SUPPORT FOR GUIDELINE DEVELOPMENT THROUGH ERROR CLASSIFICATION AND CONSTRAINT CHECKING

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Purpose
Clinical guidelines aim to eliminate clinician errors. Computer-interpretable guidelines (CIGs) can deliver patient-specific advice during clinical encounters, which makes them more likely to affect clinician behavior than narrative guidelines. To reduce the number of errors that are introduced while developing narrative guidelines and CIGs, I studied the process used by the ACP-ASIM to develop clinical algorithms from narrative guidelines.

Material and Methods
I observed and recorded ACP-ASIM experts as they created flowchart versions of clinical algorithms based on two narrative guidelines that they had created previously, for treating migraines. I used a classification scheme proposed by Knuth to classify changes between narrative guideline text and the clinical algorithm produced from it. This scheme was developed to classify changes between requirement documents and resulting software.

I used Protégé-2000 to develop an authoring and validation tool for CIGs. Protégé enables defining allowed data types and checking them, establishing cardinality constraints, and setting limits on numerical values. I used Protégé’s axiom language to define integrity constraints in a subset of first-order predicate logic.

Results
The medical expert who created the algorithm made the following types of changes between algorithm versions: (1) logic changes, (2) addition of details, (3) complexity management, and (4) omissions.

The changes between the original narrative guidelines and the final version of the clinical algorithms were classified as: (1) better user interaction, (2) clarity, (3) quality improvement, (4) omission, (5) generalization/specialization, and (6) changes that were a result of confusion.

I used the authoring/validation tool to author guidelines and to check them for errors. The tool identified errors such as decision steps that were linked to single decision options and instances of nodes that were not part of any algorithm.

Conclusion
Using the CIG authoring and validation tool might help the ACP-ASIM team create algorithms that are valid and clear. By looking specifically at the process of algorithm creation and following it closely, we can recommend that the ACP-SIM team should: (1) guarantee that all relevant information is carried from the narrative guideline to all versions of the clinical algorithm, (2) provide all the information necessary to rank treatment options, and (3) consider different patient scenarios.

References