

Modelling Clinical Guidelines and Protocols for the Prevention of Risks Against Patient Safety

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Modelling Clinical Guidelines and Protocols

for the Prevention of Risks Against Patient Safety

- Clinical Guidelines

- Systematically created recommendation describing optimal care (based on scientific evidence)

- Clinical Protocols

- Concise, localised versions of guidelines

- Why modelling?

- To transform natural language text and diagrams to computer-processible data

- Automatic linking to Electronic Health Record
 - Verification, Validation, Simulation, Critiquing, ...

} CGP



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Modelling Clinical Guidelines and Protocols
for the **Prevention of Risks Against Patient Safety**

- Patient Safety ~ Optimal care
- Risk against patient safety
~ Deviation from the protocol
- Prevention of RAPS through
 - Quality assurance of the care process
 - Detecting potential problems through simulation
 - Detecting deviation from optimal care
 - Presenting recommendations at the point of care



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Asbru

- Representing treatment steps as plans
 - hierarchical decomposition
- Complete formal semantics
- Automatically executable
- Very complex



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MHB

The Many-Headed Bridge

- Semi-formal
 - Bridging natural language and Asbru
- Sentences ~ Chunks
- Aspects of chunks grouped in 8 dimensions

control

data

time

background information

evidence

patient aspects

resources

document structure

- Compatible with alternatives to Asbru



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DELT/A

Document Extraction and Linking Tool with Add-ons

The screenshot displays the DELT/A software interface in Advanced Mode. The main window is titled "Document Exploration and Linking Tool (with Addons) v2.7.3 (Advanced Mode)".

HTML View (Left): Shows the document content "ProtocolForBirth.htm". The text includes "Labour and delivery management" and "1. [ADMISSION CRITERIA]". Below this, there are several bulleted items with hyperlinks: "a. rupture of membranes", "b. active labour", "c. abnormal Fetal Heart Rate Tracing", and "d. maternal of fetal clinical reason". A section titled "At admission:" follows with items "a. collect case history", "b. measure blood pressure", "c. perform vaginal examination", and "d. perform fetal heart rate evaluation and an ultrasound assessment of amni index". The text concludes with "Enemas and perineal shavings should not be part of routine clinical practice."

XML View (Right): Shows the XML structure of the document. The root node is "root (1)", which contains a "chunk-group (3)" with "group-id='#GROUP-00001'" and "title='ADMISSION CRITERIA'". This group contains three "chunk" nodes. The first chunk is "chunk (2)" with "chunk-id='#CHUNK-00001'", containing a "structure" node with "status='recommendations'". The structure node contains an "if-then (1)" node with "condition='rupture of membranes OR active ...'", which in turn contains a "data (1)" node. The data node contains four "usage (1)" nodes, each with a "name" attribute and a "delta-link link-id='2'" attribute. The names are "rupture of membranes", "active labour", "abnormal Fetal Heart Rate Tracing", and "maternal of fetal clinical reason".

XML Node: ELEMENT 'usage' (Bottom Right): A table showing the attributes of the selected "usage" node.

Attribute	Value
name	rupture of membranes

Macro View (Bottom Left): Shows a list of macros under "Level 1" and "Level 2". The "Data Dimension" macro is selected under Level 1. Under Level 2, the "Usage alone" macro is selected.

Macro Preview (Bottom Right): Shows the preview of the selected "Usage alone" macro. The macro code is: `<usage (1) name='%TEXT%'>` followed by a `delta-link link-id='%LINK-ID%'` node.

Valid Mode: A checkbox labeled "Valid Mode:" is checked.

RemineBirth: A button labeled "RemineBirth" is visible in the bottom right corner.



HTML ProtocolForBirth.htm

Labour and delivery management

1. **[ADMISSION CRITERIA]**

[Admission to the hospital must be done in case of:

- rupture of membranes
- active labour
- abnormal Fetal Heart Rate Tracing
- maternal of fetal clinical reason]

[At admission:

- collect case history
- measure blood pressure
- perform vaginal examination
- perform fetal heart rate evaluation and an ultrasound assessment of amni index]

Enemas and perineal shavings should not be part of routine clinical practice.

MHB BirthMHB1.xml

```

Document node
├── DocType node
├── MHB document created by seyfang using DELT/A on 12/16/08
└── root (1)
    ├── chunk-group (3) group-id="#GROUP-00001" title="ADMISSION CRITERIA"
    │   ├── delta-link link-id="1"
    │   └── chunk (2) chunk-id="#CHUNK-00001"
    │       ├── structure status="recommendations"
    │       ├── control (1)
    │       │   ├── if-then (1) condition="rupture of membranes OR active labour OR abnormal Fetal Heart Rate Tracing OR maternal of fetal clinical reason"
    │       │   │   └── delta-link link-id="2"
    │       │   └── data (1)
    │       │       ├── usage (1) name="rupture of membranes"
    │       │       │   └── delta-link link-id="2"
    │       │       ├── usage (1) name="active labour"
    │       │       │   └── delta-link link-id="2"
    │       │       ├── usage (1) name="abnormal Fetal Heart Rate Tracing"
    │       │       │   └── delta-link link-id="2"
    │       │       └── usage (1) name="maternal of fetal clinical reason"
    │       │           └── delta-link link-id="2"
    │       └── delta-link link-id="1"
    └── delta-link link-id="1"
    
```

XML Node: ELEMENT 'usage'

Attribute	Value
name	rupture of membranes

Attribute: Insert degree-of-certainty

Macros View MHB-Remine1.macros

Level 1

- Basic
- Control Dimension
- Data Dimension**
- Temporal Dimension
- Evidence
- Background Information

Level 2

- Data containing Definition
- Data containing Usage
- Data containing Input
- Data containing Abstraction
- Definition alone
- Usage alone**

Macro Preview

Macro: Usage alone

```

usage (1) name=" %TEXT%"
└── delta-link link-id=" %LINK-ID%"
    
```

OMA

Original text – MHB – Asbru

- Original protocol mixed with table representation of MHB and optionally Asbru
- Index listings
- Cross reference listings showing missing bits



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Richtlijn - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

file:///E:/Dokumente%20und%20Einstellungen/seyfang/Eigene%20Dateien/Asgaard/Protocure/8hb/GMT/

[*Provision of information and communication*]

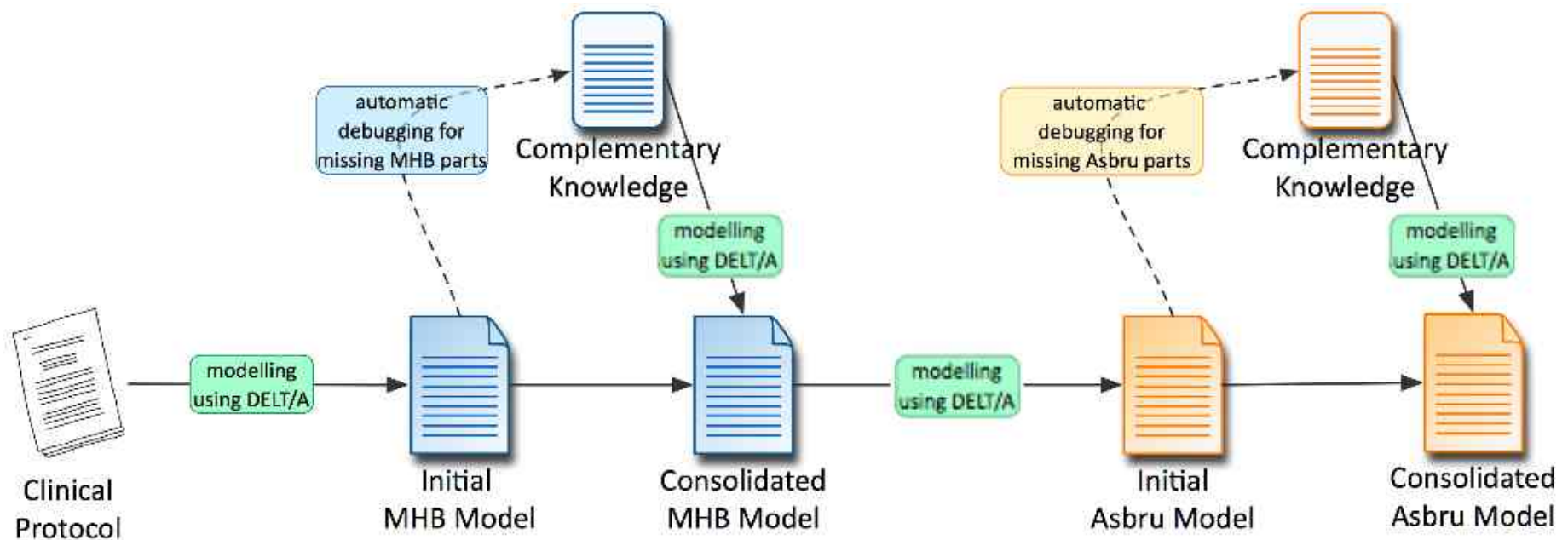
[The possibilities of breast reconstruction should be discussed with the patient prior to non-breast-conserving surgery^{CHUNK-00113}]. [The patient should also be informed that a correction may be carried out on the other breast.^{CHUNK-00114}] In women who, preoperatively, have a [higher risk of requiring postoperative radiotherapy, the increased risk of complications should be considered^{CHUNK-00115}] when deciding whether to carry out primary or secondary reconstruction.

...

CHUNK-00115	deciding whether to carry out primary or secondary reconstruction		
control	decomposition	parent-task	deciding whether to carry out primary or secondary reconstruction
		child-task(s)	consider the increased risk of complications
	if-then	condition	higher risk of requiring postoperative radiotherapy
		result	consider the increased risk of complications
		degree-of-certainty	should
data	usage	name	is there higher risk of requiring postoperative radiotherapy
structure		status	recommendations

Done

The Modelling Process



Risk Prevention by CGP Modelling

- Detailed examination of original document during modelling
 - Informal
 - Formal
- Optional execution at the point of care
 - Assisting in the selection of care steps
- Optional simulation
 - To find out problems
 - in the care process
 - in the CGP



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Conclusion

- Prevention of Risks Against Patient Safety is important
- CPGs play an important part in RAPS prevention
 - but need to be modelled
 - which is hard
- Our contribution:
The modelling process & tools



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