

Case-based auditing and surveillance using the DHIS

These requirements are based on functionality and design of the DHIS 1.4 Patient module and specifically how it is used to implement the Maternal Death Audit system in Zanzibar.

Rationale and summary of the use case:

Every clinic or ward providing delivery services reports a monthly summary form (aggregated data) for deliveries where maternal deaths is one of the data elements.

This form is captured using the DHIS in the "normal" way for aggregated (non-patient) data.

In order to reduce maternal mortality rate the MoH wanted more details on the causes and related events of maternal deaths, e.g. the complications leading to the death, action taken to avoid the death, and various details about the deceased such as ANC history, social and educational status, home village etc. To capture this information about every single maternal death (institutional) the delivery facilities have to fill a special audit form for every maternal death in their facility. This audit form is a case-based form with the details described above as well as the name of the deceased mother, the facility where the death occurred, and the date of death.

Data elements and datasets

This form is filled on paper at each facility and sent to the higher levels where it is registered electronically into the DHIS patient module using a custom form that looks exactly like the paper form.

In this patient module all the data items captured in the audit form are represented as data elements, and they make up a dataset that represents all the data captured in the form. In the user interface these data elements are called Patient Data Elements, but under the hood they are just normal data elements using the same table structure as other data elements. These data elements are often of the type text, but can be of any of the following types; text, long text, yes/no, number, date, OLE object

In order to do analysis (meaningful aggregation) on the text-based data values most of the data elements have pre-defined value lists that appear as drop down lists in data entry where the user must select one of the pre-defined values. These pre-defined values are defined in data set management and each data element+ dataset combination has its own list or no list at all (free data entry). It is also possible to have value lists that are only meant as optional values, meaning that free text is allowed for the same data element although a value list exists.

Note that the value list functionality already exists in DHIS 2, as it was recently implemented by Murod.

Data values

Each data value captured in the form is stored with a reference to the patient, the orgunit, the date and the dataset. The values are of different types defined by their data element types.

Routine (aggregated) data elements

In order to use these data efficiently for analysis it is possible to define aggregated/routine data elements that are cohorts from the patient data. These aggregated data elements are defined as expressions or formulas describing how they are counted/aggregated from the patient data. E.g. in the maternal death audit the user fills in the data element called "Direct cause of the maternal death" with one of multiple pre-defined values (where one is "Eclampsia").

If we want to know how many maternal deaths that was directly caused by eclampsia we could define a new Routine Data Element called "Maternal deaths with direct cause eclampsia" with an expression (criteria) like:

"Patient data element: "Direct cause of death" = "Eclampsia".". Expressions can also be combinations of many patient data elements with criteria for their values.

In the user interface these aggregated data elements are called Routine Data Elements, and in addition to the normal properties of a data element they also contain an expression for aggregation.

Every month, after all maternal deaths for the previous months have been registered the user can generate the aggregated values for the Routine Data Elements for the previous month.

That process looks up all defined Routine Data Elements and follows their expressions to count how many "hits" they had for each organisation unit for the selected month. Other period intervals are also possible, like quarterly or annual. The result is a set of routine data values with references to a routine data element, an orgunit and a period.

These data values are then exported to an xml file and later imported into the core DHIS module for aggregated data. Note that in DHIS 1.4 there are two separate backend databases for aggregated and patient data. The two types of

data values are slightly different as patient data references patients and datasets in addition to data element, period, and orgunit. With an online system the security of patient data will of course be another important difference between aggregated and patient data.

Reports

There are different types of reports involved here.

- 1) One is to simply print out the data entry form without any aggregation, similar to data set report in DHIS 2. Standard and custom forms are supported.
- 2) Another is to create a so-called cross tab report where you get a tabular view to the data captured with all patient data elements as columns and each case/patient per row.
- 3) Aggregated reports. Based on the defined routine data elements, data is aggregated for specified routine data elements, periods and datasets, and then displayed in pivot tables or other custom reports based on routine data elements.

Search records

Per dataset it is possible to use one or more data elements and their pre-defined values to search (query) the patient records. Results (with only selected or all data elements) will be listed in a cross-tabbed report.

Import/Export

Just like with a normal DHIS system data is transferred between instances using XML based import/export files. Metadata import/export is also supported. What is new here is the option to export the generated Routine Data to a standard DHIS 1.4 XML format for aggregated data that can be used to import into the core module.