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ICT in Nursing in Dutch Hospitals

Ir. H.G.M. HILDERINK *(NICTIZ)*, P. EPPING *(Epping consultancy)*,
Dr W.T.F. GOOSSEN *(Acquest)*
The Netherlands

Abstract. VIZI and its successor NICTIZ (National ICT Institute for Healthcare) carried out a study to assess the status of ICT use in hospitals. The statutory obligation for the retention of care records and instructions was highlighted by the professional nursing institutions. Literature was studied to find out more about the contribution of nursing records to the care provided. Nursing records are kept in all hospitals, and keeping a good record is essential to the care. Nevertheless not much evidence was found to support the idea that the traditional way of keeping of keeping a nursing record has substantial positive effect on the care provided.
It became clear however that Clinical Pathways does indeed seem to be promising as a protocol for treating patients and putting demands on registration, and to provide a clear method by which the electronic nursing record could be built up as a part of the integrated electronic patient record. By means of two questionnaires, one applied to suppliers and one applied to hospitals, the status of ICT in hospitals was addressed. It transpired that several suppliers are active in this area, but usually with general EPR systems which have little dedicated functionality for nurses. The number of nurses in hospitals who are using computers on a regular basis is on the increase. It also transpired that most of the functions that are being used by nurses are general functions such as recording demographic patient data, roster planning, etc. Finally we asked the hospitals to send us information about their own projects. Some 20 projects where submitted, 10 of which were regarded as being significant. The best application was rewarded with a prize.

Key Words. Electronic patient record, nursing information systems, nursing records.

1. Introduction

In 2000 the Dutch Association of Hospitals decided upon an ICT strategy document [1]. This document included the necessity to take further action in the area of nursing, and it proposed the idea of a Whizz-kid approach in order to enhance progress. To this end a project entitled OVERZORG was started. This project aims to determine the status of ICT in nursing in hospital care and to progress from that point with the aid of innovative projects. The project was started and carried out by the VIZI Foundation (Virtual Integration of Care Information), a foundation established in 2000 and positioned to bundle the efforts of the Dutch Association of Hospitals, the Order of Medical Specialists and the Association of General Practitioners.

In 2001 NICTIZ (National ICT Institute for Healthcare) was founded. This institute strives toward supporting the electronic patient record by coordinating standardization efforts and developing a knowledge bank. It is positioned to serve the entire healthcare-sector in the Netherlands. It took over the OVERZORG project. The first phase of the project lasted from November 2001 till April 2002. The results [2] were presented during a conference in April 2002.

The project as a whole was intended to foster the use of ICT in nursing care with the aim to support nursing care, as a part of the whole care process, and to achieve measurable improvements in care. The first phase was intended to deliver a status report on ICT in nursing care and to make recommendations on how to proceed with subsequent phases.

The study started with a literature search. Data on the status of systems was collected by way of 2 questionnaires. The study was done in cooperation with the LCVV and the AVVV, as the two organizations which represent the Dutch nursing profession. The study was supervised by a group under the chairmanship of Prof. Dr. Vanachterberg.

2. Nursing: an information processing profession

A lot of information processing is being done by nurses. It is estimated that about 30% to 50% of their effort is spent on "coordination", mainly involving all kind of communication and administration. In the Netherlands, as in most countries, there is a statutory obligation to keep proper records of the patient's situation and the care delivered to him. In the Netherlands the so-called "CBO Consensus text" (from the Dutch Institute for Healthcare Improvement) [3] and the professional profile of nurses [4] give a more detailed definition of what is to be recorded. The items presented are strongly based on the nursing process. They include a problem list, a nursing diagnosis, goal statement, planning of interventions, executing the care, and evaluation. Several classifications and nomenclature systems such as NANDA, Gordon, ICF, etc. exist to support registration. But, has all of this led to successful and supportive nursing records in the Netherlands?

Duijnhouwer et al [5] conclude that the nursing process is very incompletely implemented. Nursing care plans where implemented in only 50% of the hospitals surveyed. Research in the area of care for psychiatric patients [6] showed that care plans were not followed as a rule, while most nurses thought they where acting according to the plan. Furthermore it was found that following the care plan led to a diminishing quality of care. Following the nursing process is widely accepted. However it is also widely criticized because of its rigidity, its rationalizing impact, and the labor cost of registration. For these and other reasons we have concluded that there is a lack of evidence supporting the idea that the nursing process and extensive nursing registration enhance the effect of nursing care. Nevertheless, some form of standardized nursing records are being used in many hospitals, usually including some sort of nursing diagnosis and interventions. Keeping a good nursing record is essential, and required by law, but we have obviously not yet discovered what demands really give results and under what conditions.

In many hospitals protocols are set down on paper. In the present decade we increasingly see paper being replaced by Intranet in many hospitals. More recent clinical pathways have attracted attention [7]. Holtzman et al [8] report a significant reduction in length of stay and the number of complications. These and other studies lead us to the conclusion that clinical pathways lead to a better organization of care, and guide us towards a more dedicated method of registration. The clinical pathway includes what needs to be recorded during each phase of the care process, and which data are critical in judging the status, prognosis and advisable interventions. This may lead us away from the burden of large quantities of paperwork and help us to record less, but more essential, data. It is obvious that this only can be achieved with the aid of ICT! We believe that these

findings may lead to a new impulse in achieving better results in the efforts to improve nursing care with the aid of ICT. It is relevant to note here that in August of 2002 the CBO, OMS, LCVV/AVVV and the Clinical Pathways Network signed an agreement to develop and implement clinical pathways for some major patient population groups in the Netherlands.

3. Systems for nursing practice in the Netherlands

What systems are available to support the nursing profession in hospitals in the Netherlands and which aspects of nursing care do they support?

With the support of the OIZ (Organization of vendors of Information systems in Healthcare) we sought answers to this question by submitting a questionnaire to about 80 vendors. From this list many vendors appeared not to be active in this area. About 30 vendors, including all the market leaders, responded to this questionnaire. Table 1 gives an overview of vendors and their products.

Vendor	Product
2 Cure Medical Information Services	2Cure EPR
Ascom Nira B.V.	TeleCAREvision (multi-media bedside terminal)
B+P Computer systems	Hardware supplier
Chipsoft B.V.	CS-electronic Care Information system
CN Partners Automatisering BV	Specifac (office automation for the medical specialist), Specitekst (for correspondence), Hospiview (diary, planning)
Datex-Ohmeda B.V.	Deio Anaesthesia, Deio Critical Care (EPR for operating theatre and IC)
De Heer & Co. Software	Intellact, IKS, Plancare
Dräger Nederland B.V.	Recall AIMS (Anaesthesia), Scora (operating theatre planning),
GE Medical Systems	Centricity (EPR), Muse, Cardas (Cardiology)
Getronics Healthcare	VISY (nursing plan module), SAP-ISH*MED (EPR)
Gino B.V.	GINO-RIO (indicator organs), GINO-V&V (intra- and semi-mural nursing and care), GINO-ZOS (care support for the blind and partially sighed)
HISCOM B.V.	Mirador (EPR), VISY (nursing plan module)
INAD B.V.	Medical Office: Trauma, ICIS, Obstetrics, Pre Op, Pre Op Screening (all EPR for various departments)
Information Builders	WebFOCUS, Iway ETL Manager
Innovit	Synaps (EPR for mental healthcare), e-Medsolution (EPR and other functionalities for general hospitals)
LifeLine Networks B.V.	e-health solutions (Web-shell EPR and network applications)
marviQ	Careview (EPR web-enabled and ASP)
McKesson Nederland	X/Care as a total Care Information System, or as a partial solution, Horizon (web portals for various target groups)
Medictcare (in the process of being established)	MEP, Statistics, Score lists (all components of EPR)
MI Consultancy bv	Norma (EPR), NormaWeb, Norma Wireless
Microbais Automatisering B.V.	HetHis, Aposys, WebRecept, VisCom (for general practitioners)
Nedercare	Care4 (EPR for residential care, mental healthcare)
Philips Ned.BV Medical Systems	Carevue (Intensive care), Orion visual integration
SAP Nederland	IS-H*Med (EPR)
Siemens Nederland N.V.	Soarian (web-enabled EPR with extensive functionality)
Triple P Healthcare	TRACE (no longer active in this market)
VIR E-Care Solutions B.V.	Ecares (EPR for rehabilitation and general hospitals)
ZorgDomein Nederland B.V.	Application to acquire information for a GP in connection with referral
Zorgplus Information Systems BV	GIZ- Elderly care, GIZ-Disabled care, GIZ-Asthma centre, Regional waiting list application

All vendors claim to support nursing care. Six vendors claim to fully support the nursing process. Further exploration of the answers, however, indicates that suppliers often do not differentiate between their plans and their available products.

Moreover, from the description of their products we noted that quite a few products are incomparable. Some support PDAs, others support general patient functions, while others focus on rehabilitation or long stay care, but very few have dedicated nursing functions. Most widespread are general EPRs giving flexible access to patient (looking glass EPRs). Quite a few vendors have been starting to develop extra functionalities such as adding specific professional datasets and special on-screen forms. These functions are powerful in expanding the use of the EPR in different situations but adapted to specific demands. They may, however, easily result in uncontrollable, too weakly structured and unreliable data.

We asked the vendors what their policy will be for the next two years and what new features they will bring to market in the next two years. Almost all state they will invest further in the EPR. Many state that integration will be a major topic. Web-enabling the system is also often stated. Transmural integration and mobile technology are mentioned much less often.

Apart from the questionnaire we held several interviews. They indicated wide support for flexible internet-based technology, and for HL7 as the leading integration protocol.

The coming years promise to show a boost in the use of EPRs. The great flexibility is, on the one hand, a promising and necessary tool for successful implementation. On the other hand, however, it may involve high risks because of the complexity of data integrity.

4. Activities in Dutch hospitals on nursing information systems

With some help from the Dutch Association of Hospitals we sent a questionnaire to many Dutch hospitals and a few other institutions. Only about 35% of the hospitals approached actually responded, so the results should not be assumed to be truly representative.

Thirteen of the 22 hospitals responding to the question "how many departments are using an EPR" said they have an EPR system operational in more than 60% of their wards. In about 50% of the respondent hospitals, nurses hardly ever use the EPR (once a week or less). In the other hospitals there is some form of regular use. These figures are higher than we expected and must be expected to be partly due to selective response. As the figures for doctors were also higher then measured 2 years ago, and in accordance with expectations, there will probably have indeed been a strong increase in computer use by nurses.

It became clear that general patient functions, roster planning, workload intensity appraisal, protocols and office automation (including internet), were by far the most used functions. Dedicated nursing functions like documenting the nursing case history,

diagnosis, etc., rated very much lower (in the order of 3 hospitals out of 20 responses). The use of standardized terminologies such as NANDA, NOC, etc., rated even lower.

One of the most interesting aspects of the results concerned own activities within the hospital. We asked the hospitals to mention their internal projects. Some 40 activities were reported. Some of them were in the planning phase or involved the implementation of existing products. About 20 projects did have relevant innovative aspects. Eleven of these were selected to give a presentation during the final open conference, which was visited by over 300 participants. The presentations, for which the original Dutch titles have been retained, were on the following subjects:

1. *Decubitus registratie en ordercommunicatie; Academisch Ziekenhuis Rotterdam.*
2. *Theriak: Medicatie aanvraag en toedieningsregistratie aan het bed; Ziekenhuisapotheek Midden-Brabant.*
3. *Klinische paden als Bouwsteen binnen het EPD.; Albert Schweitzer Ziekenhuis Dordrecht.*
4. *Klinische paden op papier; Ziekenhuisgroep Twente locatie Twenteborg Ziekenhuis Almelo.*
5. *Met minimaal schrijfwerk naar maximale informatie; Medisch Spectrum Twente.*
6. *Actueel functioneren snel in beeld: Onderzoek ICF. Academisch Medisch Centrum, Amsterdam.*
7. *VISY met een draadloos netwerk en draagbare werkstations. VU Academisch Ziekenhuis Amsterdam*
8. *Kwaliteitsbeleid, functiedifferentiatie en het verpleegkundig dossier leiden tot een optimaal EPD.; Spaarne ziekenhuis Haarlem*
9. *Geautomatiseerde verpleegplannen in gebruik voor psychologische patiënten in het UMC. UMC Utrecht.*
10. *Verlengde arm bij chronisch hartfalen versterkt met ICT. Martini Ziekenhuis, Groningen.*
11. *Effect van implementatie van een ICIS op verpleegkundig handelen . OLVG Amsterdam*

5. The future

Several studies (NVZ ICT strategy 2000 [1]; NVZ, het ziekenhuis van de toekomst, 2002) expect major changes in the way we will provide care in the years to come. Many changes will also occur for nurses. They are expected to take over more routine tasks from the medical specialists, possibly guided by knowledge systems. Nurses will take on more responsibilities in the area of counselling chronic patients, while resource management and other systems will strongly affect coordination tasks, etc. All of these issues require the preparation of nurses and the involvement of professional organizations.

The foregoing has led to the following conclusions and suggestions:

1. **Start innovative projects**: Some interesting experiments have shown the impact ICT can have on Care. Generally speaking not too many insight has been gained in the way ICT can help Nursing Care. Expanding successes en experiments may well be the best way to proceed. Having an excellent project manager from within the organization might at this time well be the most critical success-factor.
2. **Create possibilities to undertake investments that include risks**. In the Netherlands there is no stimulus to invest in ICT. Failures must be paid for by the

hospitals themselves. Reimbursement bureaucracy prevents adapting new ways of doing things. Creating a situation in which innovation does pay off is crucial.

3. **Stimulate knowledge distribution**: During the project it became clear that most people hardly know about other projects and experiments, and little experiences are effectively shared. Distributing en actively sharing knowledge is therefore necessary.
4. **Promote Standards**: it is obvious that standards, classifications and data structures are essential in order to develop unambiguous and communicable systems. NICTIZ should intensify its activities in developing and especially implementing results in this area.
5. **Start Technology Assessment**: institutions will only invest in ICT applications on a significant scale if there is sufficient reason to believe that an application will have the result it is intended to obtain. It is essential that TA (Technology Assessment) be seen on the one hand as an instrument to give some formal indication of the usefulness of an application and on the other hand as an instrument to guide developments towards effective usefulness. NICTIZ and other parties should take up TA activities.
6. **Intensify and focus education**: although it became clear that an extensive knowledge of ICT is not a crucial success factor for ICT projects in Nursing, some basic knowledge is obviously necessary. Educational and professional organizations must take up activities in this area and focus on the area where professional activities and ICT meet.
7. **Formalise the basic structure of the EPR**: some insights regarding the structure of the EPR have come quite far (e.g. RIM, EHRCA, Gehr). There is also widespread agreement and experience within the nursing profession about the necessity of registering a number of items like a nursing diagnosis, and hard data like temp lists. In those areas where sufficient conformity has already been achieved it is now worthwhile and feasible to create a basic structure for the nursing part of the EPR, and to support this with score lists, classifications, and so on. Activities in this area must be taken up. NICTIZ and professional organizations should take the lead.

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