

Improving Antibiotic Prescribing for Dentistry in France Using an Ontology

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Abstract. Antibiotic overprescribing in dentistry is a major concern that contributes to the emergence of antimicrobial resistance. It is due in part to the misuse of antibiotics by dentists but also by other practitioners who see patients in emergency for dental care. We used the Protégé software to create an ontology regarding the most common dental diseases and the most used antibiotics to treat them. It is an easy shareable knowledge base that could be used directly as decision support tool to improve the use of antibiotics in dental care.

Keywords. Antibiotics, Dentistry, Ontology, Emergency room decision support

1. Introduction

In France, misuse of antibiotics is seen in dentistry and in GP practice. About 60% of the prescriptions given by dentists worldwide are unnecessary or inappropriate [1]. Furthermore, many French people go to emergency services or a GP for urgent dental care [2] and 57.1% of GPs who see patients for dental emergencies prescribe antibiotics without waiting for a consultation with a dentist [3]. Indeed, antibiotics for urgent dental care are prescribed for 68% consultations on a Telemedicine platform and 33% at the ER (Melot B. et al, to be published). There are few existing ontologies regarding dental infections [4–6]. Our aim was to improve antibiotic prescribing for urgent dental care for French patients seen in primary care by the design of an ontology of dental infections.

2. Methods

To build the ontology on the topic of antibiotics in dentistry we used Protégé software [7] providing interoperability by supporting Web Ontology Language (OWL). The relevant concepts and relationships between antibiotics and diagnosis in dentistry were identified and set in the ontology using the latest French recommendations [8]. These included classes for different types of antibiotics, most common dental diseases and patient related knowledge and information (e.g. age, symptoms). Properties and relationships between the classes were defined. The ontology was continually reviewed

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as additional concepts and relationships were added. Subject matter experts were consulted and relevant literature was reviewed [9,10] to ensure the accuracy and completeness of the ontology.

3. Results and Discussion

We managed to create a knowledge base for dentistry in the form of an ontology regarding antibiotic, diseases and patient related information. It is based on 3 main classes: patient, dental disease and antibiotics. In each of those we implemented subclasses to be as exhaustive as possible (Figure 1).

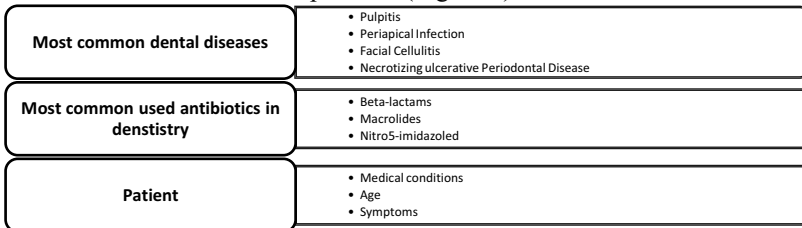


Figure 1. The three principal concepts and their subclasses in the ontology allowing the practitioner to identify the correct indication of antibiotics for dental care.

Despite current recommendations, patients are frequently prescribed antibiotics during acute teeth pain without clinical confirmation for infection. Our ontology is an exhaustive but simple tool allowing the mimic of the clinical reasoning for most common dental diseases. It organizes and structures up-to-date knowledge regarding antibiotic prescription in dentistry and improves the quality and safety of dental care. It does not exist yet in general practice in France and could be used for clinical decision-making algorithms or recommendation systems.

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