

## **Implementing a Hypertension Guideline in a Health Care Information System: Insights, Challenges and Implications**

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Implementation of guidelines as part of a healthcare information system (HCIS) has been found to improve compliance [1] by providing the practitioner with patient-specific recommendations at the point-of-care. Several factors, including the structure of the guideline (e.g., vaguely stated decision criteria), the content of the guideline (e.g., recommendation may require a resource that is not available locally), and the functionality of the HCIS may affect implementation of such guideline-based decision support.

Most implementations of guidelines in HCISs have been done in a proprietary, system-dependent and application-specific manner. This limits sharing and customization of guidelines. Representation models and formats are being developed for computer-interpretable guidelines that are not HCIS-dependent and will allow sharing of encoded guidelines [2]. Yet guideline modeling environments tend to be developed in a top-down approach, based on (1) representation of knowledge in the narrative text guidelines; and (2) assumptions of the importance of features that are needed for the kinds of applications to be supported. The development of a representation for shareable, computer-interpretable guidelines is hampered by lack of real world experience that identifies successful approaches and barriers to implementation of more globally developed guidelines within a local environment.

We undertook a study aimed at better understanding guideline implementation issues within an HCIS. This analysis could be useful to developers of guideline representations, to developers of new guidelines, to developers of software tools to aid in implementing guidelines, and to those evaluating compliance with guidelines. We studied the implementation of a nationally developed hypertension guideline [3] in a HCIS. The study focused on the transformations made to the guideline in order to implement it.

The guideline was implemented in Logician 5.4 (Medscape Corp., Hillsboro, OR), a commercially available EMR system for an ambulatory practice. While this system does not include explicit support for implementing guidelines, it does provide tools that can be used for encoding guidelines. Of particular interest to this study, the system provides the capabilities to build custom encounter forms for data display and entry, to add user-defined fields and field values, and to program rules for clinical decision support in a proprietary expression language.

The hypertension guideline was implemented as a set of five encounter forms that had embedded within them recommendations that are dynamically generated by decision support rules. The providers can override any of the management recommendations provided by the decision support rules. The forms included those for education and evaluation by the nurse, evaluation by the physician, risk factor assessment, goal setting, and treatment.

The analysis of the guideline implementation centered on how the recommendations and the decision criteria in the ICSI guideline were implemented in the HCIS. We looked at whether decision criteria and recommendations in the narrative guideline were maintained or modified in the implementation in the HCIS. We also explored the reasons for the modification. We classify the results of the analysis into two categories: (1) adaptation or modification of guideline knowledge content, in other words, how and why recommendations were modified; and (2) integration of the guideline knowledge into the HCIS and how the attributes of both of these affected the implementation

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