

Strategies for Problem List Implementation in a Complex Clinical Enterprise

James R. Campbell MD
University of Nebraska Medical Center
Omaha, NE

Abstract

Although the Institute of Medicine states that a patient problem list should have a prominent place in the computer-based patient record, the design and function of the problem list is not a matter of universal agreement. Developer experience with implementation has been inconsistent, in part because of confusion on data standards, uncertain user acceptance of data entry, and minimal rewards for the clinician. I propose that necessary features of the problem list include:

1) clinical focus, 2) codification of problems, 3) support for problem resolution, 4) historicity of problems, 5) support for multiple clinical views, 6) integration of maintenance functions with workflow, 7) support for administrative reporting, and 8) integration with useful clinical tools. I describe the strategies that we employed to meet these goals while implementing the problem list in a computerized patient record serving a large, complex clinical enterprise. I further report the successful achievement of those goals based upon audits six months after implementation.

Introduction

A patient problem list (PL) is proposed by the Institute of Medicine as a prominent component of the computer-based patient record (CPR).^{1,2} This is based in part upon observations that the PL helps to reduce errors, remind the clinician of issues often forgotten,³ and improve communication between providers.⁴ Nonetheless, a highly publicized effort to implement a problem oriented medical record (POMR) in a computerized clinical information system at the University of Vermont ended in failure. More recent efforts with the PL have continued to grapple with two issues that often conflict: the need to encourage clinician data entry and the benefits of structured (codified) problem data. This conflict has frequently resulted in PL implementations employing textual entry.^{5,6} This conflict is intensified because coding standards are not a matter of universal agreement and probably require additional development.⁷⁻⁹

In October 1997 the University of Nebraska Medical Center (UNMC) culminated two years of joint work with IDX (formerly PHAMIS) by implementing a comprehensive coded PL across the entire clinical enterprise, including inpatient wards and outpatient clinics. This implementation employs clinical coding standards of SNOMED International¹⁰ and administrative coding of ICD-9-CM.

Procedures

The PL is not new to all of UNMC. Since 1985, the department of Internal Medicine has maintained a highly successful implementation of COSTAR® modified for the problem oriented record¹¹. This implementation served as a prototype and proof-of-concept for the contract negotiations with IDX. Three years before anticipated implementation of the IDX software, work began for conversion of COSTAR problem data and development of a comprehensive clinical lexicon that would serve the entire enterprise.

Multi-disciplinary implementation teams, spear-headed by physicians and nurses, were formed eighteen months prior to go-live in order to identify operational strategies and propose medical record policy. These teams formed an alliance with hospital work flow redesign efforts and included representatives of all clinical and administrative users of the PL. Systematic discussions and focus groups attempted to identify barriers to success, enumerate payoffs and rewards, and develop proposals for a successful operational plan. Table 1 summarizes the major elements of these discussions, outlining the major barriers and projected pay-offs.

From these planning sessions, a comprehensive literature review, our design experience with COSTAR, and from collaboration with IDX, we formulated a set of program and implementation specifications that guided our subsequent efforts. These attributes of the PL - programmatic, organizational and administrative - are summarized as follows:

Attributes of the problem list

A) Information attributes

Clinical focus - the PL is the centerpiece of the patient record and not primarily a billing document. Although it may provide billing and administrative utility, the design and purpose is to serve patient care. It is not built upon billing coding schemes nor restricted by administrative mandate. It is patient centered. This issue of focus is often at odds with enterprise goals and assumptions of some PL users.

Codification - all concepts chosen as problems must be codified employing CPR standards. The codification must support all detail demanded by the clinician community in a real-time manner. The language must be familiar and comfortable for the clinician.

Resolution - assessment of problems changes over time. The system must support structured problem statuses which allow for problem resolution that is non-destructive and suitable for audit.

Historicity - each problem may be updated as the understanding of the clinician and available data improves. The system must maintain a full audit trail of these changes and permit documentation of the rationale of care.

Viewability - the PL must offer features that allow tailoring of presentation suited to the clinical needs of the current user.

Furthermore, successful implementation demands that data be entered whenever new clinical events are recognized. Yet getting the clinician to enter data has been a Sisyphean problem facing all system designers. Therefore, further attributes are critical to recruitment of clinicians into use of the PL:

B) Administrative attributes

Work flow integration - data recognition and capture should be part of a well-organized scheme that merges with accepted patterns of care, assures one-time data entry, and allows efficient completion of required duties. The costs of work flow reorganization should be acceptable to the clinician and the enterprise administration.

Administrative cross-references - Work flow integration usually requires that problems be indexed into one or more administrative schemes.

Clinical utility - the PL is an important tool for case finding and decision support. Suitable tools must be available to the clinician community that support these functions so that the clinician appreciates the added value of the PL.

These attributes are summary features that guided our implementation process. Remaining faithful to these principles and reorganizing the entire clinical enterprise around the PL required many strategies that were negotiated with the clinician community, the hospital and clinic administration, and the programming staff. Important steps in this strategic process were as follows:

Implementation strategies

A) Concept definition and buy-in

Focus groups representative of the enterprise community were brought together to create a clear, clinically oriented vision statement defining the PL and its purpose. The statements were widely published and discussed during educational presentations. We formulated an enterprise definition of the PL as follows:

“The patient Problem List is an historical compilation of all the physical and diagnostic concerns, procedures, psychosocial and cultural issues that may affect the care of the patient.”

The more difficult issue of responsibility and accountability was addressed by defining the concept of the clinical care team and asserting the primacy of the care team in PL maintenance. By defining the care team as the collaboration of the clinicians active in patient care at any time, and not identifying a single individual or role as the primary agent, maintenance of the PL was defined as a shared multi-disciplinary activity.

B) Implementing full on-line coding

PLs, billing documents, history and physicals and care notes were audited across all enterprise clinical departments starting three years before implementation. A clinical terms list of the concepts found from these sources, as well as the COSTAR problems recorded over ten years on 55,000 patients, became the core lexicon for the PL. At one level, the lexicon was a large “pick list” of terms that we knew to be important for the PL. We coded these terms in a defining manner in SNOMED International, as well as ICD-9-CM and UMLS where possible. The lexical elements were collated into multiply referenced look-up tables for the clinical workstation. Such tables, although hierarchical and voluminous, could be customized by the user to move their common clinical vocabulary to the base of the table. The speed of response for these tables is nearly instantaneous for alpha browsing.

Although the lexicon was a large list of terms, we could not anticipate staying current with clinical vocabulary without on-line updates. “Just-in-time” coding was implemented in the clinician interface. If a doctor or nurse could not find the term they sought, the program allowed them to add their phrase under a generic entry: “Unlisted problem.” A weekly report of these entries is reviewed by a coding committee. Specialists in ICD-9-CM and SNOMED add new terms to the lexicon, update the browsing tables, and revise the patient record so that the entry is current and correct in the updated lexicon. Confusion as to terms, incomplete look-ups and mistakes are reviewed with the user as a part of ongoing education in problem coding.

C) Clinical view

During our focus group discussions, feedback from portions of the clinical community clearly described very different ‘types’ of PLs. The conundrum was this: “if the purpose of the PL is communication, then how is it logical to create multiple lists?” We addressed this issue by implementing coded status bytes with each problem which classified problems as: time limited, health maintenance, ongoing or procedural. Each user could employ a set-up feature of the PL to define the organization of these categories within their view, and to filter by organ system if desired. Hence, we shifted the emphasis from ‘different lists’ to ‘different views’ of a single patient PL.

D) Visibility and utility

PL software was initially limited with few reports and no integration with other enterprise print features. Based upon user feedback we designed and programmed a uniform summary list of medications, problems, allergies and care plan. This is printed and placed on the chart every day a patient is in the hospital. It is provided to the physician at every clinic visit. An on-screen version of this report is the ‘home screen’ for the clinician community. Placement of the PL on radiology and pathology requisitions and printing in other care environments has been important to visibility. A new panel query function allows clinicians to search patient records for specific problems as well as visit data, lab results and medications. This can be done without programmer assistance. The panel query has been identified as a highly useful feature by physicians.

E) Work flow management

1) Inpatient

Data entry is encouraged for inpatients by allowing physicians to ‘order’ problems on the chart. They are later coded into the record by the ward clerk. Physicians may also dictate updates to their PL during dictation of admission and discharge documents. We are expecting to reorganize discharge planning from the hospital to require physicians to identify those problems addressed during the hospital stay, permitting PL update by ward personnel. These problems will then be transferred by the program to the discharge summary, reducing dictation requirements.

All patient laboratories and diagnostic units with procedures targeted for the PL were briefed and vocabulary was added to the lexicon for encoding their work. Each lab is required by operational plans to record their procedures on the PL at the time of the event. Each unit is responsible for integrating these duties with their billing and other administrative recording.

Because of new HCFA requirements for diagnosis recording at the time of order entry, we are currently prototyping an order entry system that would allow clinicians to link the PL to their orders, thereby supplying the ICD-9-CM code to the charge record that is linked in the problem lexicon.

2) Outpatient

Preliminary studies with COSTAR showed concordance between outpatient billing diagnoses and the PL 70% of the time. Outpatient billing sheets allow clinicians to specify diagnoses in free text. These can then be placed on the PL and billing sheet with one step. Problems can be ‘dragged and dropped’ onto the billing sheet when clinically appropriate without coding lookup by clerical staff. Although clinicians are trained in updating the PL, busy schedules often require that they leave updates on paper for clerical staff to enter.

F) User education and recruitment

Computer-assisted learning programs were prepared and distributed via the clinical Intranet for on-line training. Campus information sessions were held to propose and discuss the concept statement and policies for implementation.

G) Cost management

Work flow reorganization required additional duties and costs for a number of enterprise units, especially inpatient ward clerks and outpatient discharge staff. Training was needed for these personnel as well as transcriptionists, who would be coding into the PL as part of their redesigned duties. From estimates of PL size and coding needs taken from COSTAR, a detailed budget was prepared of increased personnel costs. Coding specialists for 'just-in-time' updates were included. Projected savings from a reduction in outpatient code look-up and reduced time in researching bills for pathology and ancillary departments were included with favorable response from hospital and clinic administration.

Experience and Discussion

The PL was implemented across 76 clinics and in all wards of the UNMC hospital on October 1, 1997. PLs for 53,321 patients were imported from COSTAR, amounting to 205,895 discrete problem entries. By the end of the first month, 60,000 PLs were present. Six months following implementation, there are 315,000 problem entries for 84,198 patients. Transaction counts initially peaked at 1200/work day as historical data was being added and are now steady at 850/work day. This is an estimated 70% of the transaction volume that was projected to be complete data capture for the enterprise patient volume. Our experience shows that the majority of problem data is recorded in the outpatient setting, usually linked to clinic check-out functions.

Audits of outpatient clinic areas currently show that 95% of patients seen in clinic have at least one problem on the list. Virtually 100% of diagnoses identified in encounter documents find their way to the PL when they are clinically relevant. In the inpatient environment, 78% of all patient charts have a PL with at least one entry. The average inpatient chart has 6.4 coded problems per PL.

During the first six months of operation, 800 terms were added to the PL lexicon at requests of clinical users, bringing the lexicon to a total of 12,000 terms. The entries for 'Unlisted problem' (requesting a new coded term) peaked immediately following implementation at 120 requests/week and has now fallen to a stable rate of approximately 20/week. Approximately 15 new coded terms are added to the lexicon weekly based upon these clinical user requests.

Our implementation teams are currently working with clinical units to resolve issues that were identified accompanying PL use. One such difficulty arose with surgery specialty clinics which often deal with diagnoses that must be coded in ICD-9-CM as 'historical' (codes V10.-V15.) This conflicts with the design of our coding lexicon, which assumes problems are active and current. Some units have additional PLs for historical reasons. For example, inpatient nurses maintain two PLs due to JCAHO requirements and because of legacy code that has not yet been converted. The nursing staff freely admits that limited time forces them to often make a choice between these two tasks. In this arena and our rehabilitation units we are working to remove legacy systems and consolidate the PL into one medical record feature.

©COSTAR is a registered trademark of the Massachusetts General Hospital

Table 1
Problem List Implementation Issues

Barriers

- Clinicians distrust the problem-oriented record
- Incomplete understanding of "what is PL?" and "what are goals of PL?"
- Clinicians concerned about expressiveness of coding language
- Confusion as to "who is responsible?" and "who owns the PL?"
- Requires duplicate work in recording assessments; takes too much time
- Not available or visible at point-of-care; frequently lost or discarded
- Differing viewpoints among clinicians on appearance and content
- Costs of maintaining the data in a computer

Pay-offs

- Orient the clinician to the patient
- Coordinate the process of care
- Improve communication between providers
- Comply with JCAHO and NCQA guidelines
- Promote research through case finding and audit
- Aid student and resident education
- Assist with revenue management

Bibliography

- [1] Dick RS, Steen EB, eds. The Computer-based Patient Record: An Essential Technology for Health Care. 1991; Institute of Medicine, National Academy of Sciences
- [2] Weed LL. Medical records that teach and guide. *NEJM* 1968;12:593-600, 652-657.
- [3] Simborg PW, Starfield BH, Horn SD. Information factors affecting problem followup in ambulatory care. *Medical Care* 1976;14:848-856.
- [4] Starfield BD, Steinwachs I, Morris G et al. Concordance between medical records and observations regarding information on coordination of care. *Medical Care* 1979;17:758-766.
- [5] Zelingher J, Rind DM, Caraballo E, Tuttle M, Olson NE, Safran C. Categorization of free-text problem lists: an effective method of capturing clinical data. *Proc Annu Symp Comp App Med Care* 1995;416-420.
- [6] Scherpier HJ, Abrams RS, Roth DH, Hail JJ. A simple approach to physician entry of patient problem list. *Proc Annu Symp Comput Appl Med Care*. 1994;206-10.
- [7] Campbell JR, Payne TH. A comparison of four schemes for codification of problem lists. *Proc Annu Symp Comp App Med Care* 1994; 201-205.
- [8] Payne TH, Martin DR. How useful is the UMLS Metathesaurus for building a controlled vocabulary for an automated problem list? *Proc Annu Symp Comp App Med Care* 1994; 705-709.
- [9] Henry SB, Holzemer WL. A comparison of problem lists generated by physicians, nurses, and patients: implications for CPR systems. *Proc Annu Symp Compu Appl Med Care*. 1995: 382-6.
- [10] Cote RA, Rothwell DJ, Palotay JL, Beckett RS, Brochu L, eds. The Systematized Nomenclature of Human and Veterinary Medicine: SNOMED International. 1993, College of American Pathologists
- [11] Campbell JR, Givner N, Seelig C, Greer A, Patil K, Wigton R, Tape T. Computerized Medical Records and Clinic Function. *M.D. Computing*. 1989; 6(5):282-287.