Conceptual Clinical Information Model for a General Dental Record
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Abstract
Currently there are no standard information models available for the domain of general dentistry. This lack of a standardized information framework has lead to the development of various electronic dental record designs supporting different level of patient information coverage. This project developed a clinical information model consisting of 155 classes with 986 information items with two primary types of relationship. The entire clinical information model was represented under 63 subject areas.

Objective
The objective of this project was to develop a draft of the conceptual clinical information model for general dental record.

Background
To develop a meaningful Electronic Dental Records (EDR), the first and foremost essential criterion is to define and develop a clinical information model for the domain of general dentistry. Failure to adopt such an information model during the design and development of EDR would lead to the inability of the systems to support clinical documentation completely and accurately, there by failing the whole purpose of the EDR.

In previous studies a list of dental information items was extracted from a set of patient’s dental records and was later validated through a formal Delphi study. This project incorporated the validated dental information items list into a clinical information model appropriate for general dental records.

Methods
The Dental Information Items List (DIIL) developed from a preliminary study was organized under the different segments of the dental record used by general dentists for documenting patient information. Although the DIIL had some structure, this structure was not granular enough to provide the detailed hierarchy required in an information model. The top-level categories of the information model were first connected to their parent category in the ANSI/ADA Specification 1000 [1]. While the information items within the DIIL were extracted in a bottom-up fashion from the patient records. The various information categories within the information model were mapped to the third level and fourth level decomposition of the conceptual clinical activity model from the ANSI/ADA Specification 1039 [2] to support the business process.

Results
The clinical information model was a comprehensive, hierarchical structure with a maximum depth of five levels. The information model consisted of a total of 155 classes with 986 information items. The two primary types of relationship used in the information model were Generalization and Referencing. The Generalization relationship in turn consisted of ‘Is-A Type Of’ and ‘Is-A Part Of’ relationship. There were also secondary relationship used in the modeling process such as ‘Source Of’, ‘Documents’, ‘Provides Care’, ‘Associated To’, ‘Occurs At’, ‘Determines’, ‘Diagnoses’, and ‘Presents’. The entire clinical information model is represented under 63 subjects areas.

Discussion
The continued absence of an information model will simply perpetuate the current approach of producing dental records that cannot be used for much more than supporting the care of a specific patient. If we are, on the other hand, committed to continuously improving patient care, creating efficiencies in the health care system and fully integrating dental practice into the process of answering important research questions, the need to create a robust, consistent and comprehensive infrastructure for storing patient data becomes inescapable.

Conclusion
To even begin realizing the “Meaningful Use” of EDR, a standardized content of the EDR has to be in place. The design of the dental record should represent and adequately document the patient care process in dentistry.

References