**Triggering / Decision Support**

Electronic Case Reporting (eCR) involves moving electronic Initial Case Reports (eICR) from EHRs to Public Health Agencies (PHAs) in a (mostly) automated fashion that, as closely as possible, matches complex statutory condition and jurisdictional reporting requirements. The eICRs are used to detect and monitor disease trends and manage possible cases to support public health policies and response.

**Current State**

eCR has been advanced to date as a two-stage process because of the complexities of the many different conditions (a typical Public Health Agency can have over 200 reportable conditions) and jurisdictional reporting requirements (all State and Territorial and many Local Public Health Agencies have different reporting laws) as well as the difficulties in distributing and implementing complex business rules in EHRs.

The first stage of the two-stage process uses “flat” trigger code value sets in a spreadsheet that EHR vendors / clinical care personnel download and use to match against certain EHR data types (e.g. diagnoses, problems, lab results, and lab orders - for suspect cases).

The second stage uses a business rules engine that can, among other things:

* Determine the legally responsible PHA(s);
* Apply appropriate rules for specific conditions;
* Determine reportability;
* And help develop an appropriate response.

The second stage is currently oriented to implementation on a common, shared services platform although if a PHA can take the first stage data, the HL7 eICR could also go straight to them.

In general, PHA’s only want PII data that very closely aligns with their reporting laws and while the first stage trigger codes align well with a reasonable suspicion of reportability, most PHAs would like more detailed rules processing (second stage) to occur before they receive the data.

**Next Steps**

In other parts of this For Comment Ballot are specifications for a FHIR value set bundle, FHIR RESTful APIs and a FHIR subscription service to use as an alternative to the current trigger code spreadsheet and download process. When available on a FHIR server, the value sets may be retrieved directly via the FHIR REST API. Implementers may choose to be automatically notified of value set updates via the [FHIR Subscription mechanism](http://hl7.org/fhir/subscription.html) that can include email, SMS, web sockets, and RESTful hook channels for XML or JSON trigger code access. The service can communicate updates when available and does not require that the user’s EHR has implemented FHIR. We would appreciate comments on what is laid out in this specification for the FHIR value set bundle and FHIR subscription service.

**Future State**

In this portion of the IG we would like to describe some public health requirements and ask a series of questions about future triggering / decision approaches. FHIR offers opportunities to improve the timing, consistency, and ease of implementation of automated reporting to public health and reduce provider reporting burden. It can also potentially advance the provisioning of public health information and guidance to clinical care in the context of reportable and non-reportable conditions.

There are also a number of policy reasons to consider that, in time, and with successful roll out of one or more of the technical approaches discussed above, distributing more complex decision logic to EHRs eventually makes sense.

We would like this input relative to future FHIR implementation but also plan to use the input to incrementally improve the implementation of the existing CDA standards where possible. The requirements and questions for triggering / decision support fall into two broad categories: Standards and technologies and EHR workflow implementation.

**Triggering / Decision Support - Standards and Technologies**

**Requirements**

* The many EHRs, PHAs, and conditions define a need for standardization that can allow EHR vendors to implement their products in many places while having a consistent interface to public health.
* This means processing rules for both the location that care is being provided and for the location where the patient resides – wherever in the country that may be.
* Technical standards need to be able to support secure transport of PII
* The trigger codes and decision support rules are not PII and while they need to be secured from changes can be considered publicly available data.
* There are several broad models for providing more complicated decision support for public health reporting at the point of care:
  1. Public health could distribute standardized decision support rules for implementation by EHR vendors (e.g. distribute CQL or some other rule format)
  2. Public health could develop and support an application that would be distributable to all clinical care sites that would run decision support locally (e.g. distributing a CDS Hooks or SMART app)
  3. Public health could develop and support one or more centralized decision support services that would be called by EHRs to determine reportability (e.g. using a standard API for decision support)

**Questions**

1. Regarding model “a” above: In time, will the standardization of APIs and data in FHIR resources offer practical opportunities to distribute decision logic to EHRs?
   * Will CQL be the standard that is first implemented broadly for operationalizing distributable business rules? If not, what other alternative may do so?
   * If you are an EHR vendor, in what general timeframe will you be able to implement distributable business rules in your system?
   * Based on your knowledge of the heath IT landscape, when do you estimate that there will be such a nationwide EHR decision support capability that can be used by public health?
   * Are there opportunities to incrementally advance some business rules (like only – positive lab results, or location specific reporting) before broad capabilities are available?
   * Some decision support implementations involve regular polling of EHR data and some may use more of a subscription service where matches create a notification. Are there limitations of, or preferences for, these different technical implementations?
   * Are there other issues for this approach?
2. Regarding model “b” above: Will APIs offer practical opportunities to distribute decision support apps to all EHRs?
   * In this model, for eCR, should more than the APIs be standardized? What else?
   * Could multiple public health entities contribute rules to such an app and how?
   * In CDS Hooks; the EHR registers a hook, the CDS service executes logic pulling FHIR data from the server, and a card is returned to the user noting that case reporting has begun. eCR is, for the most part, a fully automated workflow. Can the CDS Hooks approach align with electronic Case Reporting (eCR) needs?
   * Are there models for the successful distribution and support of software by government or others for nationwide or State-wide clinical care implementation?
   * Are there other issues for this approach?
3. Regarding model “c” above: Will APIs offer increased opportunities for central services that can be called from distributed and cloud-based EHRs?
   * If so, do EHR vendors and healthcare organizations have limitations on, or requirements for, avoiding dependencies on external code and services that they do not “own”?
   * Are there opportunities to use OpenID and OAuth 2 to secure these transactions at a nationwide or statewide scale? Are there other standards that would be better?
   * Are there other issues for this approach?
4. The trigger codes in this specification are to be retrieved using a FHIR Bundle resource since they are expected to be updated simultaneously and are versioned as such. The specification also describes how to retrieve them as individual ValueSet resources.
   * Should one or both approaches should be advanced?
   * How would this be done if the value sets represented a union of different inputs for each one?
5. EHR vendors have indicated that they would like a common set of trigger codes. Are there specific needs that State and Local PHAs have for 1) creating additional trigger codes and 2) managing their own reporting rules?
   * How could rules be structured so that there could be reporting to the PHAs of the patient’s residence wherever that may be nationally (vs. the location that care was provided) be enabled?
   * There is currently a single set of Trigger codes that is produced from PHA rules input into the shared public health decision support system (Reportable Condition Knowledge Management System) on the shared services platform. These trigger codes do not necessarily need to be used with RCKMS. Does this approach adequately capture trigger codes needed by public health agencies for reporting?

**Triggering / Decision Support - EHR Workflow Implementation**

**Requirements**

* Public health needs eICRs to be initiated for some conditions when they are suspect, when there is a clinical diagnosis, and eventually when there are combinations of findings. The current trigger codes focus on diagnoses, problems, lab results and lab orders.
* Public health needs eICRs to be initiated beginning a short period of time after the beginning of a patient encounter. While there is a desire to have reporting as soon as possible after the start of the encounter, this need is somewhat in a tension with the desire to have at least some minimal data populating the eICR.
* Public health needs updates/replacement eICRs with additional data that have been accumulated during encounters and, potentially, after an encounter has ended and most results have been added to the chart.
* Public health needs to get comparable / consistent data from different EHRs and clinical sites.
* Public health would like to be able to, at times, deliver information to providers as soon as possible and while the patient is still in the clinical setting.
* Providers would like to have confirmation from public health that statutory reporting requirements have been completed.

**Questions**

* In non-FHIR EHR implementations and CDA document exchange, the time/date of initiation and the end of clinical encounters have had variable implementation and availability. FHIR has specific data variables for both. Will these data be more consistently implemented in FHIR for decision support use?
* How can FHIR be used to initiate an eICR in close proximity to the start of an encounter, while still including a reasonable amount of initial data?
* Assuming that decision support can be close to immediate and recognizing that charting practices differ in different clinical environments, will it be useful to de-couple the delivery of public health information for a reportable condition from the actual first reporting of that condition (that will have adequate data)?
* For encounters where a condition has been identified and reported, it make sense to separate next-step reporting for an encounter into reporting on newly identified conditions and reporting on the already identified condition:
  + When a new condition is identified sometime after the start of an encounter, does it make sense to delay reporting on that new condition so as to collect information as above, or because it is later in the encounter should the reporting of a new condition be immediate?
  + In FHIR, will it be possible to maintain information about conditions that have already been reported for an encounter? If so, in what timeframe should update / replacement eICRs be transmitted?
  + Should a final eICR be sent at some point after the end of an encounter so as to include all data that were available for that encounter? Is there an approach to setting a transmission for some time or event post-encounter to do so?