

Complex Classification Criteria Inhibit Phenotyping Periodontal Health Using OMOP Vocabularies and Tools

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Background

The infrequent use of diagnostic coding in dental care settings requires researchers to reconstruct periodontal health status phenotype from their classification components and build them into complex flow chart algorithms. These algorithms have not yet been mapped to standardized OMOP vocabularies or saved as phenotypes on the OHDSI Atlas platform. This poster evaluates the effort needed to introduce such phenotypes in support of future observational periodontal research.

Methods

The author mapped OMOP concepts within the two most commonly used periodontal health classifications: the 2018 system from the American Academy of Periodontology and European Federal of Periodontology (AAP-EFP)¹ and the 2012 system from the Centers for Disease Control & Prevention and the American Academy of Periodontology (CDC-AAP)^{2,3}. The mapping exercise followed straightforward rules in the CDC-AAP documentation for reproducing the classifications from scratch. The more complex AAP-EFP classification was operationalized following two separate flow-charting guidelines: (1) as published by Patel et al⁴, piloted in a dental record system at an academic dental care setting, and (2) as published by Holtfreter et al⁵, designed for epidemiological survey implementation. Each component within the flow charts were mapped, where possible, to OMOP concepts. Concepts were mapped using both a pre-coordinated approach through LOINC codes and a post-coordinated approach through SNOMED codes. The author then attempted to create the relevant phenotype and cohort criteria within the OHDSI Atlas platform.

Results

The CDC-AAP classification relies primarily on counts of sites with certain criteria for interproximal pocket depth and clinical attachment loss. The AAP-EFP system relies on similar calculations of maximum clinical attachment loss, while also incorporating criteria

such as the extent of radiographic bone loss, the count of teeth loss due to periodontitis, counts of opposing teeth, measures of tooth mobility or furcation involvement, and the presence of certain other oral abnormalities. In almost all cases, the author could map a classification criteria element to a standardized vocabulary, but at a different level of aggregation. For example, clinical attachment loss at the tooth and site level can be mapped to either LOINC or SNOMED, but not *maximum* clinical attachment in the whole mouth, or the *count of interproximal* pocket depth measurements exceeding 5mm. As these aggregated measures were not available in Athena, and Atlas does not enable complex table calculations, producing these phenotypes was not feasible.

Conclusions

The concepts required to compute common periodontal health phenotypes can be mapped to standard OMOP vocabularies, but only after statistical processing. Examples include aggregating site-level measurement to the tooth and mouth, calculating maximum distances, and understanding where remaining teeth are positioned relative to other remaining teeth. Three workable solutions include: (1) promoting pre-processing and aggregation in the clinical record and allowing non-standard mappings, (2) introducing new codes to account for these non-standard levels of statistical aggregation, or (3) allowing more complex logic and computation within the Atlas platform.

References

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