Improving Guideline Development and Implementation

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Target Population: General

Summary: Over the past 15 years, a major global initiative has been undertaken to develop, disseminate, and implement clinical practice guidelines. However, in a process as complex as translation of medical knowledge into systems that influence clinical behavior, a number of shortcomings have been identified, including problems in the authoring process, quality defects in the production of guidelines, and obstacles to effective implementation. Although systematic reviews have demonstrated that computerized systems can be effective in implementing guidelines in clinical practice, creating computer-mediated guideline implementation systems has also proven to be onerous and not uniformly successful.

Yale University has designed a research program, co-funded by the National Library of Medicine and the Agency for Healthcare Research and Quality, on the Effective Representation of Guidelines using Ontology. This study is intended to reduce guideline ambiguities, improve efficiency, and create and evaluate tools that promote the writing of comprehensive and implementable guidelines. Overall, this program helps researchers gain an understanding of how to improve knowledge acquisition, and helps guideline authors to state recommendations precisely and comprehensively in a manner that remediates ambiguity and facilitates implementation.

Project Objectives:

- Create a library of representative guideline recommendation statements that will be used to better understand and characterize the current corpus of guideline statements and to serve as a resource for modeling and evaluation activities. **(Achieved)**

- Delineate the range of ambiguous, vague, and underspecified language in recommendation statements and devise targeted remedies. **(Achieved)**

- Analyze the terminology of obligation (deontic components) used in guideline recommendation statements to understand how this concept can be applied most effectively. **(Achieved)**

- Create ontology of recommendations. **(Achieved)**

- Develop and evaluate a controlled language editor for use by domain experts to facilitate authoring of recommendations that can be translated into decision support tools. **(Ongoing)**

2010 Activities: The first generation of Building Recommendations in a Developer's Guideline Editor (BRIDGE-Wiz) was developed in the earlier years of this project and, to date, has been used in four guideline development efforts and with good results. BRIDGE-Wiz formalizes and systematizes a process for creating implementable guideline recommendation statements. The software continues to be evaluated and refined. The focus of activity in 2010 was on creating the ontology of recommendations and

developing and evaluating a controlled language editor that can be translated into decision-support tools. To that end, the concept of action type(s) for each guideline recommendation was applied to BRIDGE-Wiz as an organizing principle. The American Academy of Pediatrics has incorporated BRIDGE-Wiz in their standard development process. In addition, activities related to developing and evaluating a 'what you see is what you mean' interface are ongoing. This interface is expected to be used by domain experts to facilitate authoring of recommendations that can be translated into decision support tools to enhance the accuracy of translation and ease of implementation of new knowledge contained in guidelines.

Two project-related papers were published in 2010 and a third paper in press at the time this summary was written. Another two papers were submitted for publication in 2010. Numerous presentations, a poster, and a workshop course were also delivered at various venues.

Preliminary Impact and Findings: Ambiguity, vagueness, and underspecification have been demonstrated to impair the perceived value and implementability of guideline recommendations. Working with collaborators in Zurich, Switzerland, the project team translated a set of guideline recommendation statements into Attempto Controlled English (ACE). ACE texts are computer processable and can be unambiguously translated into discourse representation structures, a syntactic variant of first-order logic. The team found that ACE can be used to adequately express clinical practice guideline recommendations and ACE statements were judged to be acceptably 'natural'-sounding. Principles identified can be used to improve the quality, clarity, and implementability of clinical practice guidelines. This represents some of the first work with controlled natural language in health care.

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

Business Goal: Knowledge Creation