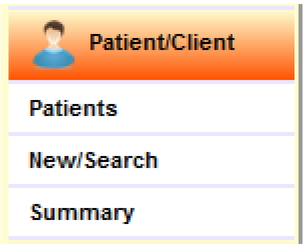
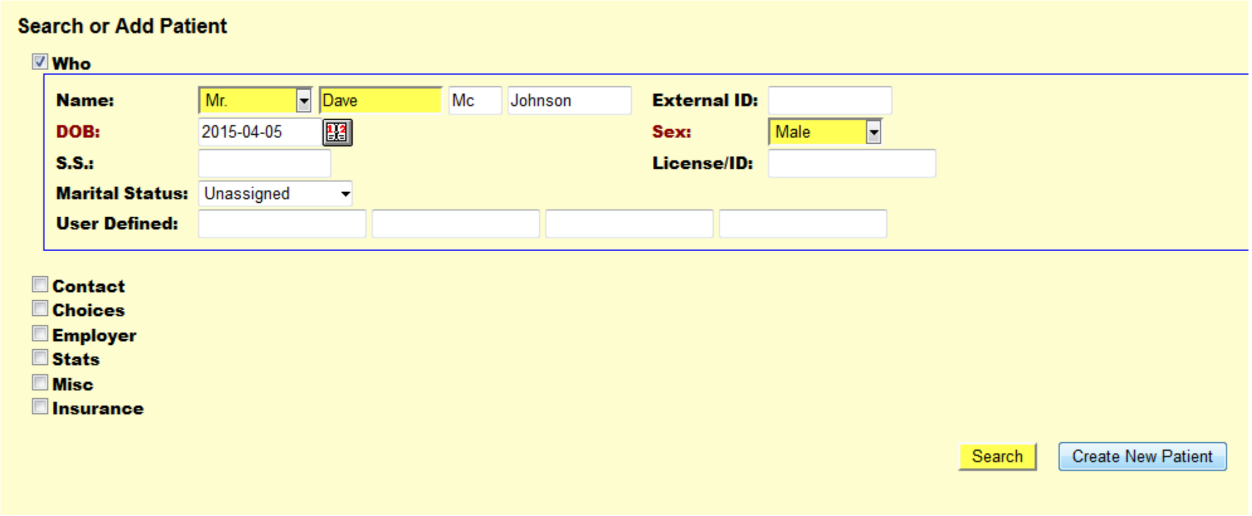
For each feature this document lists the name of the feature, the description of the feature, how to use the feature (where relevant) and how the feature works. Features are listed in order as found at http://jnoll.nfshost.com/cs4098/projects/shcyup-backlog.html

First a patient needs to be created in OpenEMR



Click “New/Search” and enter the required information



Search or Add Patient

☑ Who

Name:	Mr. Dave Mc Johnson	External ID:	
DOB:	2015-04-05	Sex:	Male
S.S.:		License/ID:	
Marital Status:	Unassigned		
User Defined:			

☐ Contact
☐ Choices
☐ Employer
☐ Stats
☐ Misc
☐ Insurance

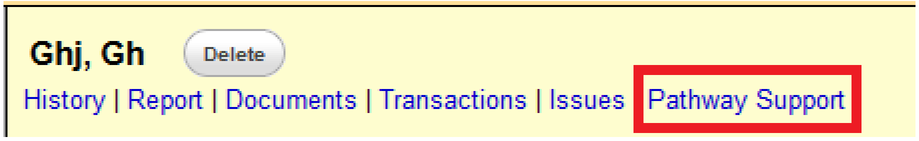
When done click create new patient, then confirm again when the popup appears.
Select “Patients” from the left hand menu and select the desired patient.

Popup injection - 5:

“Add pathway support popup to EMR UI.”

How to use:
The user cannot use this feature directly, but can see that it is working when they see “Pathway support” on the patient page

How it works:
This feature was implemented by using sed to insert our code into OpenEMR after OpenEMR has been installed

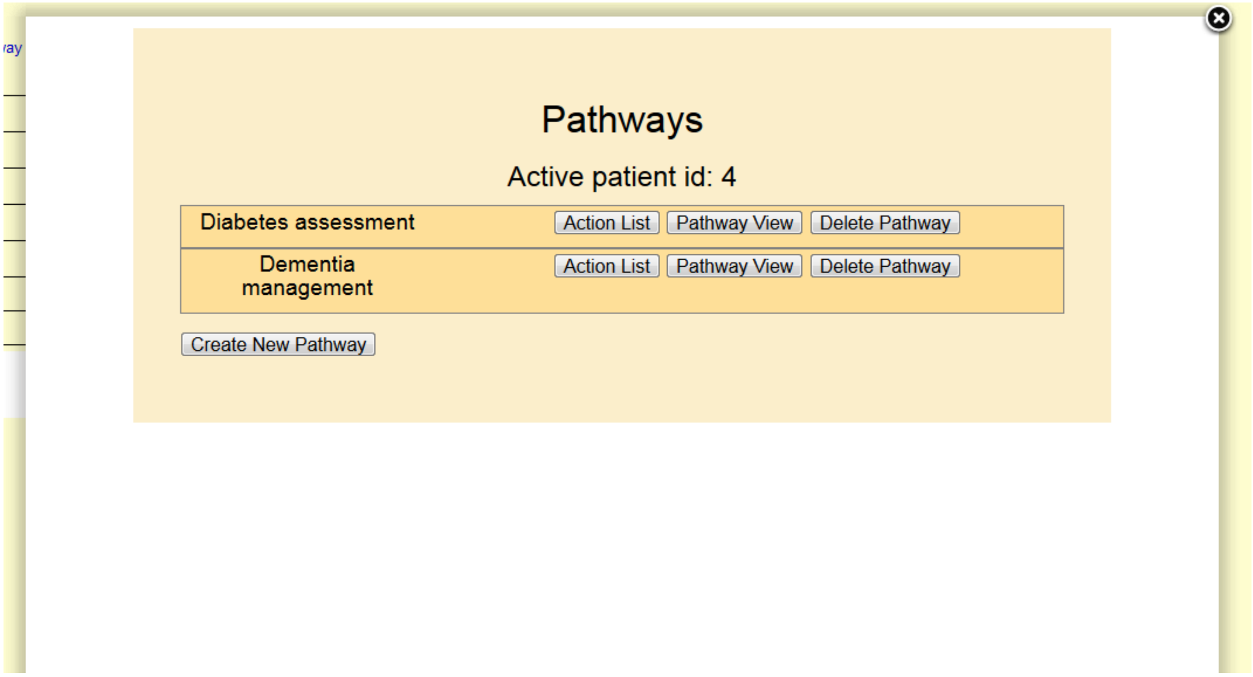


Popup content - 10:

“Display task list and pathway graph in popup(s).”

How to use:
Click on “Pathway support” and view the popup that appears. See popup implementation and pathway graph view for further details

How it works:
See popup implementation and pathway graph view for further details



Pathways

Active patient id: 4

Diabetes assessment	Action List	Pathway View	Delete Pathway
Dementia management	Action List	Pathway View	Delete Pathway

Popup implementation - 20:

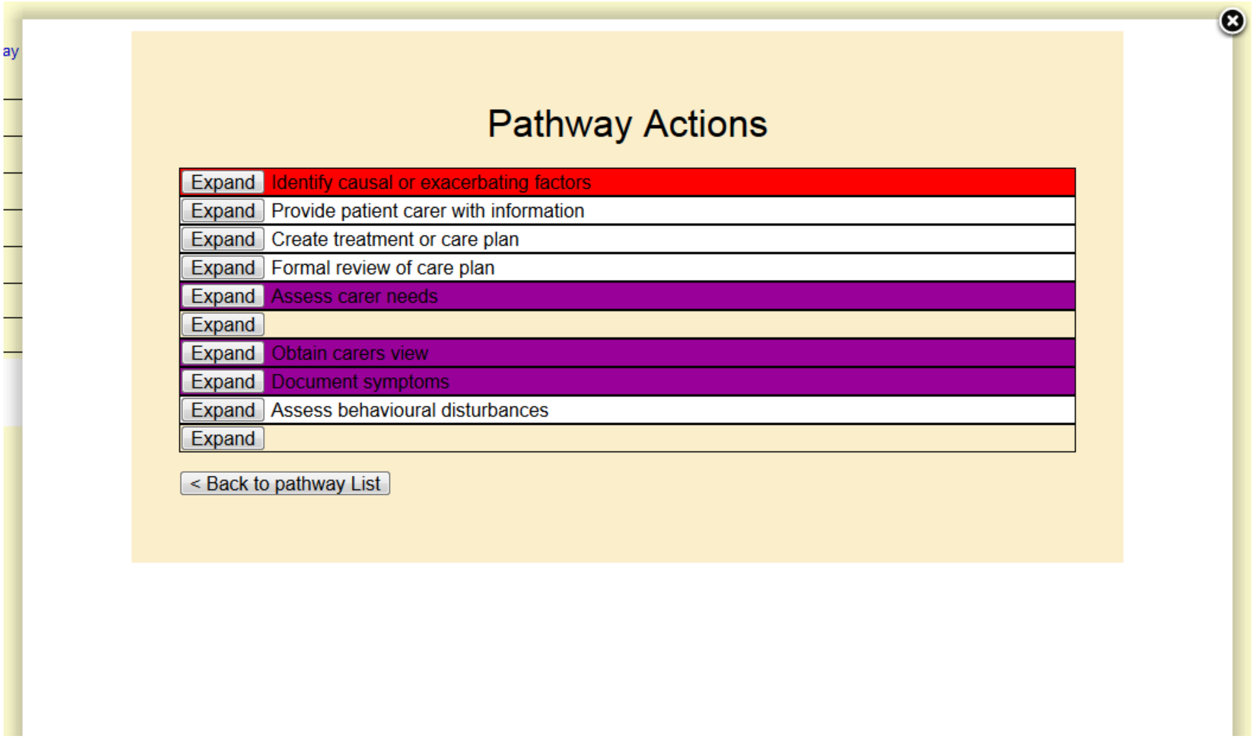
“Implement task list popup content. Tasks should be clickable to display script, resources, and start/finish/abort buttons.”

How to use:

Click on “Pathway support” and view the popup that appears. Create a pathway by clicking the “create new pathway” button and select a pathway. Click on the created pathway and view what state each action is in. Click the buttons to modify the state of each action.

How it works:

The frontend submits data (such as patient ID, selected action etc) to a backend CGI script that invokes peos with the given arguments and returns the result to the frontend.



Pathway Actions

Expand Identify causal or exacerbating factors
Expand Provide patient carer with information
Expand Create treatment or care plan
Expand Formal review of care plan
Expand Assess carer needs
Expand
Expand Obtain carers view
Expand Document symptoms
Expand Assess behavioural disturbances
Expand

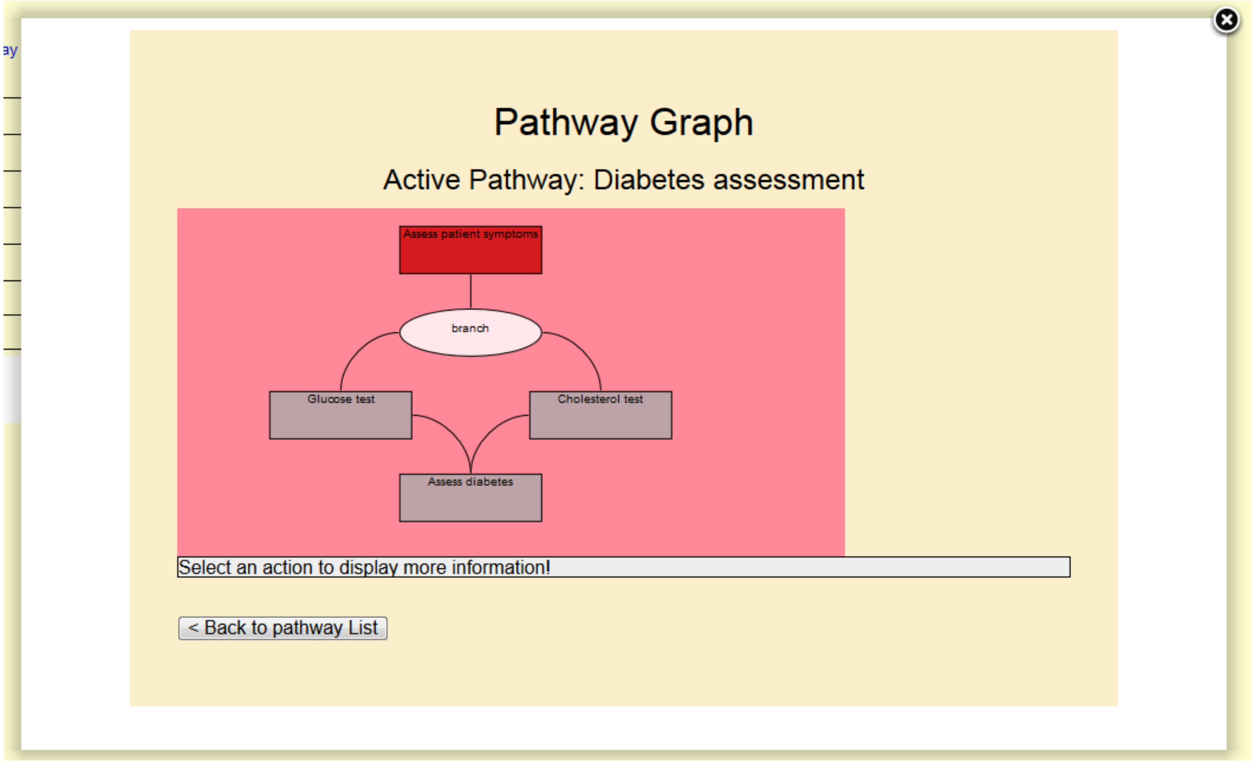
< Back to pathway List

Pathway graph view - 50:

“Present pathway as a graph, with actions colored according to state, and clickable to display script, resources, and start/finish/abort buttons.”

How to use:
Click on “Pathway support” and view the popup that appears. Select a pathway and create an instance of it. Click “pathway graph” beside the pathway. View the graph that appears. Click on a node of the graph to view information and available options for that action. The detailed information for the action appears below the graph.

How it works:
This feature makes use of Raphael, a graphics library released under the MIT license, to render the graph.
Each node in the graph is linked to either a branch of actions or an action. Each action node is clickable to display detailed information about that action below the graph. Furthermore, the start/finish/suspend/abort buttons are clickable for that specific action.
The graph also expands to accommodate bigger pathways.



Pathway Graph

Active Pathway: Diabetes assessment

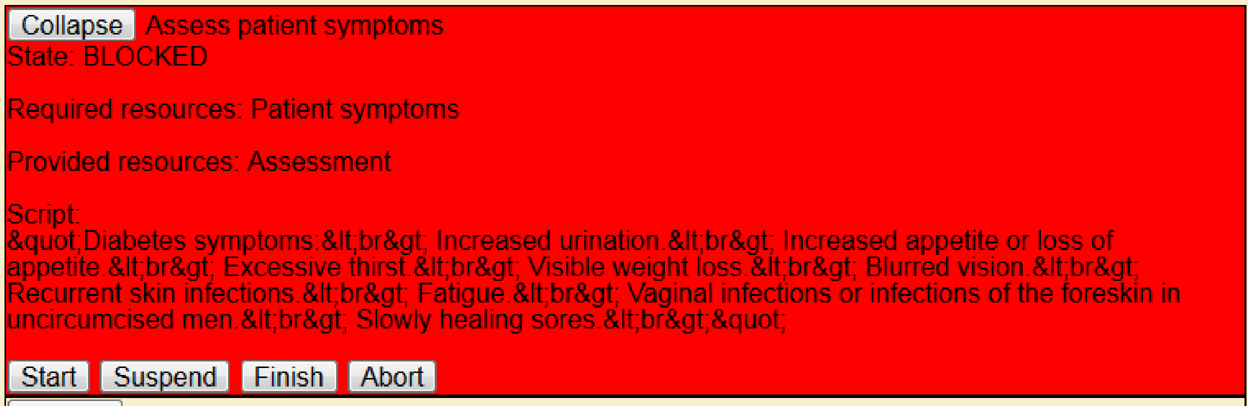
Select an action to display more information!

Parse XML process table - 6:

“Parse kernel's xml process table to obtain list of active pathways and their actions.”

How to use:
The user cannot directly use this feature via the popup, but can see that it works as the required resources and scripts have data in them. The automated test “GETLIST_test.py” tests this feature. It tests if the returned JSON process table contains the process automatically created earlier.

How it works:
A python script reads the content of the XML file and converts it into JSON, the JSON file is then saved. The Python lxml library is used.



Assess patient symptoms
State: BLOCKED

Required resources: Patient symptoms

Provided resources: Assessment

Script:
&quot;Diabetes symptoms:&lt;br&gt; Increased urination.&lt;br&gt; Increased appetite or loss of appetite.&lt;br&gt; Excessive thirst.&lt;br&gt; Visible weight loss.&lt;br&gt; Blurred vision.&lt;br&gt; Recurrent skin infections.&lt;br&gt; Fatigue.&lt;br&gt; Vaginal infections or infections of the foreskin in uncircumcised men.&lt;br&gt; Slowly healing sores.&lt;br&gt;&quot;

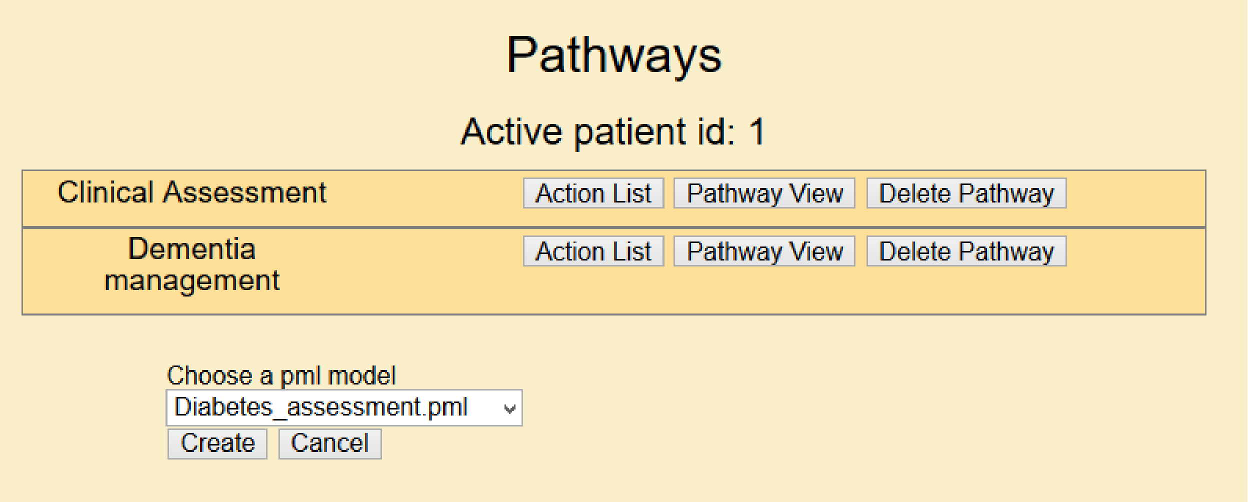
Required resources and script have data taken from the XML in them

<u>Create process - 20:</u>

“Create an instance of a pathway, according to practitioner choice.”

<u>How to use:</u>
Click on “Pathway Support”, click on “Create New Pathway”, select the pathway you want to create an instance of and confirm the choice.
The automated test “CREATE_PROCESS_test.py” tests this feature. It makes a GET request to create a process and verifies that the process then shows up in the process table.

<u>How it works:</u>
The command and all needed data are submitted to a CGI script. The CGI script then calls peos to create a process with the relevant arguments

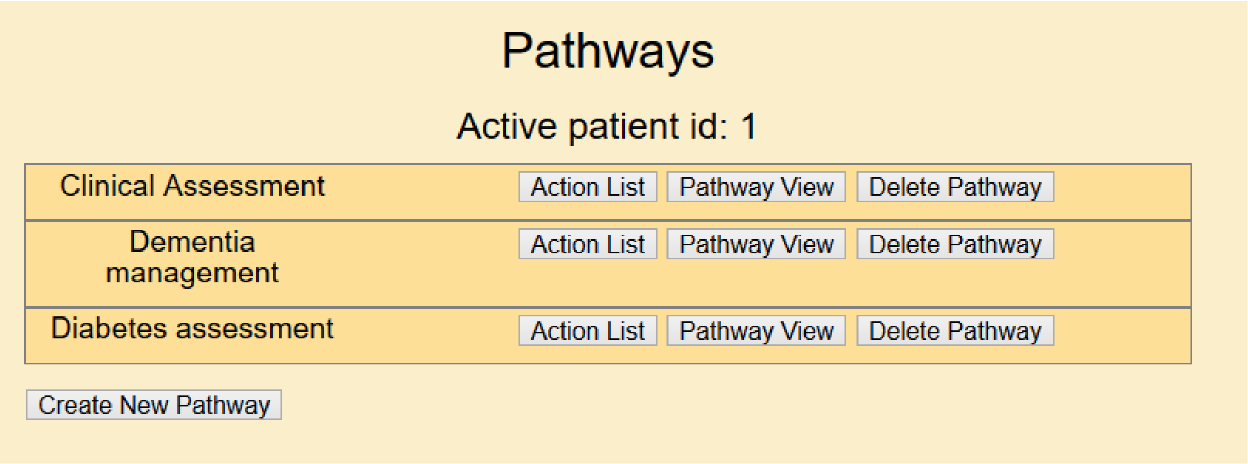


Pathways

Active patient id: 1

Clinical Assessment	Action List	Pathway View	Delete Pathway
Dementia management	Action List	Pathway View	Delete Pathway

Choose a pml model: Diabetes_assessment.pml



Pathways

Active patient id: 1

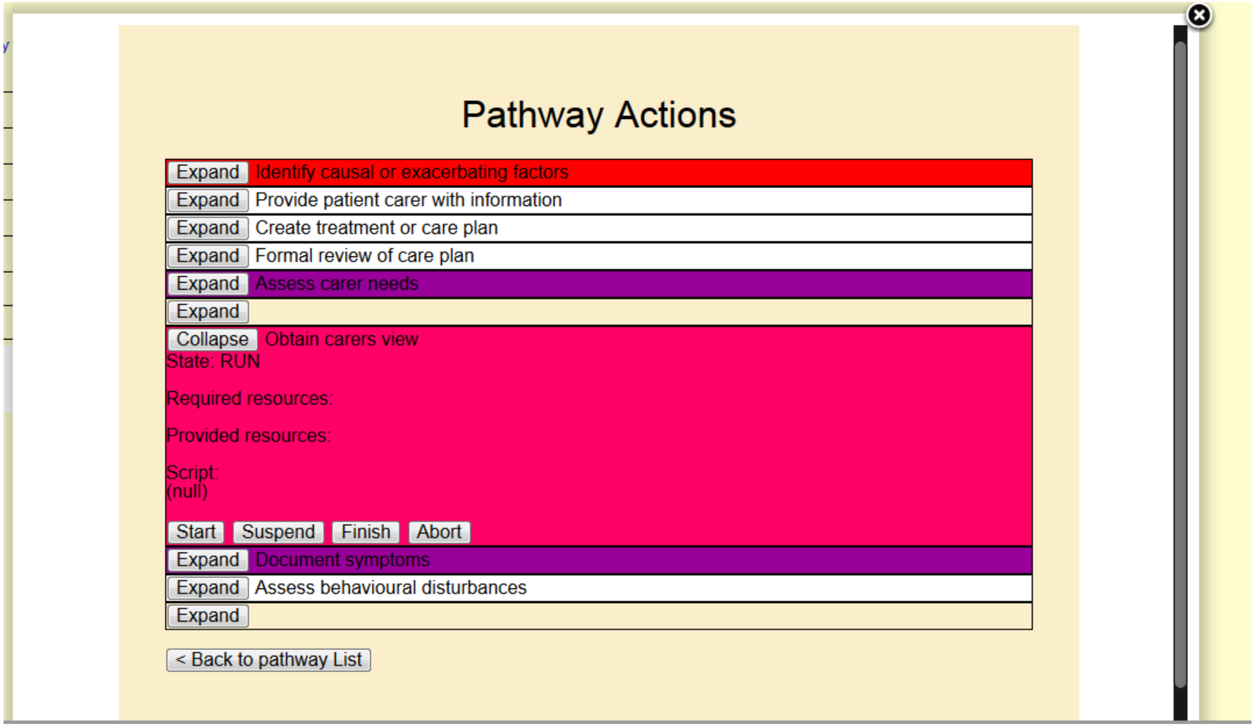
Clinical Assessment	Action List	Pathway View	Delete Pathway
Dementia management	Action List	Pathway View	Delete Pathway
Diabetes assessment	Action List	Pathway View	Delete Pathway

Start action - 5:

“Capture and submit *start action* process events.”

How to use:
Select an action and click the start button, or open a pathway graph and click on the action, then press the start button

How it works:
Similiar to get create process but with different data



Pathway Actions

Expand Identify causal or exacerbating factors
Expand Provide patient carer with information
Expand Create treatment or care plan
Expand Formal review of care plan
Expand Assess carer needs
Expand
Collapse Obtain carers view
State: RUN

Required resources:

Provided resources:

Script:
(null)

Start Suspend Finish Abort
Expand Document symptoms
Expand Assess behavioural disturbances
Expand

< Back to pathway List

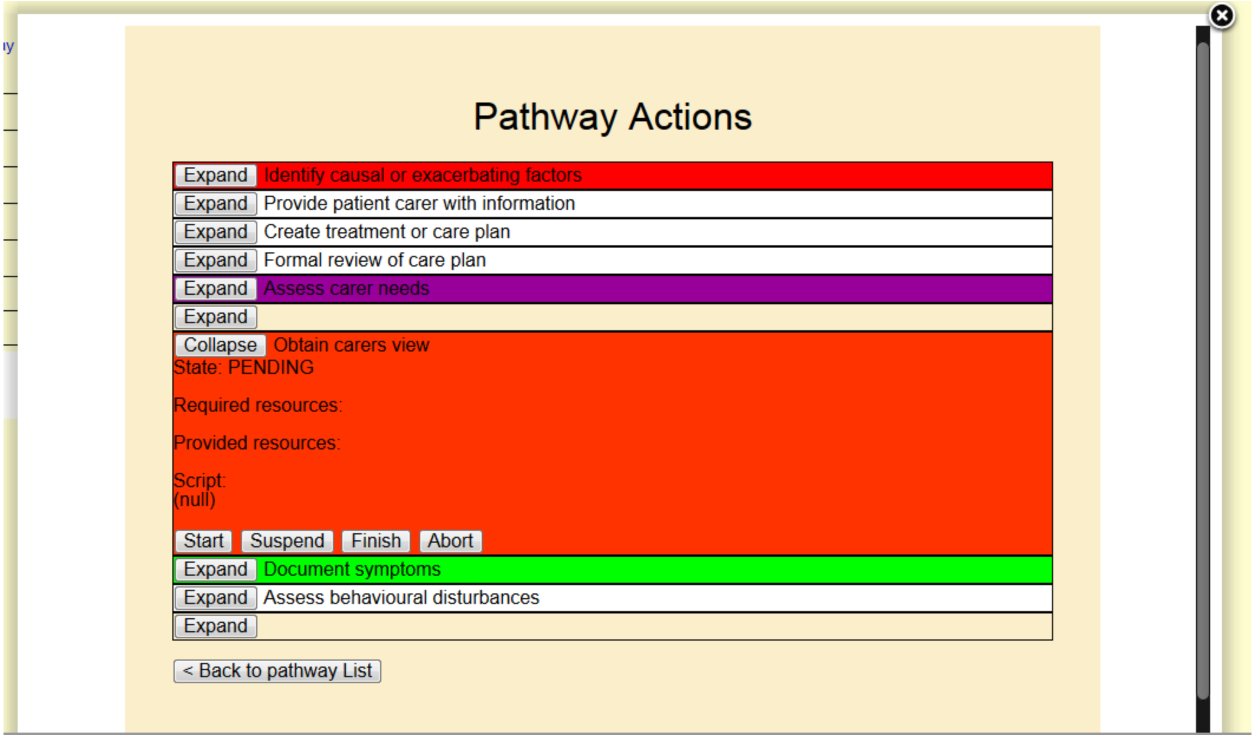
Obtain carers view after “start” has been pressed

Finish action - 5:

“Capture and submit *finish action* process events.”

How to use:
Select an action and click the finish button, or open the pathway graph and click on the action, then press the finish button

How it works:
Similiar to get create process but with different data



Pathway Actions

Identify causal or exacerbating factors
Provide patient carer with information
Create treatment or care plan
Formal review of care plan
Assess carer needs

Obtain carers view
State: PENDING

Required resources:

Provided resources:

Script:
(null)

Document symptoms
Assess behavioural disturbances

Obtain carers view after “finish” has been pressed. Note that document symptoms has changed from available to ready

Resource events - 5:

“Detect events that might result in a change in a resource, and call *peos_notify()*. This is likely to be any change in the patient's medical record, as events such as the arrival of lab results will be logged by clinic staff.”

How to use:
The user cannot use this feature directly

How it works:
This feature runs “peos -u” to make *peos_notify()* run. This is executed when a button event is sent to the backend, i.e. when one of the start/finish/suspend/abort buttons are clicked. *peos_notify()* then modifies the internal data structure (the *Graph*) and updates the process table.

HL7 interface - 32:

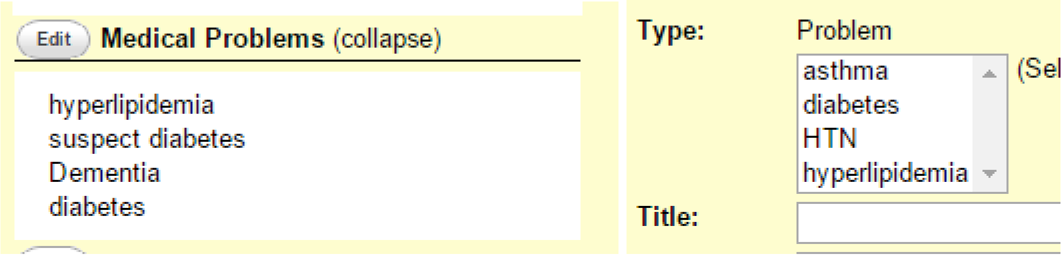
“Trigger HL7 export from EMR, and extract resource status from HL7 records.”

How to use:
The user cannot use this feature directly.

How it works:
OpenEMR does not support HL7 so we get the required information from its database through the TCL language. To do this mysqltcl is used. We needed to look into the relevant table for each TCL function. A function represent a PML attribute. In the PML files, there are resources and some resources have attributes, these attributes become the name of the function and the function takes in a resource by using the TCL keyword *resource*. The functions all return a boolean value *0* or *1*.

Not all resources could be found on OpenEMR’s database, so they return a *0* (*false*) by default.
An example of an attribute that PEOS looks for is the type of illness a patient has. For instance `diagnosis.diabetes` means that the attribute is `diabetes` and we need to check the `diagnosis` report for the word “diabetes”. If the word is not found in the medical records, a *False (0)* value is returned. To add an illness to a patient’s record:

- Click on the patient’s name
- All the patient’s details should now be displayed, on the right hand side of the screen is the word “Medical Problems” with a text box underneath
- Click on the “Edit” button
- A list of the patient’s medical problems will be shown - if there are any
- Click the “Add” button
- A new window will appear, it will contain a form
- Select the illness from the box underneath “Problem”, if the illness is not on the list, type it into the text bar across from “Title:”
- Fill in any other information that you may have
- Click “Save”, the window will close and the patient’s list of medical problems will be updated.



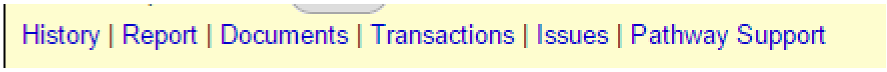
hyperlipidemia
suspect diabetes
Dementia
diabetes

Type: Problem
asthma
diabetes
HTN
hyperlipidemia
(Sel
Title:

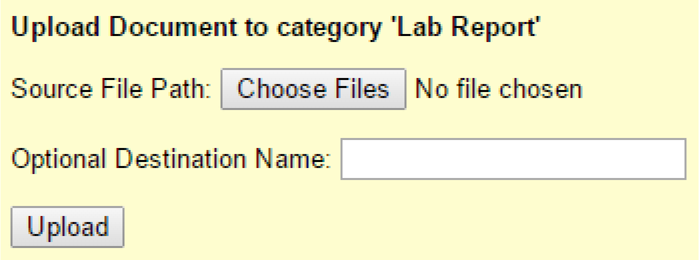
Now the *resource* is available when using the diabetes pathway

The same thing can be done for lab reports. For example to stored blood test (`blood_test.cholesterol_test)` you can follow these instructions:

- Click on “Documents”


History | Report | Documents | Transactions | Issues | Pathway Support

- Click on Lab Reports
- Chose the file you wish to upload
- Upload the report by clicking “Upload”


Upload Document to category 'Lab Report'

Source File Path: Choose Files No file chosen

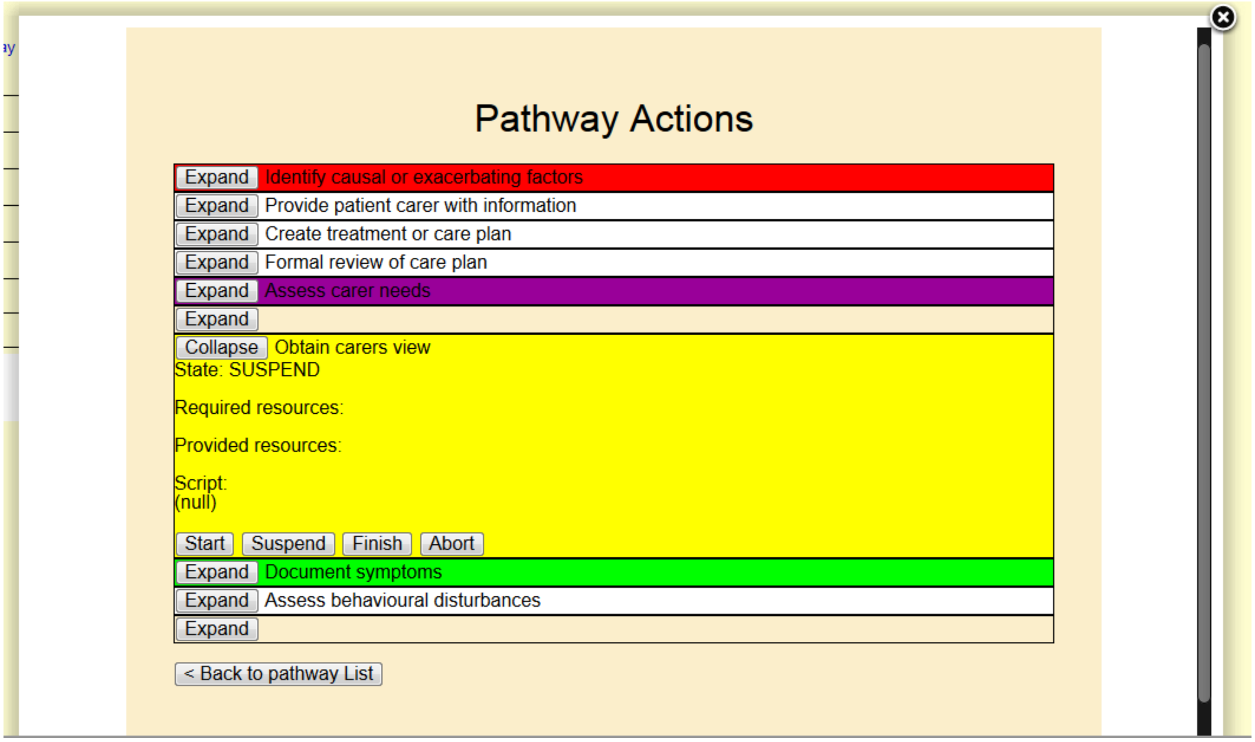
Optional Destination Name:

Suspend action - 5:

“Capture and submit *suspend action* process events.”

How to use:
Select an action and click the suspend button, or open the pathway graph and click on the action, then press the suspend button

How it works:
Similiar to get create process but with different data



Pathway Actions

Expand Identify causal or exacerbating factors
Expand Provide patient carer with information
Expand Create treatment or care plan
Expand Formal review of care plan
Expand Assess carer needs
Expand
Collapse Obtain carers view
State: SUSPEND

Required resources:

Provided resources:

Script:
(null)

Start Suspend Finish Abort
Expand Document symptoms
Expand Assess behavioural disturbances
Expand

< Back to pathway List

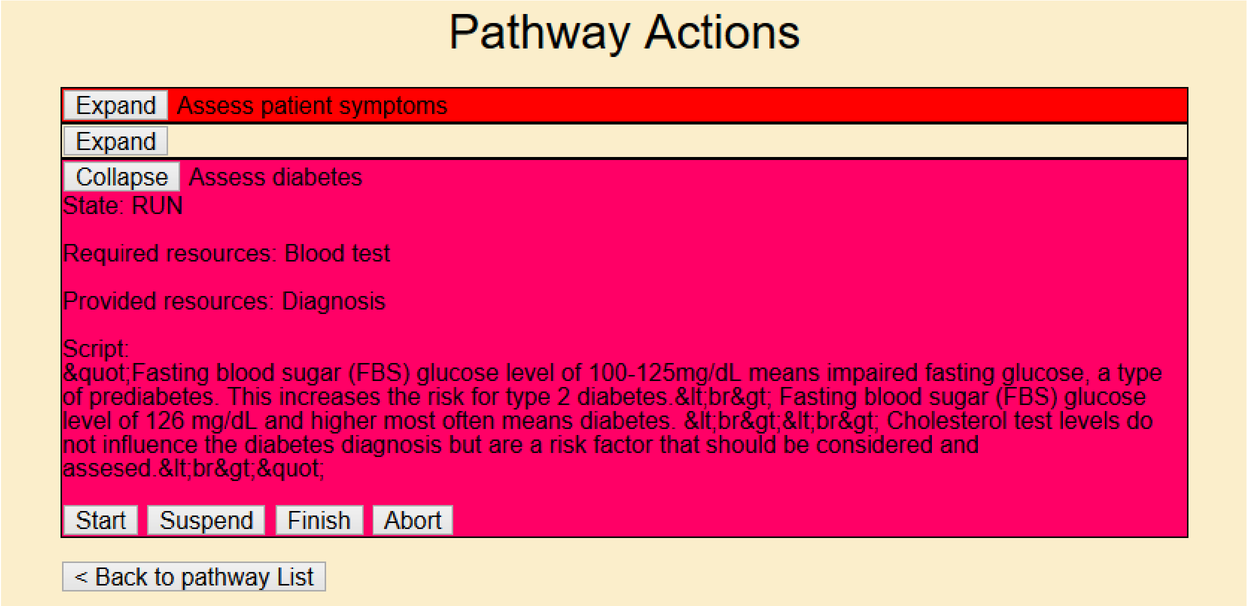
Obtain carers view after “suspend” has been pressed

Abort action - 5:

“Capture and submit *abort action* process events.”

How to use:
Select an action and click the abort button, or open a pathway graph and click on the action, then press the abort button

How it works:
Similiar to get create process but with different data



Pathway Actions

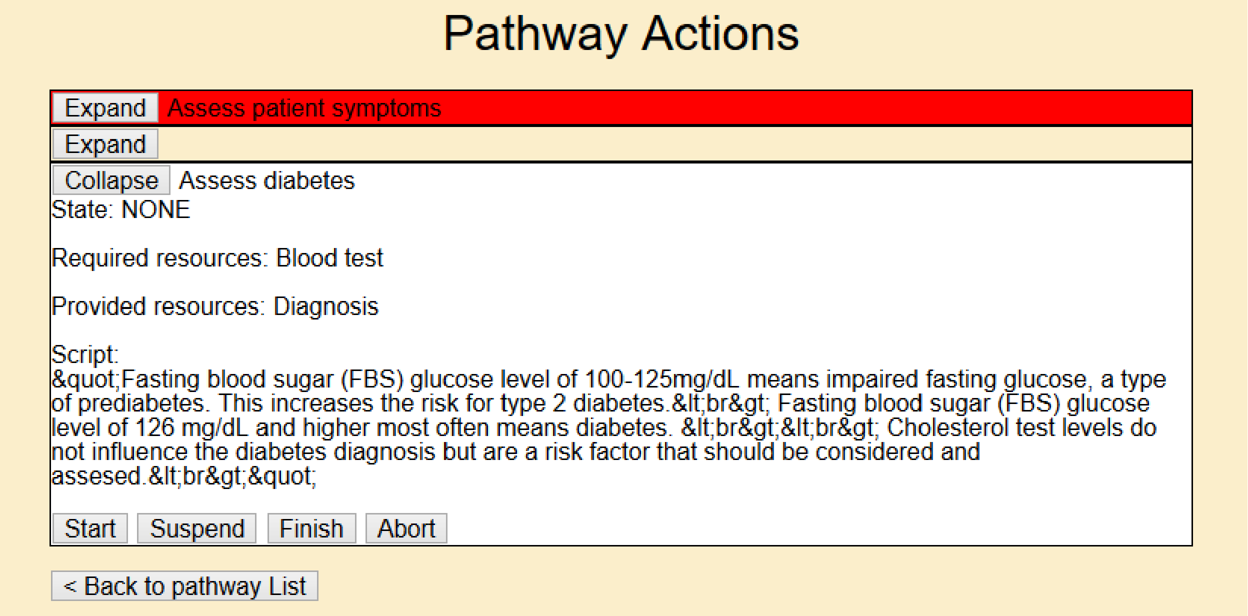
Assess diabetes

State: RUN

Required resources: Blood test

Provided resources: Diagnosis

Script:
&quot;Fasting blood sugar (FBS) glucose level of 100-125mg/dL means impaired fasting glucose, a type of prediabetes. This increases the risk for type 2 diabetes.&lt;br&gt; Fasting blood sugar (FBS) glucose level of 126 mg/dL and higher most often means diabetes. &lt;br&gt;&lt;br&gt; Cholesterol test levels do not influence the diabetes diagnosis but are a risk factor that should be considered and assesed.&lt;br&gt;&quot;



Pathway Actions

Assess diabetes

State: NONE

Required resources: Blood test

Provided resources: Diagnosis

Script:
&quot;Fasting blood sugar (FBS) glucose level of 100-125mg/dL means impaired fasting glucose, a type of prediabetes. This increases the risk for type 2 diabetes.&lt;br&gt; Fasting blood sugar (FBS) glucose level of 126 mg/dL and higher most often means diabetes. &lt;br&gt;&lt;br&gt; Cholesterol test levels do not influence the diabetes diagnosis but are a risk factor that should be considered and assesed.&lt;br&gt;&quot;