

Project Title: Safety Through Enhanced e-PreScribing Tools (STEPStools):
Developing Web Services for Safe Pediatric Dosing

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Organization: Vanderbilt University

Mechanism: RFA: HS07-006: Ambulatory Safety and Quality Program: Improving
Quality through Clinician Use of Health IT (IQHIT)

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Summary Status as of: December 2008

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve the quality and safety of medication management via the integration and utilization of medication management systems and technologies.

Business Goal: Synthesis and Dissemination

Summary: This project was initiated in September 2007 and has completed the first third of the grant period. The broad goal of this project, called STEPStools (Safety Through Enhanced e-PreScribing Tools) is to assess the impact of a generally available knowledgebase for pediatric medication management on the quality and safety of prescribing in this age group. STEPStools will construct, pilot test, and evaluate generally available tools that provide medication-specific knowledge about rounding and extemporaneous formulations necessary in small children. This project will also evaluate the effectiveness of using a service-oriented architecture to distribute knowledge, which is an emerging approach to knowledge management and dissemination.

If successful, this project will demonstrate two things. First, the project will contribute knowledge in a computable form to the e-prescribing community. The project is committed to releasing this database as a toolkit, ideally through the National Library of Medicine and RxNorm, but also initially as a dataset available publicly through AHRQ, and as a peer-reviewed publication in the pediatrics literature. Second, the project will inform the vendor community and general public about the utility of Web services as a tool for knowledge dissemination, as proposed in the clinical decision support roadmap, among others. These approaches to dissemination of the knowledge developed will contribute to improved e-prescribing in pediatrics. In addition, the American Academy of Pediatrics (AAP) is committed to adding to this knowledgebase, enabling this knowledge to be available to e-prescribing developers for many years.

Specific Aims

- Convene a panel of AAP and American Medical Informatics Association (AMIA) experts to construct a knowledgebase of actionable data to guide e-prescribing systems in the appropriate rounding of calculated doses and selection of extemporaneous medication formulations. **(Ongoing)**
- Use established service-oriented architecture models to construct Web services and a Web-based client to allow the knowledgebase. **(Ongoing)**
- Evaluate the usability and content validity of these Web services, using a series of pediatric prescribing use cases, site visits to pilot users, and through an examination of the error rate of prescriptions generated with and without the use of these Web services. **(Upcoming)**

2008 Activities: With the help of partners at CVS Caremark, project staff have created an initial version of the data for medication compounding. This database is ready to be populated based on published evidence of Food and Drug Administration (FDA) reports. The plan is to have a completed draft knowledgebase available in July 2009 for review. In addition, construction of use cases has begun to outline how community pharmacists might use this knowledgebase. These use cases will be evaluated by members of the National Association of Chain Drug Stores and the Pediatric Pharmacist Advisory Group over the summer 2009 months.

Development of a schema has started for the knowledgebase, consisting of commonly prescribed medications and the dose rounding that is tolerable at each age. The initial approach is being modified by interviews with pharmacy experts. A data acquisition protocol has been constructed, recognizing various sources of knowledge with differing evidentiary quality: FDA; commonly used textbooks, such as the Pediatric Dosage Handbook; peer-reviewed literature; and expert opinion.

After discussing this project with the AAP, the project is collaborating with them to recruit a high-volume practitioner to participate on the STEPStools Working and Advisory Group. This practitioner will help provide expert opinion or a dissenting voice that will trigger additional research or expert consultation with specific drugs.

The project approach has also been modified to recognize the interdependence between accepted medication-specific weight-based dosing formulae (which are often based on indication) and the therapeutic window for each medication. The knowledgebase will now include dosing formulae for common indications, although the project will most likely not provide these formulae as recommendations; rather, it will use these formulae to reconcile specific use cases, such as a dose submitted to STEPStools that is too low for common use, though possibly appropriate for a specific indication (i.e., antibiotic prophylaxis). In this setting, were the dose being prescribed for common uses, it would be appropriate for STEPStools to return the minimum dose rather than the calculated dose. Therefore, the project may have to return multiple doses based on indication for cases such as this.

Preliminary Impact and Findings: The project continues to build the knowledgebase of pediatric compounds and rounding knowledge. Project staff have realized the importance of using a knowledge formalism to help describe the rounding process, and are in communication with one of the contractors for the AHRQ Clinical Decision Support Demonstrations to help with this strategy.

Selected Outputs

Drs. Weinberg and Johnson hosted a meeting of e-prescribing vendors at a recent American Academy of Pediatrics meeting.

A newsletter article for the American Academy of Pediatrics Newsletter, which has been released.

Available at: Vanderbilt University Medical Center. STEPStools. <http://www.pedstep.org/>. Accessed May 2009.

Constructed a knowledgebase of medications that are commonly compounded (available with password).

Grantee's Most Recent Self-Reported Quarterly Status: The project is on track in terms of constructing the Web services and will soon have completed the knowledgebase development. A publication about the Web services was submitted to AMIA, as was a poster about the knowledgebase development efforts. The project anticipates completing both components by the end of summer 2009.

Milestones: Progress is on track in some respects but not others.

Budget: Significantly under spent, approximately 5 to 20 percent.