Problem Oriented Health Record Functional Profile (POHR FP) Standards Development

HL7 Electronic Health Record Work Group — POHR Project
Working Group Meeting
16-20 January 2023
• Initial Problem List Management (PLM) phase based on Functional Requirements, followed by Data Requirements
  • Starting point: EHR-S Functional Model (FM), Care Provision (CP) Conformance Criteria (CCs) #1-26 — POHR FP added CCs #100-139
    • Successfully balloted - limited clarifying changes made per balloting comments
    • Examples of PLM standards — see slide 5
  • Initial PLM FP being published as “informative” document, subject to change by later project phases

• Developed POHR Use Cases, as basis for data requirements, FHIR mapping, and further functional requirements
  • Use cases illustrate vital POHR functions in addition to PLM. For more detail, see slides 10-12 below.
HL7 EHR Work Group

POHR Data Requirements and FHIR

• Initial mapping to FHIR Resources/Elements (compare USCDI)
  • Started with Problem List Management
  • Examine Compatible Elements (e.g. FHIR ”Condition” Resource...)
  • Identify Disparate and Missing Elements
  • Collaborate with Patient Care Work Group to Add/Refine Elements
  • Create FHIR Resource Profile(s) and Extension(s), as appropriate
  • Create FHIR POHR Implementation Guides/White Papers
  • Compare USCDI data elements, which lack context provided by POHR
• Revisit FP, Refine/Expand PLM Functions/Conformance Criteria
• Continue with Data Requirements - other Vital POHR Functions
POHR Guidance — to be developed

• Considerations, Recommendations, Best Practices:
  • POHR background: evolution from problem-oriented record to system
  • Guidance for EHR and CDS Software Designers, Developers, Implementers
  • Guidance for POHR Primary End Users = Clinicians, Patients
  • Guidance is intended to help optimize POHR design and actual use for patient care. Optimal use in real-world care improves POHRs for secondary uses outside patient care (e.g., research, quality improvement, regulation, public health, admin, economic analysis)

• Guidance = White Paper – Developed, Reviewed and Approved
  • By EHR Work Group OR
  • Via Full HL7 Consensus Ballot

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POHR Project Standards Development
POHR FP Conformance Criteria (CCs)

- CCs consolidated, revised from EHR-S FM (#1-26) and POHR FP (#100-139). CCs define capabilities for EHR vendors to design and build. **CC Categories:**
  - Problem entry modes/sources and user roles
  - Terminologies for problem entry and display
  - Problem List (PL) clean-up, e.g. for duplicate problems, consolidating and updating problems; duration or recurrence thresholds for changing status
  - Defining problems in terms of evidentiary basis, goals, status, disability, e.g. root problem and manifestations (see also EHR-S FM CCs)
  - Linkage of related problems, e.g. root problem and manifestations (sometimes designated as primary/secondary problems)
  - Linkage of problems to record entries, e.g. to orders, encounter notes, care plans, medication list entries, referrals/reports, discharge summaries
• **CC Categories** (cont’d)
  
  o **Sorting and displaying problems**, e.g. by specialty/organ system, by priorities of individual users, by last edit date.
  
  o **Specifying problems relevant to current care setting** and managing unified PL across care settings (e.g., inpatient and outpatient); problem list reconciliation at discharge
  
  o [Reserved]
  
  o **CDS functionality and linkages between CDS tools and EHRs**
  
  o **Record entries** other than problem entries
  
  o **Workflow, task management, messaging**, both internal and external to POHR
Problem List: Top and Second Level Views

• Top level view of entire problem list enables quick overview of patient’s medical needs, giving clinicians total context for working on any one problem. This view has 2 elements:
  • **Status**: active or inactive. Active problems include preliminary problem entries to serve as placeholders on the PL, pending further data collection and analysis (initial workup) needed to fully define the problem
  • **Title**: The problem title can be either free text or from a terminology or both. The clinician should compose the title so as to briefly inform other users of the current nature of the problem. Thus language of title may be somewhat informal.

• Second level view has multiple elements, including a formal statement of problem, usually from a terminology (SNOMED-CT preferred). This problem statement and the title may or may not be the same.
Second level view elements

- Status, with date of last change in status
- Title of problem (same as top level)
- Statement of problem
- Comments on problem statement
- Definitional elements (these are also care plan elements - slides 16-18 below)
  - Basis
  - Goal
  - Disability
  - Stability
- Onset date
• Second level view elements (cont’d)
  • Date added to current problem list
  • Link to medication list as last reconciled or updated
  • Link to current flowsheets
  • Specialty category(ies) / body system
  • Allergies/intolerances
  • Progress note (link to most recent note)
  • Information source(s)
POHR FP Use Cases

• Use cases specify the following basic elements
  • Actor and actor role in a use case (event)
  • Data requirements (inputs and outputs with respect to data/records) for event. Outputs from one event become inputs to next event
  • Actions supported by EHR system functions, other system functions
  • Corresponding EHR-S FM Functions and POHR Conformance Criteria
  • FHIR category correspondences (including discrepancies and gaps for FHIR vs. POHR)

• Initial use case: New patient and new POHR; establish preliminary PL, and refine/expand it into complete PL of defined problems. This event is broken down into sequential sub-events:
  • 1A: collect new patient’s prior medical records for curation into new POHR
  • 1B: construct preliminary PL per initial encounter and prior record review
  • 1C: refine/expand preliminary PL into complete list of defined problems
Susan Q Public, age 25, has moved from Portland, Maine to Wilmington, Delaware, in order to live near her elderly parents. She does not have records from her former doctors in Maine and now wants to find a new primary care practitioner (PCP) in Delaware. But her immediate health concern is a recent flare-up of long-standing problems with pelvic pain, abdominal pain, and gastrointestinal symptoms. (These problems are suggested by a WebM&M Case Study at https://psnet.ahrq.gov/web-mm/endometriosis-common-and-commonly-missed-and-delayed-diagnosis.) Unable to get a prompt appointment with a local PCP, she goes to the nearest hospital emergency department (ED).

An ED physician does a brief history of present illness (HPI) and a limited physical exam, without ordering lab tests or imaging. From that limited data, he arrives at an initial “working” diagnosis of irritable bowel syndrome (IBS). Determining that an inpatient admission is not necessary, the ED physician discharges her with an opioid prescription for pain relief. A hospital social worker helps her arrange an appointment at a local multi-specialty group practice (GP clinic) for a month later, and transmits the ED discharge summary to the GP clinic as a PDF. The discharge summary states the IBS working diagnosis but does not state the ED physician’s specific observations and findings, whether positive, negative, or uncertain. Only some of these are recorded by the ED physician in the hospital EHR encounter note.

At the GP clinic appointment a month later, the patient meets with her new PCP for 20 min. and provides contact information for the last doctor she saw in Maine. The GP clinic office staff subsequently contacts her last doctor in Maine and the Maine HIE, seeking copies of whatever paper and electronic records are available from the various doctors she had seen in Maine. Those encounters occurred during a ten year period in which she had been experiencing the chief complaint symptoms of concern.

The PCP reviews the ED discharge summary, skims the incomplete prior records received as of the appointment, collects HPI and physical exam data, and orders some basic lab tests and imaging, for purposes of investigating the chief complaint (to the extent time permits during the 20 min. appointment). He asks the staff to schedule a follow-up appointment, at which the PCP hopes to be able to fully review the patient’s prior records, review the lab test and imaging results, do a complete screening and health assessment, further investigate the chief complaint, develop a complete PL, and formulate care plans and/or referrals for all identified problems.

That night, the PCP writes an encounter SOAP note that includes, as part of the assessment, a preliminary PL as follows: (1) IBS, recorded as the encounter diagnosis for billing purposes, (2) abdominal pain, and (3) gastrointestinal symptoms. In his assessment, the PCP expresses uncertainty as to whether problems (2) and (3) should be combined with (1) as manifestations of the IBS diagnosis. The encounter note selectively records data from the HPI and physical exam. Like the earlier ED discharge summary, the encounter note does not state all of the PCP’s observations, whether positive, negative, or uncertain. The note also does not make clear whether the PCP regards the IBS diagnosis as confirmed (rather than provisional) and thus as a basis for a treatment care plan (which he defers until the next appointment).
• Importance of identifying/defining all problems carefully at the outset
  • When this 15-year-old girl was first seen for menstrual pain and bleeding, her clinicians jumped to a conclusion (premature closure). They diagnosed “primary dysmenorrhea,” failing to recognize:
    • Two distinct problems (cramps and bleeding) required investigation
    • Primary dysmenorrhea is a diagnosis of exclusion, requiring rule-outs of alternatives
    • Several important alternative diagnoses should first have been investigated, even more so after the first attempt at therapy failed to bring improvement
  • When a new problem (GI symptoms) later appeared, again the clinicians prematurely closed on a diagnostic hypothesis, as if it had been confirmed.
  • Years more of suffering and futile care elapsed until endometriosis was recognized as the correct diagnosis — that happened only when revealed by an appendectomy.
• This case became a 12-year diagnostic odyssey of suffering (and expense), much of which could have been avoided had problem-oriented care occurred at the outset.
• The initial use case described above (new POHR for new patient) is based on review/curation of patient’s prior records plus detailed initial data collection from patient re chief complaint and other problems, active and inactive. To the extent that the resulting output (new POHR) is deemed "authored and assembled in FHIR," then it could constitute a **FHIR Document**: “FHIR resources can be used to build documents that represent a composition: a coherent set of information that is a statement of healthcare information, including clinical observations and services

• Further FHIR correspondences with POHR – see following examples
• FHIR “Condition” Resource corresponds to POHR “problem” concept
  • Key elements include Condition.VerificationStatus and Condition.Code

• In FHIR a problem list (PL) is but one type of list supported by FHIR List Resource ("A list is a curated collection of resources").
  • Given the centrality of PL to entire EHR, FHIR may need some corresponding special status for PL.
  • FHIR may need to distinguish a preliminary PL from a complete list of carefully defined problems (such a complete PL would conform to standards of completeness and careful definition, to be established by POHR FP). Similar distinction needed for problem entries on PL. Phase 1 (PLM) of POHR FP only addresses PL updates, maintenance etc.
POHR FP — Relationship to FHIR — Care Plans

• FHIR **CarePlan Resource**: This scope of this resource is extremely broad, including a clinician’s plan for an individual patient problem, “Multi-disciplinary cross-organizational care plans,” and “Decision support generated plans following specific practice guidelines.” The CarePlan resource belongs to several **Compartments**, enumerated in that Resource.
  • FHIR CarePlan Resource seems too broad to be useful for POHR FP. POHR care plans are problem-specific, as distinguished from an aggregate care plan for entire patient
  • **In FHIR,** “CarePlans can be tied to specific Conditions,” however they can also be condition-independent.” See CarePlan **Addresses** element, which "Links plan to the conditions it manages." For POHR FP, a care plan should link to problem on PL; rather than "addresses,” a clearer term might be "focus" or "problemfocus."
  • FHIR seems incomplete in care planning context. E.g., FHIR includes a **Medications Module**; yet, medications are but one category of treatment alternatives. Other alternatives should usually be considered before medication plan is chosen. Alternatives include lifestyle changes, physical therapy, surgeries, etc., which FHIR CarePlan Resource should reflect. See generally **Level 4 of the Welcome to FHIR index**.
• POHR care plan component guides users via displaying specific data elements. By populating these elements, users are guided to develop organized care plans specific to each problem in context of entire PL (as distinguished from a single, aggregate care plan for all of patient’s problems). These plans are updated as problems/plans evolve.
  • EHR system needs to enable easily updating each element from SOAP notes without requiring duplicate entries, just as evolving problem definitions need to be easily updated. This can be accomplished with a checkbox indicating that the entry should appear in both the SOAP note and the problem definition or care plan element (preserving an audit trail of changes).

• POHR care plan data elements:
  • Basis: Evidence justifying the problem statement in the complete PL. For example, the preliminary PL in two different patients might state a presenting symptom, shortness of breath (dyspnea), as the problem. Then analysis for developing a complete PL might show that (a) one patient’s dyspnea can be diagnosed/confirmed and stated as COPD on the complete PL, while (b) the other patient’s dyspnea combined with other data might plausibly suggest several possible diagnoses, none of which yet have enough of a basis to be confirmed as the final diagnosis. For patient (a), the EHR system should enable linkages to the record data justifying the COPD diagnosis. For patient (b), the complete PL should continue to state the problem as dyspnea; the plausible diagnoses should appear in the assessment and care plan SOAP note components, not the PL.
• POHR care plan data elements (cont’d):
  • **Status.** Simply indicates whether problem (not overall patient status) is getting better, stable, or getting worse. This element is key for priority-setting, and also for surfacing different perceptions between the patient and clinician. If the patient feels the dyspnea is getting worse while the clinician thinks it’s getting better, then the clinician needs to know that discrepancy. It might be a crucial red flag, signaling a need to re-visit the care plan (see Follow course element, below).
  • **Disability.** Simply states disability caused by the problem, e.g. inability to perform certain activities of daily living, inability to work, inability to perform certain work functions, interference with mental functioning, etc. Specifying the disability often affects other care plan elements.
• POHR care plan data elements (cont’d):
  • Goal: In setting the goal for a problem, two factors are paramount: (a) taking into account the full context as revealed by the complete PL and the patient's SDoH; and (b) the patient's informed involvement. "Morale is achievement, and achievement depends on reasonable goals set by the patient. Multiple specialists independently making demands on a multi-problem patient can all fail when each acts unilaterally and has no way of coordinating his or her efforts in the total context of the patient's life" (LLW's 1991 book, p. 105). Provider quality measures or population-based guideline adherence should not be permitted to override individualized goals chosen by the informed patient/family.
  • Follow course and treatments: Specifies parameters to monitor problem and treatment. It answers the basic question of what data should be collected (and how often) to follow the problem's status and effects of treatment. For more discussion, see LLW's 1991 book, Knowledge Coupling, pp. 105-106. As stated there: "Choice of parameters and the frequency of observation is one of most crucial activities in medicine. ... Physicians have to be constantly on their guard that parameters chosen for one problem are not invalidated by the treatment or course of another one of the problems on the list ... formulating plans in multiproblem patients demands meticulous attention" (LLW's 1991 book, p. 106).
• **Investigate further:** This element is where the clinician states what options (diagnostic possibilities and/or treatment alternatives) are being considered, what data will be needed to investigate those options, and in what sequence those data will be collected. Here the clinician should rigorously distinguish between "need-to-know" and "nice-to-know" data. Making this distinction reduces clinician and patient burdens over time. Glossing over this distinction increases burdens, wastes resources, and threatens patient safety.

• **Complications to watch for:** This element can be conceived as an especially important parameter for following the course of disease and treatment. Selecting and examining "S" and "O" data with anticipated complications clearly in mind can inform "A" and "P" thinking. Such discipline helps protect against overlooked complications erupting into crises. As an example, "if it is known that patients with infectious mononucleosis can on occasion actually develop respiratory failure or rupture a spleen, then the physician does not fall into the trap of losing such a patient through inadequate monitoring, having dismissed the case as 'just another case of mono.' It was not just another case; it was a patient whose spleen was extremely large and tender or whose remarks about a breathing difficulty were completely ignored by the busy physician." Many emergencies are allowed to develop in medicine unnecessarily. Signals go unrecognized because simple steps are not taken to anticipate and avoid the emergency. (1991 book, pp. 108-109).
• Initial creation of POHR is based on review/curation of patient’s prior records plus detailed initial data collection from patient re chief complaint and other problems, active and inactive. To the extent that output (new POHR) is deemed "authored and assembled in FHIR," then it could constitute a "FHIR Document."

• FHIR correspondences with POHR care plan elements:
  • Basis element could correspond to ClinicalImpression, Observation, Condition.evidence, ConditionVerificationStatus, DiagnosticReport
  • Status element could correspond to ...
  • Disability element could correspond to ...
  • Goal element could correspond to ...
  • Follow course and treatment element could correspond to ...
  • Complications to watch for element could correspond to ...
POHR FP — Further Use Cases/Topics

• Problem-oriented management of highly complex cases involving multiple problems and multiple clinicians, potentially until end of life
• Linkage of record entries to problems on problem list – manual and automated alternatives
• Care planning: use cases for specific data categories
• Progress notes
  • Subjective/symptomatic (S) and objective/other (O) components – how they relate
  • Assessment component of SOAP notes
  • SOAP notes and APSO alternative sequence
  • Flowsheets (using spreadsheet capabilities to present quantitative and other data in tabular form for one or more problems)
  • When to write progress notes – setting priorities and clinician burden
• Problem orientation in relation to FHIR
• Problem orientation in relation to USCDI
• Health maintenance activities in POHR
• Patient involvement — central to problem-orientation
• CDS – new medium for practice guidelines, integrally related to POHR
• Implications beyond individual patient care, e.g. research, public health, population-based vs. individualized medical knowledge
## Selected Areas of Potential Integration (Primary Uses in Patient Care) | Key HL7 Work Group Collaborators
---|---
Problem List Management – Problem Definition | Patient Care (PCWG)
Linkage of PL to Other Record Entries | PCWG, Orders+Observations
Care Plans/Planning Coordination of Care | PCWG/Care Plan DAM, Multiple Chron Condit. Human and Social Services WG Patient Empowerment WG
Medications List and Reconciliation; other List Management (Immunizations, Allergies, etc.) | PCWG, Pharmacy WG, EHR WG Med Reconciliation Project
Orders and Results, Referrals | Orders+Observations
Clinical Decision Support | Clinical Decision Support
FHIR (upcoming Rel. 5 proposals) | Patient Care, FHIR Infrastructure
Clinical Documentation | Patient Care, Orders+Observations

16-20 Jan 2023

POHR Project Standards Development
## HL7 EHR Work Group

### POHR Integration Path w/Collaborations

<table>
<thead>
<tr>
<th>Selected Areas of Potential Integration (Secondary Uses External to Patient Care)</th>
<th>Key HL7 Work Group Collaborators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>Biomedical Research and Regulation</td>
</tr>
<tr>
<td>Public Health</td>
<td>Public Health</td>
</tr>
<tr>
<td>Quality Measurement and Reporting</td>
<td>Clinical Quality Information</td>
</tr>
<tr>
<td>Billing, Claims, Finance</td>
<td>Patient Admin, Financial Management, Payor/Provider...</td>
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Problem-Orientation Informs “Problem Context” for HL7 Standards on AI Tool Development and Application

• Scientific standards for medical practice. Scientific inquiry begins in problems to solve, not in observations or concepts or theories. This principle clarifies why a system of health care in general, and EHRs in particular, should be problem-oriented. This principle further suggests that HL7 should treat the problem context as foundational for purposes of health information and health IT standards generally, including standards for AI tools.

• Core concept: AI tools must be carefully matched to an individual patient’s problem in the context of the patient’s complete problem list (PL). Each problem entry on the PL organizes underlying details about the problem, while the PL enumerates the patient’s other problems. Together, the problem entry and the PL organize all EHR data relevant to the problem context.

• Careful matching. Each patient’s problem context must be carefully matched with human intelligence, traditional software tools, and AI tools. These three engines for handling information differ in their capabilities and thus should be carefully matched to patient’s problem situation.