

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

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<b>Organization:</b>	Vanderbilt University
<b>Mechanism:</b>	RFA: HS07-006: Ambulatory Safety and Quality Program: Improving Quality Through Clinician Use of Health Information Technology (IQHIT)
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<b>Summary Status as of:</b>	December 2010

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**Target Population:** Pediatric\*

**Summary:** The Safety Through Enhanced e-PreScribing Tools (STEPStools) project assesses a generally-available knowledgebase for pediatric medication management's impact on quality and safety. STEPStools is constructing, pilot testing, and evaluating available tools that provide medication-specific knowledge about dose rounding and extemporaneous formulations necessary for small children. The project also evaluates the effectiveness of using a service-oriented architecture to distribute knowledge, which is an emerging method for knowledge management and dissemination.

The project is committed to releasing this database as a toolkit, initially as a dataset available publicly through the Agency for Healthcare Research and Quality, and ultimately through the National Library of Medicine and RxNorm, the drug nomenclature for standardizing the representation of clinical drugs. 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 places such as the clinical decision support roadmap. In addition, the American Academy of Pediatrics (AAP) will contribute to this knowledgebase and will enable its availability to e-prescribing developers for many years.

### Specific Aims:

- Convene a panel of AAP and American Medical Informatics Association 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. **(Achieved)**
- Develop Web services and Web browser client to allow browsing this knowledgebase. **(Achieved)**
- Evaluate the usability and content validity of these Web services through a series of pediatric prescribing use-cases, site visits to pilot users, and an examination of the error rate of prescriptions generated with and without the use of these Web services. **(Ongoing)**

**2010 Activities:** The validation of the rounding knowledgebase, which provides age-specific dosages for commonly-prescribed medications, continued through 2010. Dr. Johnson and his team created rounding recommendations and presented these recommendations to the AAP. Rounding consensus was reached on approximately 20 medications, after which the rounding knowledgebase was completed.

In order to test the knowledge and rounding algorithm, the team added another testing phase of the knowledge database. The evaluation was not part of the initial proposal but became necessary as

the research team realized the challenges associated with selecting a formulation and ideal dose for each patient request. The knowledge and rounding algorithm was tested with a dataset of thousands of completed prescriptions, and the variability between the rounding algorithm recommendation and the approach used by the pediatrician was quantified. Analysis of these differences provided additional information to improve the algorithm. A survey of pediatric providers was completed and providers were presented with a series of case studies to show the results of medication rounding through STEPStools. The providers were asked to agree or disagree with the suggested dose, and to explain why if they disagreed. Each instance of disagreement was reviewed by the project expert panel and resolved.

The ecological survey conducted early in the project informed the process of incorporating STEPStools into the e-prescribing workflow. Throughout the year the research team worked with vendors to tailor the database and integrate its contents into the e-prescribing workflow. Two groups, Office Practicum and Vanderbilt, are contributing to the evaluation of STEPStools. NextGen was originally planned as a partner, but they were not able to collaborate on the required timeline. STEPStools is now live with the Office Practicum and Vanderbilt sites and both vendors are working with multiple practices. Due to delays in collaborations with vendors, the grant received a no-cost extension to continue the evaluation through February 2011.

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**Grantee's Most Recent Self-Reported Quarterly Status (as of December 2010):** The project is on track with 80-to-99 percent of milestones and the budget spending is roughly on target.

**Preliminary Impact and Findings:** The project team is working on several manuscripts that describe the project findings. These include a manuscript on the rounding knowledgebase and another on the rounding algorithm. A third paper will describe the team's approach to developing Web services. In addition, several posters are planned.

Some of the initial findings are about the types of information that providers find useful in the tool. For example, the tool scores a variety of answers, starting from the top-choice medication, down to one that would not be recommended. The team learned what information providers find useful, and what is extraneous.

The project team also increased its understanding of how to link knowledgebases when working with vendors. RxNorm is used as a link between the rounding knowledgebase and the vendor-supplied knowledgebase. The RxNorm creates unique identifiers for the medication name (i.e., Amoxicillin), the routed form of the medication (Amoxicillin Oral), and the dispensable form of medication (Amoxicillin 400 mg/5mL Oral Suspension). Although the unique identifiers were expected to link with other knowledgebases, a number of unanticipated barriers have arisen and will be outlined in a planned manuscript. Another finding was that inactive ingredients in compounds are not typically included in RxNorm and are not coded in many vendor systems. Therefore, inactive ingredients will not be included in the knowledgebase.

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**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

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\* AHRQ Priority Population