Modeling the criteria for withholding X-Ray:

All the models, but Asbru, who assumed that stopping ACEI is outside the scope of the case study) check if ACEI was given before the cough started and then advise to stop ACEI:

GLIF:
Then we decided whether “suspecting ACEI as the cause of cough” (a user choice step). The details of this step are shown in
Figure 1. The details of the “suspecting ACEI as the cause of cough” choice step. ACEI is suspected as the cause of cough if the cough started within 4 weeks after the administration of ACEI.

EON:
The case step “cough after ACEI” has the following expression:

<table>
<thead>
<tr>
<th>Label</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>cough after ACEI</td>
<td>OVERLAPS(Medication, Condition) and AFTER(END_OF(Condition), NOW)</td>
</tr>
</tbody>
</table>

PRODIGY:
The action step “discontinue ACEI” has a rule in and a rule out.
<table>
<thead>
<tr>
<th>Name</th>
<th>Comment</th>
<th>References</th>
<th>Actions Which Don't Change Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>discontinue ACE Inhibitor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trend Prompt</td>
<td>Cough due to ACE?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Prompt</td>
<td>discontinue ACE Inhibitor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trend Term</td>
<td>V C +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>V C +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rule In Condition</td>
<td>V C +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>regime presence ACE inhibitor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greyed In Condition</td>
<td>V C +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greyed Out Condition</td>
<td>V C +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>not on ACE inhibitor</td>
<td>V C +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Next Step</td>
<td>Chronic cough - symptom</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PROforma:
The user enters a yes/no value for the parameter “ACE_related”. If the value is True, then the Discontinue_ACEI is executed.

action :: Discontinue_ACEI ;
    caption :: 'Discontinue ACEI' ;
    precondition :: ACE_related = Yes ;
    procedure :: 'Observe the result of discontinuing the ACE-I for 4 weeks' ;
    context :: 'For patients who developed cough shortly after beginning to take an ACE-I' ;
end action .

The action of stopping ACEI:

GLIF:
If ACEI is suspected to be the cause of cough, then we order to stop the ACEI through the action step “Order stop ACEI for 4 weeks” that has a medically-oriented action specification task, shown in Figure 2. Note that this negative recommendation is expressed as a Medication object in the “order not to” mood. The critical time is set to the interval starting “now” and ending 4 weeks later.

![Figure 2. Ordering stopping an ACEI](image)

EON:
The action step “stop ACEI” has the following action:
PRODIGY:
The action step “discontinue ACEI” has the following action:

PROforman:
action :: Discontinue_ACEI ;
    caption :: 'Discontinue ACEI' ;
    precondition :: ACE_related = Yes ;
    procedure :: 'Observe the result of discontinuing the ACE-I for 4 weeks' ;
    context :: 'For patients who developed cough shortly after beginning to take an ACE-I' ;
end action .

Representing the criterion on withholding X-ray:

In GLIF, EON, and PRODIGY, the criteria are formally expressed using formal expression languages that refer to medical terms defined in a medical domain ontology with reference to vocabulary codes. In GLIF, the medical terms are mapped to the HL7 RIM observation, medication or procedure classes. In WON and PRODIGY, there are EMR_entities for that purpose.

The PRODIGY EMR_Entities:
The PRODIGY hierarchy of medical terms

The EON
The EON hierarchy of medical terms is shown below:
The EON EMR entities are:
GLIF data items refer to vocabulary codes and to RIM data model classes (that are like EPR entities), which are either medication, observation, or procedure. For example, the cough data item is defined as: