CUSTOMIZED ELECTRONIC CHART TO IMPROVE TEACHING AND CARE IN OROFACIAL PAIN

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Idea
- Design, develop and implement a smart Electronic Medical Record (sEMR) for the Orofacial Pain and Oral Medicine (OFPOM) Clinic of the Herman Ostrow School of Dentistry of USC.
- Automated data entry forms to improve diagnostic and treatment.
- Develop an electronic Pre-encounter Smart Questionnaire to predict diagnosis that will further improve the accuracy and efficiency of the encounters.
- Develop a treatment recommendation system to further improve the accuracy and efficiency of the encounters.
- Use the e-Smart Questionnaire to guide clinicians and help correlate the results of the interview with their knowledge and clinical findings in an easy and efficient way.

Target audience
- Students, residents, clinicians and faculty working in the field of Orofacial Pain and Oral Medicine, and by extension other clinical applications.

Rationale
- Effective management of hospital staff time is crucial for quality patient care [1, 2].
- Widespread implementation of EMR systems [3].
- Domain specific EMR systems can facilitate multitasking and benefit the training of healthcare providers [4].

Gap in learner performance
- Current practice for residents at the OFPOM Clinic is to take notes during encounters and transcribe the notes on an EMR after a Faculty review.
- Existing EMR systems are generic and do not include the features needed to facilitate learning for clinicians in training.

Proposed Smart EMR system
- Web-based responsive sEMR that is (i) auditable and compliant with regulations, (ii) compatible with current EMR systems, (iii) including data entry, smart questionnaire suggestions system and follow-up system, and (iv) pedagogical features in support of clinicians in training and allows for more accurate and efficient patient encounters.
- The sEMR will be (i) specific to the OFPOM domain and (ii) help teach OFPOM process and domain information, e.g., to minimize transcription errors and teach interview, diagnosis and treatment plan options.

Intervention and Methodology
Where
- At the Orofacial Pain and Oral Medicine Clinic, Herman Ostrow School of Dentistry of USC.
When
- In 2019, design has started in January 2019.
Who
- Dental students and residents of the OFPOM Clinic.
How
- To develop the smart features of the system we will use a dataset comprised of retrospective patient encounters that we have created from real patient encounters. Domain experts will provide the information required for feature extraction for the ML (machine learning) algorithms (Figure 1).
- We will validate the design of the prototype and test for the efficiency and accuracy of the system in a pilot study.
- We will conduct a study with students in OFP to test and validate the system using the virtual patient encounter system (Figure 2) we have developed [5]. Two groups of students will be exposed to virtual patient cases for which they will have to make final decisions. A first group (the control group) will use current system in use at the OFPOM clinic. A second group will utilize the sEMR system with the same cases. The Pre-encounter Smart Questionnaire (Figure 3) will be created as a consensus opinion of a group of experts. Efficiency will be measure by comparing total times for each group in the study. Accuracy will be graded in consensus by a group of domain experts.

Outcomes
1. Automated encounter data entry form and patient management system.
2. Electronic Pre-encounter Smart Questionnaire and suggestion system for diagnoses.
3. ML for treatment protocols of related diagnostics.
4. Follow-up patient management system.
5. Validation study with virtual patient encounters.

Conclusions & Future Work
The proposed system has the potential to improve education in OFPOM and other clinical decision-making applications where patient interview skills are needed. Our goal is to implement a smart EMR at the OFPOM clinic. Future work will include: extending our sEMR to OM cases, Facilitate patient’s follow-up, validate the Pre-encounter Smart Questionnaire with real patients, improving the prediction accuracy of ML algorithms and optimize the overall system for production.

References