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Defining the Contextual Problem List

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Abstract. The Problem Oriented Medical Record (POMR) is considered a key charting method to support clinical care. Although not uniformly represented amongst digital health systems, this paper presents a clinical model to represent multiple clinical perspectives from a single problem list. The contextual problem list model is defined according to primary diagnosis, comorbidities and problems arising from the primary condition. It is represented within the patient record as a single composition according to the prescribed context. The model pattern could help alleviate the traditional criticisms of paper and digitally based problem records.

Keywords. Contextual problem list, problem oriented medical record, problem list, clinical models, digital health, electronic health records.

1. Introduction

Health records are traditionally ordered into individual data silos such as pathology, medications or radiology. One such silo, the problem list is represented within the digital domain with variable degree of functionality[1] despite the rules of the concept being well understood[2]. Medical care pathways are traditionally arranged to support the management of multiple problems in the primary care setting through to secondary care via a range of diagnostic procedures[3]. This iterative process achieves a more granular focus with increasingly detailed problems for specific conditions such as diabetes.

The Welsh Information Solution for Diabetes Management (WISDM) is being developed as part of a national digital platform. It is *by definition* a problem oriented medical record (POMR). Its specification describes functions to support the curation of a problem list according whether an entry is a complication of the primary disease, or other important comorbidity that may affect ongoing treatment. This paper describes a clinical model for a contextual problem list (CPL) as a persistent composition within the electronic health record (EHR) to support this requirement.

2. Background

As suggested by Dr Lawrence Weed, there is a need to align the patient record according to the problem[4]. Since the first computerised systems began to appear there has been great variability in how the problem list manifests in the (EHR). Merely replicating paper-based processes and transposing them to the digital domain are not sufficient.

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Manual curation of a list is inherently burdensome and data quality impacts how likely it is to be used and updated[5]. The rules on what should or should not be included in the problem list are less clear[6]. As a result, the problem list as a component of the wider digital record has been shown to not always be available or necessarily complete[7,8].

Disadvantages of the POMR include emphasis of when problems manifest opposed to their priority, and the repetitious nature of their structure[9]. The effect of "compartmentalisation" in inhibiting the "synthesis" of multiple problems and the additional risk of substantiating a differential or incorrect diagnosis as the clinical truth is also cited[10]. POMR can be seen as a barrier to the patient narrative through the propagation of increasingly granular but clinically similar problems[1]. This is further complicated by the need for different views depending on clinical perspective or role and the nature of problems being recurrent[11]. Despite this, the problem list is a persistent function within many modern EHR systems.

Weed[4] originally envisaged his chart as a flat list of entries marked as active or inactive with nested variants where appropriate. This juxtaposed the common pattern found within secondary care reporting or outpatient letters of primary problem/ diagnosis with comorbidities. The latter focused on a single problem or care pathway while the Weed POMR takes a more holistic approach.

Grouping individual entries as a diagnosis or comorbidity is key for billing and the attribution of expended resource. However, it might be postulated that it provides direct clinical value in prioritising and focussing a set of complex clinical issues around the presented problem (and perhaps more so than a POMR styled list). We therefore present the pattern defined within this paper for the CPL as a hybrid of both approaches.

3. Definitions

Within the context of this research, a "problem" may be a presenting complaint or confirmed diagnosis. The nature of the CPL means that the following definitions are inherently flexible and individual records may exist within any given category depending on the clinical perspective and may change over time. As a result, the underlying model needs to support the ability to refute, dispute and replace individual entries and for those changes to be clear and visible within the patient record. Utilising coded entries derived from a terminology service is preferred although this represents a point of note for implementers to observe and is not mandatory.

Primary diagnosis represents the condition for which the patient is receiving care and frames the clinical context of the CPL. While the primary diagnosis may be a variation of a range of entries, these should be limited to a specific care pathway (in this case diabetes). It is possible to initiate a CPL without a primary diagnosis being present as the context itself is categorised within the associated metadata of the composition.

Co-morbidity is a coded diagnosis that does not require management or direct acknowledgment by clinicians within a specified disease domain. However, it is of clinical importance to the ongoing care of the specific disease context. It can be assumed that comorbidity entries will be actively managed through alternate care pathways, but they are compatible with the underlying information model for primary diagnosis.

Problems and complication records represent a diverse range of entries. They may contain a clinical problem that has arisen from the primary diagnosis, is being investigated as a result of the problem or is a keynote for the clinician to consider such as a recent bereavement or learning disability. Disease complications will require active

management by the clinician and maybe the result of referrals from other care settings. Entries within this section may reside from clinical findings (e.g. a presenting complaint of pedal oedema) or disease related disorders (e.g. diabetic retinopathy).

The final category concerns entries that may derive from a variety of findings or disorders, but are not of direct concern or relate to the context instantiated with the CPL. However, these records cannot be ignored as they may become important in future. Consideration must be given by the clinician to reconcile entries from a variety of sources.

The approach defined here means that a diabetologist may be treating a patient with some form of diabetes and record a primary diagnosis of Type I diabetes mellitus with peripheral angiopathy. Conversely, a renal physician could be treating a patient with a primary diagnosis of chronic kidney disease. Both primary diagnoses are dependent on the clinical context, and in some cases may be linked if one disorder is predicated by the other (e.g. chronic kidney disease due to type 2 diabetes mellitus). Both entries are also suitable for inclusion under the comorbidity heading of their respective CPL.

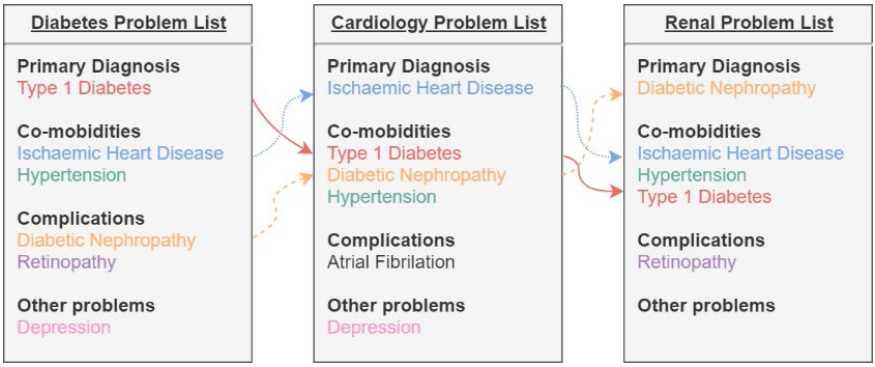

Figure 1. Shared problem records within three contextual problem lists.

A diagnosis of "diabetic nephropathy" may be considered a complication of the patient's primary diagnosis of Type I Diabetes i.e. this condition would not have occurred had the patient not had this primary diagnosis. However, this could also be considered the primary diagnosis for a nephrologist (Figure 1).

3.1. Model Development

The CPL was modelled with openEHR Archetype Designer[12]. Figure 2 describes the applied model pattern. Each context category is embedded within the relevant section with additional attributes from problem/diagnostic qualifier to support, barring the "Other problem". This is to ensure that the pattern cannot be disrupted through incorrect attribution of problem categories within the "Other Problem" section.

Additional data elements have been included to support the wider provenance of the CPL including an absence statement that describes why the list may be empty. For example, a patient early on the diagnostic pathway may be considered to have a finding of pre-diabetes. It may not be appropriate to record this as a primary diagnosis although it is still a condition of note. A recorded entry that there are "no known problems" or "no primary diagnosis" is a potentially valuable statement of fact for a patient at this stage.

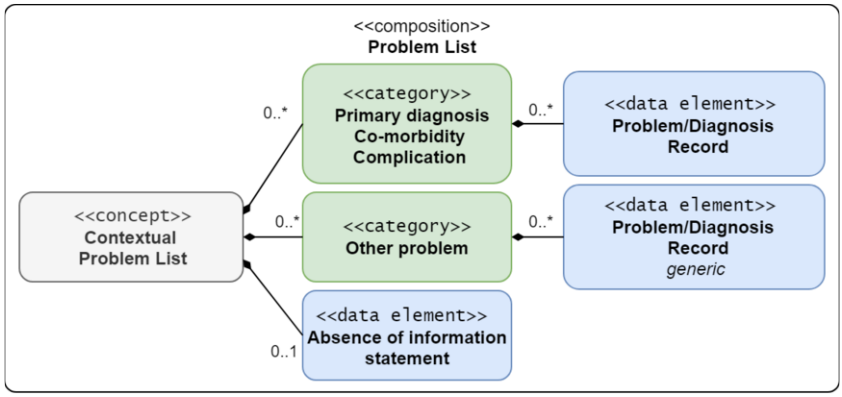

Figure 2. Information model for the contextual problem list template. Each category is optional.

4. Discussion

While the criticisms of POMR are legitimate when concerned with paper, digital functionality can support or eliminate many of them. Duplication of data, a concern in the paper domain[2], is mediated where a digital repository is able to act as a single source of truth. Orientation of the record around the problem, as Weed suggested, is key to facilitating benefits such as more thorough and increasingly relevant medical charts with faster information retrieval[1]. By utilising the CPL as a digital composition, it is possible to view a problem list with a specific clinical perspective such as diabetes as well as a master list of all other problem records. This master list is considered a core component of the EHR[13].

The design of the CPL outlined here seeks to simplify the wider requirement for a single instance of the POMR by creating individual compositions that relate to specific problems or conditions. This is analogous to the "index concept" approach[14]. The level of granularity is focussed upon a primary condition and the many subproblems that may be present with complex cases.

Where accuracy of the problem list is high, clinical errors can be reduced and patient safety increased [15]. This pattern facilitates multiple actors in the clinical pathway to create, review and update problems using data that is recorded once but shared widely. Data quality is of specific concern if we are to rely on the digital record. There is evidence that completeness of data is encouraged when alerting functions are presented to the user[16]. It has been suggested that there are benefits for sharing the POMR in cases of chronic disease management spanning multiple care domains[17]. In addition, this defines a basis from where algorithm-based care can be provided via well defined, standards-based data models.

5. Conclusion

The proposed method for representing the CPL can support multiple care domains from within a single data repository. It represents a hybrid of the traditional POMR and context specific records. While not a definitive list of all patient problems, it presents the key issues that are of concern for the management of the patient's condition at a point in time.

Individual entries within a CPL may be recorded by other clinicians and considered of interest by other clinical specialties for inclusion in their own contextual problem lists.

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