Facilitating Transitions to EMR Adoption through Client-Side Electronic Documentation
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Abstract
We provide a description of a web-based, client-side application to facilitate physician documentation of hospital admissions and progress notes. This system is currently being used in an Oregon tertiary academic medical center independent from and in conjunction with computerized hospital information systems while maintaining a paper-based inpatient chart. Unique features of the application include clickable and modifiable review of systems and physical exam templates, automatic incorporation of electronic information from the existing electronic systems, and creation of a centralized note repository.

Introduction
The transition from a paper-based record to a fully computerized electronic medical record system is often a long, multi-step process, particularly in the inpatient medical setting. Many homegrown and vendor systems do not have all the components of an advanced EMR as identified by the Institute of Medicine (electronic viewing of laboratory and radiology results, computerized physician order entry, and electronic documentation)1. Often, the computerized documentation component is the last to be implemented due to technical challenges and therefore interoperability benefits of a full electronic system are only realized if a full complement of mature systems are in place. Our tool was created to provide a needed solution in a hospital system that is still in the difficult transition phase to full EMR implementation. Our application enables residents and physicians to create legible, printed content for the paper inpatient medical record with the electronic capture of clinical content obtained from the medical history while also providing copy-and-paste ease in facilitating inclusion of clinical data contained in a number of unlinked computerized information systems, such as laboratory and radiology results, vital signs, and medication lists.

Design
The tool is designed with an emphasis on minimizing data entry and formatting time. User copied data from existing information systems can be imported directly including lab results, vital signs, prior 24 hour inpatient medications, and outpatient summary lists from clinics associated with the hospital system (which include medications, allergies, past medical history, primary care physician’s name, and medical record number). Imported data is parsed and formatted automatically. Users may also import sections of previously written notes or start a note using templates they have already created. In addition, the review of systems and physical exam note sections are designed to maximize flexibility while keeping user-initiated steps to a minimum. The review of systems can be completely individualized to each practitioner and items selected with one or two clicks. The physical exam also allows for flexibility in documentation through the use of drop-down menus and other web standard interface elements facilitating rapid inclusion of findings into the note.

Storage/Security
Each note created with the application is stored in a structured XML format on a central hospital file server accessible to each user though a unique log-in. The central server space allows for users to access their data using the program from any computer in the hospital. The application manages loading and saving of the data and provides a quick search feature for past notes by patient name, room number, medical records number, or date.

Conclusion
Our application provides a bridge toward full EMR implementation in a hospital system that already has several computerized information systems. We provide a versatile web-based interface for ease of use, multiple features to allow for quick data entry, and creation of a structured document through a client-side application.

Acknowledgements
This work supported in part by the NLM training grant #5T15 LM007092-15

References