considerable diminished by the 30 disadvantages identified. The advantages were consistent with those of computerisation in general including improved; communication; access to information; consistency and legibility of documentation; and saving time. Disadvantages were: time consuming to set-up; information not fed back; and potential breaches in confidentiality. Few advantages from information use were expressed. Those that were identified were: more efficient management; improved discharge planning; and improved utilisation of manpower. Advantages and disadvantages that related to information issues tended to have the lowest consensus. They were usually disadvantages: information not fed back; unable to act on information; and irrelevance of information. Where the low consensus was linked to an advantage it disputed, for example, improved availability of information. This lack of use of information by nurses is traditional according to Phillips who suggests that nurses are use to: using intuition rather than hard facts; collecting information for others rather than for themselves; acting on the instruction of others. [8].

Table 2: Top ten priority issues required for successful usage of NIS.

Organisational development & management of change should be given equal priority with technical issues.
There should be understanding, commitment and support from all levels of management for the system, and for the procurement and implementation process.
Information technology should be recognised as a tool to support decision making rather than resolve problems for users. Problems should be solved before systems are introduced.
Staff should receive education and training in the use of information management and technology to ensure the full benefits of manual and computerised information systems are obtained.
Prior to implementing a system a clear understanding is required of information needs, what systems will do, for whom, and what the benefits will be.
Potential users should be consulted about their information needs before a system is selected.
Systems should interface with each other to allow information to be shared and the duplication of data entry reduced.
Staff should receive training in the identification of their information needs and how to think strategically about their requirements.
The evaluation of existing Nursing Information Systems should be undertaken.
A system should not dictate practice but vice versa.

The top priority for existing and future hospital NIS was to extend the use of, or to develop, systems that support patient focused information. This correlates with the information needs of nurses of which 49% is estimated to be patient specific data [5]. Key features of the future patient record were integration of data with other: systems; health care settings; and disciplines. These findings correlate with the Carty Delphi study that examined the information features necessary for future clinical NIS. The study found that the items that generated the highest consensus supported: communication; patient specific data; and a move towards patient care plans that cross disciplines as well as institutional lines [4].

The 68 issues needing to be addressed to ensure successful usage were very comprehensive. The range of issues included: management of change; system procurement; hardware and software issues; training and support; information; and evaluation. Most of the top ten priority and the 100% consensus issues correlated with other studies. Training and support, and the need to review roles, responsibilities and practices were people issues that the "Management in the 90s" project also found were critical to success [1]. A Nordic study [9] correlated with a number of issues including: identifying information needs, system requirements and potential benefits; user involvement; project management; flexible, reliable and robust systems; and an adequate number of terminals. The Audit Commission study [1] identified a number of similar issue including: the need for user friendly systems; clear system objectives; commitment and involvement from management and users; the need for education and support; and the need to evaluate systems.

The issue that suggested "more standard packages should be used with effective re-engineering of working practices" had the lowest consensus of 52%. This is not surprising as the tenth top priority issue suggested that "a system should not dictate practice but vice versa". Disadvantages of NIS that received a low consensus included concerns about the computer standardising practice or being prescriptive and discouraging nurses from thinking. There are obviously concerns with the lack of flexibility of systems.

There was a contradiction between other low consensus issues. The issue that "nurses should control nursing information" received a consensus of 78.3%. Another issue stated "information should be shared" and received a consensus of 87%. Nurses may be able to control what and how information is collected and confidentiality, but if a common patient record is a top priority for future development information must be shared with other professionals.

5. Limitations

There were two main limitations to this study. One was the low response to the first round, in particular for all specialties except hospital nursing. A key reason may have been the time and effort required by respondents to complete the questionnaire. The other limitation was the possible lack of a third round. However, the top ten priorities were the same as the issues that received the most number of priority votes and consensus was generally very high.

6. Recommendations for Future Research and Practice

Major benefits from NIS will only be gained if the information they produce is used to inform decision making. Research is required to examine the use of information by nurses for decision making and problem solving so that these future information systems can be appropriately designed to support them. Mechanisation of existing manual systems, which appears to be the present situation, is unlikely to reap major rewards. Future work must continue in the integration of IS and their usage by all health care professionals, across all health care settings to enable the future vision of a fully integrated computerised common patient record to be realised. The *human facets in information technologies* are clearly identified in this study. People issues and the need to avoid computers dictating practice appear to be the most important ones if information technology is to be implemented successfully. The only really sure way to provide an accurate prediction of future technological events is to manage and shape them.

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