MEDINFO 98
B. Cesnik et al. (Eds)
Amsterdam: IOS Press

Transporting an Electronic Patient Record System Across International Boundaries-The Lessons Learnt.

Dr Terry J Hannan FRACP

Health Informatics Society of Australia

Abstract

This paper will outline the tasks involved, completed and not achieved over an eight year period involving the implementation of the Johns Hopkins Oncology Center Information System (OCIS) in an oncology department of a secondary / tertiary care hospital in Australia.

Keywords

Implementation; EMR; evaluation; Australia

Introduction

In 1982 and in 1997 there are no specific projects based on EMR guidelines undergoing implementation nor are there any in-established uses in the Australian healthcare environment. It was into this environment that the Johns Hopkins Oncology Center Information System (OCIS) was introduced with the intention of assessing the possibility for automation of patient medical records. [1]

The introduction of clinical staff to the OCIS software following an initial 18-month software evaluation by non-clinical staff led to an administrative decision to proceed with the implementation of the OCIS model in an oncology inpatient-outpatient department in the hospital.

Over the next 9 years the project had become a fundamental component of patient care within the oncology department and access was possible on any of the terminals within the two hospital complex where the two hospitals were situated some 10Km apart. The failure of the system to progress beyond its development in 1991 was based on administrative decisions relating to its profitability and the failure to understand that clinicians including nurses, pharmacists and physicians found it an indispensable tool for patient care. [2]

Background

The introduction of the OCIS software model into the hospital's clinical environment was influenced significantly by the following and other factors.

1. A dual administrative system governed the project development. One controlled the costs and development and the other; the hospital, controlled the access to the patients and its separate hospital information system.
2. A development team that was small, inexperienced and included full-time and part time members and these persons initially had poor concepts of healthcare computing. The Information Systems Manager had worked on the DIOGENE project in Geneva. [3]
3. Two hospitals set widely apart comprising modern hospital complexes and World War I and II army style huts as wards.
4. There were no clear funding guidelines for the planned phases of development and this was directly related to the issues relating to the systems administration and the ownership of the system was by a non-profit, publicly funded organization.
5. The minimal availability of the Hopkins team to provide on site or direct software support.
6. An oncology environment that was significantly different in size and function from the Johns Hopkins Oncology Center.

Implementation and Functions

The progress of the systems implementation has been documented elsewhere and this paper will focus on the conceptual factors affecting this path.

During the initial evaluation of the software when it became apparent that the OCIS system was patient-centered computing it was difficult to choose which component to introduce into the clinical environment. It was obvious that the whole system could not be implemented in total from the beginning so a choice had to be made as to which module(s) to select. At this stage the intended users had not been informed that the project was about to be undertaken.

An evaluation visit to the JHOC by the author and the Data Manager in 1985 facilitated the decisions to take the path finally chosen and which led to the successful implementation of the modules selected.

One of the most obvious benefits the author could see from the OCIS system was its ability to communicate precise, timely, reliable clinical information.

With this knowledge and the availability of the powerful software tool TEDIUM [4] the system was modified to produce a variety of clinical information modules, both new and modified from the original, that facilitated user acceptance and patient care.

The initial module implemented was the summary patient history called the Abstract. This provided a summary patient history in a modular format using a core model based on the original design with modifications for printing and viewing depending on the clinical environment, whether inpatient, outpatient, discharge summary or research.

Acceptance of the Abstract was facilitated by initially placing the printed format on the front of the current manual record. Over time the printed Abstract became the preferred record format especially when laboratory data became available on-line in a range of user-defined formats such as flow charts.

User involvement was encouraged from the start and 'eat-in' lunchtime meetings and these led to further changes in existing programs and the addition of new functions. Positive input from those using the system occurred despite most of the data being manually entered by project team data entry personnel. The small patient population meant that in the initial phases the Abstract and other information was available within 24 hours of seeing the patient. Physicians were cooperative by completing templates of patient visit information yet chose not to provide direct data entry.

Within 2 years (1987) nursing staff who were considered 'computer illiterate' had chosen to provide direct data entry and they requested system modifications which led to changes in the displays of tabulated chemotherapy and protocol data. These displays provided the staff with a more accurate, readable and reliable 'history' of the patients' clinical course. This information was difficult to find or simply unable to be found in the manual record.

The automated, direct transfer of hematology and clinical chemistry information from the laboratories occurred and this dramatically increased the use of the system. User access to the laboratory data was monitored electronically.

The clinical trial module was a new function requested by the users. It provided on line access to the trial protocol, selection criteria, and end points. The availability of this trial information significantly reduced the problems associated with medical officer changes during appointment rotations. On line searches of the trial data could be saved and run sequentially without the user having to redefine the search.

In the period 1991-3 the system became a functional reliable tool in providing clinical information 24 hours a day and was now being used in areas outside the patient encounter clinical environment. (List 1.) The addition of these new applications necessitated the introduction of a prototype SQL module.

1. Audits on admissions
2. Review of follow-up encounters
3. Central cancer registry data
4. Diagnostic Related Groups (DRGs) statistics
5. Clinical Trials data and management

List 1. List of ancillary care functions supported by clinical applications.

At the end of 1993 the system stored records on more than 5,200 patients. There were over 3,320 abstracts as well as laboratory data, protocol information, medication histories, cumulative drug records and clinical trial data. It was used by a variety of health care personnel, including physicians, nurses, clerical staff, palliative care staff, social workers, pharmacists, medical record managers and data managers. The information within the system was available 24 hours a day through 400+ terminals within the two hospitals and remote modem access was provided for authorized users. Evaluations for use in the renal transplant dialysis units, pediatric oncology and radiation oncology were well advanced.

No formal evaluations were carried out and the non-clinical administrators only considered the direct development costs (around A$2million) when determining the future of the project. When purchased by the hospital for use in the wards one condition of the sale was that no further software development be carried out beyond what had been implemented irrespective of the demands of the users for more functions.

Discussion

Although the project remained fixed in its development at the end of 1993 many lessons were learnt during the implementation and some of the more important of these are listed below.

1. Implementation needs to be incremental. [5,6]
2. New and effective EMR systems significantly alter the behavior of end users and their responses are critical to the ultimate success of any project
3. It is preferable to start with a system that has sound design, has been evaluated in its development, and has a flexible development environment. [1]
4. It takes nearly a decade to implement and effective system starting with an established model. Building from scratch will be more costly and take longer.
5. Involvement of users of the system in determining the path of development is critical.
6. The team must have a leader or leaders who are clinically orientated, understand the domain, be available when users and development personnel need support and to make the tough decisions when the project appears to stagnate.
7. The benefits of summarization in communicating patient care information were confirmed through the daily use of the Abstract. [7]

8. The project must be evaluated at all times thereby justifying the expenses allocated and confirming EMR benefits. [8]

Conclusions

This project confirms that the successful introduction of patient-centered computing requires, time, patience, the incorporation of end-users in the project, and a close interaction between development staff and clinicians. Absolute costs in the absence of evaluation of benefits, and the absence of administrators who have a conceptual understanding of the patient-care process is likely to see the system fail to achieve its goals.

References

[1] Enterline JP, Lenhard REJr, Blum BI. A ClinicalInformation System for Oncology. New York: Springer-Verlag, New York, 1989.

[2] Hannan TJ. International Transfer of the Johns Hopkins Oncology Center Clinical Information System. MD Comput 1994; 11:92-100.

[3] Scherrer J-R. An Integrated Hospital Information System in Geneva. MD Comput 1990; 7(2): 81-9.

[4] Blum BI. TEDIUM and the Software Process. MIT Press, Boston, MA 1990.

[5] Stead WW. The evolution of the IAIMS: Lessons for the next decade. JAMIA 1997; 4:S4-S9.

[6] Hripcsak G. IAIMS Architecture. JAMIA 1997; 4(March-April): S20-S30.

[7] Fries J. Alternatives in Medical Record Formats. Med. Care 1984; 12(10): 871-81.

[8] Tierney WM, Overhage J, McDonald CJ. Demonstrating the effects of an IAIMS on health care quality and cost. JAMIA 1997; 4:S41-S46.

Address for correspondence

FRACP, Suite 8
Level 3, St.
George Private Hospital,
Medical Complex, 1 South Street
KOGARAH 2217 NSW Australia.