Analysis of Dental Workflow with an Integrated Medical-Dental
Electronic Health Record: A Time and Motion Study

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Objective
The objective of this project was to study dental clinic staff workflow while they worked with the integrated medical-dental electronic health record and to code a defined number of activities and identify any workflow breakdowns.

Background
Oral health has recently gained much attention regarding the correlation it shares with systemic health. Many systemic diseases such as coronary heart disease (CHD), diabetes mellitus and Alzheimer's disease have been associated with periodontal disease.

Based on this latest understanding of the correlation between oral and systemic health, it seems apparent for a need to integrate medical and dental health records in order to provide the greatest quality of care possible for patients.

Marshfield Clinic recently developed an integrated medical-dental electronic health record (iEHR) environment to further advocate the idea of practicing the integrated approach to medicine and dentistry.

This new technological advancement provided an excellent opportunity to study the human-computer interaction with the iEHR environment at the Marshfield Clinic dental centers.

Methods
A data collection tool was used to capture the dental workflow. Two researchers then collected final data by observing the workflow of dentists, dental hygienists, dental assistants and appointment coordinators at four Marshfield Clinic dental centers.

Observed patient encounters included initial visits, planned visits, emergency visits and front desk interactions. Researchers documented the entire workflow of each role with a primary focus on their interaction with the iEHR.

Types of medium recorded were paper, computer and tray sheet. Activities included five main areas of tasks: data related, patient related, talking, waiting and miscellaneous, with minor tasks listed under them. Information items allowed researchers to also record detail about tasks.

Also, researchers conducted brief exit interviews and focus groups to collect participants’ opinions and experiences about working with the iEHR and other workflow issues within the dental centers.

The study protocol was submitted to the Institutional Review Board and approved under 45 CFR 46, 21 CFR 50 and 21 CFR 56, Marshfield Clinic Research Foundation IRB number ACH10110.

Results
Researchers observed 143 encounters between the four dental centers during July 2010. Encounters included 14 initial visits, 104 planned visits, 16 emergencies and 19 front desk encounters.

Dentists in particular found that posting charges significantly interrupted their workflow. It was not easy to see at a glance which charges had been posted or not. Also posting charges was inconvenient because dentists needed to go to their office computer after every patient to post charges. The operatory was often far away from their office and they had multiple patients waiting.

The ASAP list is a list appointment coordinators use to call patients to come in on short notice to fill cancelled appointments. The ASAP list took too long to load and there was no way to minimize the list once it was open. The patient’s phone number was available, but not the specific patient’s name in the case of families.

The provider drop-down selects the staff entering certain actions on the iEHR and this selection often changes throughout an encounter. If a staff member forgets to check that the proper staff is selected and enters information and tries to submit, the system alerts the user that a different staff member must be selected. The problem arises when the proper staff is then selected, all of the information previously entered is deleted.

Dentists found that ordering prescriptions took too many clicks. Also the default setting for ordering prescriptions is to send order electronically to a Marshfield Clinic pharmacy. Prescriptions were often sent electronically when the dentist intended to print them out.

Conclusions
Often the clinical information systems are designed without efficient workflow and end user’s contextual environment in mind. This forces the users of the system to adapt to the inefficiencies of the system design which could sometimes be time consuming and lead to complicated work arounds. The information gained from this study will be shared with the development team and allow for future enhancements to improve the iEHR.

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