

Properties of Jaundice

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Overview

- Choice of properties of jaundice
- Formulation of the properties in KIV
- Improvements of the formulations

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Choice of properties

- Medically relevant:
 - Intentions (CBO)
 - Indicator of MAJIC document
- Asbru/kiv view:
 - Different type of intentions:
 - Achieve/maintain/avoid
 - Intermediate/final state
 - With and without time annotation
 - Intention of "child" versus "parent" plan

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Medical relevancy

- Treatment part is more medically relevant than diagnosis part.
- Ordering of intentions:
 - (1) Phototherapy-intensive:
maintain intermediate state (TSB-decrease = yes) <time-anno>
AND TSB-change >= 1 <time-anno>
 - (if (1) fails) Phototherapy-normal-prescription:
maintain intermediate state (TSB-decrease = yes)
 - (2) Exchange-transfusion:
Achieve overall-state (bilirubin <> transfusion)
Avoid intermediate-state (bilirubin = observation)
 - (3) Regular-treatments:

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Intentions types

- Maintain intermediate state <condition>
- Achieve overall state <condition>
- Avoid intermediate state <condition>
- Hierarchy of intentions

Notice: no "action"

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Intention type: Maintain intermediate state

- Maintain intermediate state <condition>
 - "every step": plan#(...) |-
 - "always hold from now on": [] condition
 - "only if plan is activated": []plan-state.activated
→condition

**| - plan#(...) → [] plan-state.activated →
condition**

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Other intention types

- Achieve overall state <condition>
 - | - plan#(...) →**
 - [] (last and plan-state.completed →
condition)**
- Avoid intermediate state <condition>
 - | - plan#(...) →**
 - [] plan-state.activated → not condition**
- Hierarchy: use of childrens' lemma's

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Intention type: Maintain intermediate state

- Maintain intermediate state <condition>
 - "every step": plan#(...) |-
 - "always hold from now on": [] condition
 - "only if plan is activated": []plan-state.activated
→condition

**| - plan#(...) → [] plan-state.activated →
condition**

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Improvements

Phototherapy-intensive:

- maintain intermediate state (TSB-decrease = yes) <time anno> AND (TSB-change >= 1)<time anno>
- |- plan#(...) → [] plan-state.activated → condition
- Improvements:
 - Environment assumption
(only time changes, other things do not)
 - In the condition no reference to primed (') variables.
 - You can not speak about primed variables in laststep
 - Improvement condition: laststep V "condition"
 - Condition holds when plan is activated until plan is not activated any more.
 - |- plan#(...) → environment-assumption → ([] (laststep V⁹ (plan-state.<activated AND plan-state'=activated →

KIV

- Phototherapy-intensive:
maintain intermediate state (TSB-decrease = yes) <time anno>
AND (TSB-change >= 1)<time anno>
- |- plan#(...) → environment-assumption →
 ([] (laststep V
 (plan-state.<activated AND
 plan-state'=activated → time-anno holds
 → condition unless plan-state.<activated)
- |- phototherapy-intensive#(ptnp-acttime,patient-data,time,pti-acttime,pti-state)
 → (pti-state'=pti-state' AND pti-acttime'=pti-acttime' AND
 time'=time'+1) unless laststep
 → ([] (laststep V
 (pti-state.<activated AND pti-state'=activated
 → (4 <= time. - pti-acttime..value AND time.-acttime..value <= 6)
 → get-decrease(patient-data..tsb, pti-acttime..value)
 AND get-change(patient-data..tsb, pti-acttime..value) >= 10)

Current state

- (1) Phototherapy-intensive:
 - maintain intermediate state (TSB-decrease = yes <time-anno>
AND TSB-change >= 1 <time-anno>)
- (if (1) fails) Phototherapy-normal-prescription:
 - maintain intermediate state (TSB-decrease = yes)
- (2) Exchange-transfusion:
 - Achieve overall-state (bilirubin < transfusion)
- (3) Regular-treatments:
 - Achieve intermediate-state (bilirubin = transfusion)
 - Achieve overall-state (bilirubin = observation)
- Indicator MAJIC paper

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MAJIC Indicator

- No more than one measurement after phototherapy is discontinued.
- Property about regular treatments
- Lemma's for childrens' plan
- What is "phototherapy is discontinued"?
- Need additional assumptions...
(need changes in specification...)

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Conclusions

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