



Evaluating the Content of the Electronic Patient Records

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ABSTRACT

The delivery of good care and the ability to communicate effectively about patient care depends on the quality of the information available to all professions and between sectors. In addition the data in electronic patient records are used e.g. in clinical research, health system management, health services planning and government reporting. The quality of documentation of the electronic patient records is therefore of great importance. This paper presents the main points of a literature review focusing on evaluating the content of electronic patient records. The literature search was conducted in electronic databases Pubmed Medline and Cinalh. The literature indicates a lack of evaluating studies about the data elements and the structure of an electronic patient record. The documentation of patient care includes both narrative text and codes. The quality of the documentation is not always complete.

INTRODUCTION

The electronic patient record is one of the main research topics within health informatics in previous studies [1]. A special research need is the content and coding of the electronic patient records. In the future, patient-centered recording and the use of medical data for shared patient care, process-integrated decision support and reusing patient data for research and health care reporting must be taken into account in the development of the electronic patient records [1,2]. The data could also be utilized in policy development, health service management and billing [3]. The structured and coded data elements of the electronic patient records will enable the development of reminders and alerts in electronic patient record as well as links to bodies of medical knowledge. Despite the fact that the benefits of the electronic patient records have been recognized, the electronic patient records have not been diffused widely [3].

Health services have been arranged in different ways in different countries. In Finland the basis of health care provision is the constitutional right of the public to adequate social welfare and health care services. The local authorities arrange primary care in health centers and specialized treatment services in hospitals. The private sector is complementary to public services. Health service arrangements also have an influence on the developing of health information systems.

In most of the countries also the legislation must also be taken into account when developing the health information systems. In Finland, e.g., the legislation gives some recommendations on the items which must be included in patient records and organization-centric models must be incorporated in the records. [4]. The unified national manual patient record has been widely used for more than 30 years in Finland [5]. The

electronic patient records have been available for several years mostly in primary care, but paper-based patient record is still used in hospitals [6]. Most of the present-day electronic patient record applications are based on the idea of a paper-based record simply changed into electronic form. Due to that the possibilities of information and communication technology (ICT) are not fully used. These electronic patient records are poorly structured, even if the core elements of the electronic patient record have been determined [7]. They are also passive and inflexible, and do not adequately support continuity of care, quality assessment, education, health care management or statistics automatically. Furthermore, the development of the electronic patient record has occurred under the control of commercial software producers and has aimed only to immediate practical solutions [6].

In many countries, for example in Australia and England [8,9] and also in Finland, on-going projects are under way which aim to develop the national health care infrastructure with an electronic patient record at its core. The aim of the different projects will also be to define the core data elements, e.g. medication, nursing care plan, result of examinations, discharge summary *etc.* of the electronic patient records. An evaluation of the projects will also be made. Earlier the studies focusing on defining the content of electronic patient records were done using a Delphi method [10, 11] Steenkiste *et al.* (2002) have determined the content of the electronic patient record for asthma, and Goossen *et al.* (1997) have achieved a consensus about the data elements which should be included in nursing information reference model in the electronic patient record.

The objective of this literature review was to find articles focusing on the evaluation of the content of the electronic patient records.

METHODOLOGY

An automated literature search was conducted using PubMed (Medline) and Cumulative Index of Nursing and Allied Health Literature (Cinalh) databases. The Medline database was searched using the MeSH terms. The Cinalh database was searched using keywords and the keywords mapped automatically to the subheadings, which are the controlled indexing language of the database. The terms were generated by performing a search, adding terms that founded in citations, then repeating the search. The selected terms which are used in both databases were: evaluation and computerized patient record associated with documentation or classification or nomenclature or coding or vocabulary, controlled or nursing classification or medical informatics or

nursing informatics or keywords quality of data. The search was limited only to items with abstracts and articles in English.

Firstly the abstracts of the papers were reviewed to exclude articles that did not satisfy the criteria 1) the context of the electronic patient record and 2) assessment of the quality of data. Secondly the analysis of themes and trends in articles was performed.

RESULTS

Most of the articles were research papers and were published in journals. Thiru *et.al.* (2003) have reviewed the literature and revealed that the structured data, which are codes, classifications and nomenclatures, were the most commonly investigated elements in previous studies. Most of the studies were descriptive surveys. The lack of standardized methods for the assessment of the quality of data is noticed. [12]

Many terms are used to describe the non-paper patient records: electronic patient record [13,14,15,16,17,18], computerized patient record (CPR)[19], electronic medical record [20], computer-based patient record [21], computerized medical record [22]. The purpose of this review is not to define what an electronic patient record is but the presumption is that the electronic patient record is a multidisciplinary tool which also includes *e.g.*, nursing care plans and was used by all the professionals who participate in patient care.

The articles concern on electronic patient records which were used in primary health care [13,14,15,16,22] or in hospitals [17,18,19,20,21,23,24,25,26,29]. There are also studies focusing on nursing documentation [25,27,28] or Nursing Information System [28] or medical discharge summaries [24]. The different users' documentation was analyzed. The professionals were physicians [13,16,21,24,26] or nurses [26,27,28,29], but also in one study parents of children using electronic patient record. [20]

Content of the electronic patient record

The content of the electronic patient records was investigated focusing on different health events: health problems [16], medical history [20], medical discharge summary [24], causes of injury [23], medication [21,30], allergies [21], treatment plan [21], nursing care plan [29] and fluid balance chart [26]. The purposes of analyzing documentation were the accuracy of documentation [14,15], the completeness of documentation [13, 21], the amount of narrative text [16], the amount of information included in the electronic patient record [13] or whether or not the available data could be used to drive a complex guideline [19], quality of nursing documentation [29], parents' direct reporting of past medical history data [20] or efficiency and appropriateness of fluid balance charting [26]. There are studies focusing on developing a method to validate clinical databases [14] and studies whose aim was to develop or evaluate the methods focusing on information retrieval from the electronic patient records [17,18,30].

Classifications

There are studies focusing on evaluating of different classifications or the use of classification to develop the nursing databases. The different classifications were the International Classification for Nursing Practice (ICNP) Beta [31, 32], Nursing-Sensitive Outcomes Classification (NOC) [33], Read Codes [22], nursing diagnoses of The Intensive Care Nursing Scoring System (ICNSS) [25] and diagnostic codes [16].

The focus on the study of ICNP classification was the applicability of its axial structure and utility in clinical practice [31] and the development of a clinical nursing database [32]. Other studies [30,34,35] also exist focus on the development of the nursing databases by developing and evaluating the different classifications.

The differences of nursing documentation according to the nursing process was also evaluated, *e.g.* the completeness of nurse assessments of patient, outcomes, achievement of patient outcomes and nursing interventions [28].

CONCLUSIONS

The limitation of this review was that the search was conducted only in two databases. In the future, other searches in other databases and conference proceedings are necessary.

There is a lack of evaluation studies focusing on the content of electronic patient records. The electronic patient records include narrative and coded elements. When the codes were used, the correctness of the codes was high but incomplete. The studies indicated completeness of documentation and, on the other hand, incompleteness of the documentation. The use of nursing classifications has proved useful in developing the nursing databases.

REFERENCES

1. Brender J., Nøhr C. & McNair P. Research needs and priorities in health informatics. *International Journal of Medical Informatics* 2000. (58-59), 257-289.
2. Haux R., Ammenwerth E., Herzog W. & Knaup P. Health care in the information society. A prognosis for the year 2013. *International Journal of Medical Informatics* 2002 (66), 3-21.
3. van Ginneken A. M. The computerized patient record: balancing effort and benefit. *International Journal of Medical Informatics* 2002. (65), 97-119.
4. Ministry of Social Affairs and Health 2001. Decree of the Ministry of Social Affairs and Health on arrangement and storage of patient documents. <http://www.finlex.fi/pdf/sk/01/vihko012.pdf> 3.10.2003 [In Finnish]
5. The Association of Hospitals. Health care record and patient record in special health care. 1991. Helsinki:Printel Oy. [In Finnish]
6. Hartikainen K., Kuusisto-Niemi S. & Lehtonen E. Survey of Social and Health Care Information Systems 2001. Publications of the Network of Excellence Centers 1/2002. <http://www.oskenet.fi/asp/empty.asp?P=161&PS=root> 3.10.2003 [In Finnish]
7. Hartikainen K., Kokkola A. & Larjomaa, R. 2000. The Content Definitions for the Electronic Patient Record. Publications of the Network of Excellence Centers 4/2000.
8. <http://www.oskenet.fi/asp/empty.asp?P=161&PS=root> 3.10.2003 [In Finnish]
9. HealthConnect. <http://www.health.gov.au/healthconnect/publications/publications.html> 10.1.2004
10. ERDIP. <http://www.nhsia.nhs.uk/erdip/pages/evaluation/?om=m1> 10.1.2004
11. van Steenkiste B.C., Jacobs J.E., Verheijen N.M., Levelink J.H. & Bottema, B.J.A.M. A Delphi technique as a method for selecting the content of an electronic patient record for asthma. *International Journal of Medical Informatics* 2002 (65), 7-16.
12. Goossen W.T.F., Epping P.J.M.M., Dassen T.D. Criteria for Nursing Information Systems as a Component of the Electronic Patient Record. An International Delphi Study. *Computers in Nursing* 1997 Vol 15, No 6, 307-315.
13. Thiru K, Hassey A. & Sullivan F. Systematic review of scope and quality of electronic patient record data in primary care. *BMJ* 2003 Volume 326:1070
14. Hippisley-Cox J., Pringle M., Cater R., Wynn A., Hammersley V., Coupland C., Hapgood R., Horsfield P., Teasdale S., Johnson C. The electronic patient record in primary care - regression or progression? A cross sectional study. *BMJ* 2003 Volume 326: 1439-1443.
15. Hassey A., Gerret D., Wilson A. A survey of validity and utility of electronic patient records in a general practice. *BMJ* 2001 Volume 322: 1401-1405.
16. Thiru K., de Lusigan S., Hague N. Have the completeness and accuracy of computer medical records in general practice improved in the last five years? The report of a two-practice pilot study. *Health Informatics Journal* 1999 5 (4):224-32.
17. Nilsson G., Åhlfeldt H. & Streuder L-E. Textual content, health problems and diagnostic codes in electronic patient records in general practice. *Scand J Prim Health Care* 2003 21:33-36.
18. Tange HJ, Schouten HC, Kester AD, Hasman A. The granularity of medical narratives and its effect on the speed and completeness

of information retrieval. *Journal of the American Medical Informatics Association* : JAMIA 1998 Nov-Dec;5(6):571-582.

19. Mikkelsen G, Aasly J. Manual semantic tagging to improve access to information in narrative electronic medical records. *International Journal of Medical Informatics* 2002 Apr;65(1):17-29.

20. Aronsky D, Haug PJ. Assessing the quality of clinical data in a computer-based record for calculating the pneumonia severity index. *J Am Med Inform Assoc.* 2000 Jan-Feb; 7(1): 55-65.

21. Porter SC, Mandl KD. Data quality and the electronic medical record: a role for direct parental data entry. *Proceedings / AMIA ... Annual Symposium. AMIA Symposium 1999:354-358.*

22. Tang PC, LaRosa MP, Gorden SM. Use of Computer-based Records, Completeness of Documentation, and Appropriateness of Documented Clinical Decisions. *Journal of the American Medical Informatics Association* : JAMIA 1999;6:245-251.

23. Gray J., Orr D., Majeed A.. Use of Read codes in diabetes management in a south London primary care group: implications for establishing disease registers. *BMJ* 2003 Vol 326.

24. Jones SJ, Lyons RA. Routine narrative analysis as a screening tool to improve data quality. *Inj Prev.* 2003 Jun; 9(2): 184-6.

25. Murff HJ, Forster AJ, Peterson JF, Fiskio JM, Heiman HL, Bates DW. Electronically screening discharge summaries for adverse medical events. *Journal of the American Medical Informatics Association* : JAMIA 2003 Jul-Aug;10(4):339-350.

26. Pyykko AK, Laurila J, Ala-Kokko TI, Hentinen M, Janhonen SA. Intensive care nursing scoring system. Part 1: Classification of nursing diagnoses. *Intensive & critical care nursing : the official journal of the British Association of Critical Care Nurses* 2000 Dec;16(6):345-356.

27. Chung LH, Chong S, French P. The efficiency of fluid balance charting: an evidence-based management project. *Journal of nursing management* 2002 Mar;10(2):103-113.

28. Nordstrom G, Gardulf A. Nursing documentation in patient records. *Scandinavian Journal of Caring Sciences* 1996;10(1):27-33.

29. Larrabee, June H. PhD, RN. Boldreghini, Sandra MSN, RN, CS. Elder-Sorrells, Karla MSN, RN. Turner, Zettie M. MSN, RN. Wender, Regina G. BSN, RN. Hart, Jacquelyn M. BSN, RN. Lenzi, Pamela S. RN. Evaluation of Documentation Before and After Implementation of a Nursing Information System in an Acute Care Hospital. *Computers in Nursing* 2001;19(2):56-65.

30. Ammenwerth E, Eichstadter R, Haux R, Pohl U, Rebel S, Ziegler S. A randomized evaluation of a computer-based nursing documentation system. *Methods of information in medicine* 2001 May;40(2):61-68.

31. Courtney R, Rice CA. Using an encounter form to develop a clinical database for documenting nurse practitioner primary care. *Journal of the American Academy of Nurse Practitioners* 1995 Nov;7(11):537-544.

32. Ruland CM. Evaluating the Beta version of the International Classification for Nursing Practice for domain completeness, applicability of its axial structure and utility in clinical practice: a Norwegian project. *International nursing review* 2001 Mar;48(1):9-16.

33. Jorgensen HD, Nielsen TM. TELENURSE—nursing classifications, quality indicators and the electronic nursing record. *Studies in health technology and informatics* 1997;43 Pt A:133-137

34. Timm JA, Behrenbeck JG. Implementing the Nursing Outcomes Classification in a clinical information system in a tertiary care setting. *Journal of nursing care quality* 1998 Jun;12(5):64-72.

35. McDaniel A. Developing and Testing a Prototype Patient Care Database. *Computers in Nursing* 1997. 15(3):129-136.

36. Maas ML, Johnson M, Moorhead S. Classifying nursing-sensitive patient outcomes. *Image—the journal of nursing scholarship* 1996 Winter;28(4):295-301.

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