SNOMED CT Odontogram refset package Release Notes - January 2018

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1 Introduction

The SNOMED CT Odontogram refset was developed from 2015-2017 as a tool to exchange basic oral health status information between dental clinicians using a standardized format and to support gathering of research and quality data based on the most common visualizations for clinicians worldwide.

This refset includes a set of SNOMED CT content from the International Release as defined by the scope in 2.1. below. For those who are starting to implement SNOMED CT in Dentistry, you should be aware that SNOMED CT contains a large amount of content relevant to the profession, and the SNOMED International Dentistry Clinical Reference Group has professional oversight of this content, working to ensure it is relevant and up to date with practice. An additional related product is the General Dentistry Diagnostic refset - see 'Obtaining the Release' below for how to obtain refsets.

2 Background

Dentistry has been viewed as both an allied profession with medicine and as a subspecialty of medicine. Even with these viewpoints, dentistry has developed its documentation and electronic systems as well as clinical workflows in an isolated or "siloed" environment.

Electronic Dental Record systems (EDRs) originally used many of the "paper" documents used in our non-electronic environments. One of those, used in countries throughout the world, is a "picture" representation of the teeth. Within that representation, clinicians placed information on where teeth had been restored, often using a color-coded diagram of the individual tooth, thereby painting a part of the tooth diagram with a color. Frequently the color represented the status of the treatment, completed elsewhere, completed by the current clinician, or planned treatment. It could also indicate the type of procedure or material used.

Proper documentation of an odontogram can provide both historical perspective as well as current status for a significant portion of oral care. It can assist in developing proper treatment recommendations.

While other sub specialties in health care may use picture type of diagrams to represent both historical and current status, the overwhelming majority of dental care, whether it is in highly developed or less developed countries, can be readily represented by using a very small set of terms within SNOMED CT. This would provide software vendors of EDRs a very manageable tool to create a representation that might be readily transferred to any dental clinician.

As an example, the general dentistry refset, released in 2017, contained just 226 terms. In a test to correlate this set of findings and disorders to actual treatment run against data from an organization in the USA called the National Association of Dental Plans, it appears that these 226 concepts can accurately map to and account for between 98 and 99% of all treatments provided. The point is that, while the odontogram refset might not represent every possible condition, this set likely accounts for the overwhelming amount of information about the oral environment that a dental clinician would regularly use.

2.1 Scope

The purpose of the refset is twofold:

1 - it is designed to identify a set of core content that can realistically be exchanged for an odontogram.

2 - a small set may allow Electronic Dental Record (EDR) vendors and the dental payer community to more quickly and inexpensively implement tools that will allow for their use.

The odontogram refset contains primarily terms from four of the SNOMED CT hierarchies:

The most common one is Procedures, but it also includes several Body Structures and some Findings and Disorders.

A primary consideration of this refset is its ability to represent different time perspectives. It is designed to differentiate between procedures that were completed elsewhere, completed previously by this clinic/clinician or is planned treatment that is represented on the odontogram visualization. While there may be merit in defining a similar contextual representation for the findings and disorders, this set may not contain all of the necessary terms to properly do so.

2.2 Use cases:

The Odontogram refset is designed as a tool for use by EDR vendors to develop and communicate an odontogram visualization with standard formats and terms that can allow for population of another odontogram visualization in a different (or the same) software system in a manner that dental clinicians will be able to readily understand with minimal effort or training.

Use cases:

1. Creating an initial visualization of a tooth chart for a patient new to this clinician/practice
2. Updating the visualization of a current patient to maintain an accurate clinical record
3. Provide a reasonably complete representation of a patient's current oral condition to other clinicians and for proper record documentation.
4. Provide a structured set of terms for information exchange among clinicians.

Data entry- Direct entry of SNOMED CT concepts using the Odontogram term set

During a patient encounter, the dental clinician identifies a problem or need. The clinician then enters the problem/disorder/finding into a "diagnosis" field and the EDR then provides a list of the most frequent SNOMED CT terms that the clinician can then use to select the best match from the GD term set. Alternately, a set of "pick lists" could be used that would take a clinician through a hierarchy of one to several different levels that would result in the best possible match for the identified condition.

Referral/Transfer of care

A general dentist may wish to refer the patient to a specialist colleague. The general dentist would enter the information regarding the problem /disorder/finding using a SNOMED CT term from the GD term set. An HL7 message is then constructed containing the identified SNOMED CT concepts from the GD term set. This would allow the specialist to have the information and possibly differential diagnosis from the general dentist. This should reduce confusion and hopefully save the patient some time and reduce repetitive services.

Constraint of terminology for population and sub-population analysis

Whilst one can make a compelling case for a more granular and therefore larger term set, the infrequent use of terms to date in Dentistry potentially limit its value until dentists and other dental clinicians better understand the use of, purpose of, and proper identification of diagnostic concepts.

Dentistry has some general disease categories. Dental caries, gingival diseases including periodontal, and endodontic diseases account for the vast majority of treatment procedures provided by dentists when treating diseases. Further, it will take dentistry some time to get to the point where virtually all dental visits result in the assignment of a rationale or structured term for the visit.

Initially, in order to provide some level of data aggregation, less granularity may allow for the development of decisions support tools (CDS) and other forms of evidenced based tools for assisting in the determination of care plans.

3 Motivation

Understanding of a visualization of the teeth, the odontogram, is quite universal within Dentistry. It allows a dental clinician the ability to quickly identify a patient's current dental status and recommended care. Because it is well understood within the dental community, it provides an excellent platform for information exchange to facilitate a transfer of patient care or coordination of care with dental specialties.

4 Content

The odontogram refset includes all of the necessary elements to represent each specific tooth as well as conditions in the oral cavity that are related to the tooth by location or more specifically.

The refset also includes a number of procedures that are commonly provided by dental clinicians. These are normally, though not exclusively, tooth specific and can be detailed to a specific segment (surface) of a tooth.

The set also includes a number of findings that can represent current or potential problems for a tooth or teeth. Other findings represent abnormal locations or positions of the teeth to provide for better visualization by the clinician.

One of the critical aspects of the refset is that it contains terms that can assist in representing time and condition. It can represent whether procedures were previously completed (elsewhere) recently completed, including today (at this clinic by this clinician), and procedures that are planned to be completed in the future.

The term set includes a relatively small set of terms for disorders, procedures and findings that represent the vast majority of dental disease and treatment. In seeking broad adoption among dental electronic records vendors and recognizing the variability of the odontogram design and depth of detail, this refset is designed to include the core of what most systems would need to have in any odontogram visualization.

SNOMED CT contains a greater level of granulation for use with more complex implementations. The odontogram ref set is at a level of granularity that is suitable to support the scope and use-cases. Greater granularity can be grouped to the level of the ref set.

5 Design

5.1 Version

The dependent version of SNOMED CT is the January 2018 International Edition release.

5.2 Ownership

Whilst IHTSDO are the owners of SNOMED CT, clinical validation and ownership is provided by the SNOMED International Dentistry Clinical Reference Group.

5.3 Frequency

The first Production version of the refset was published after the July 2017 International Edition release of SNOMED CT. Subsequently it will be maintained in line with each release of SNOMED CT International Edition.

6 Implementation

With a very limited history of implementation of any diagnostic terms in dentistry and the fact that there are numerous different electronic dental records (EDR) system vendors worldwide using different methodologies of data structuring, databases, visualization, and workflow design, but common to most EDRs is the use of some sort of graphical presentation of the teeth. The vendors may have different levels of detail in their representation, different technical implementation to facilitate the graphical presentation and different database structures. It is therefore likely that there may be several unique and functional approaches to implementation of the odontogram refset. Additionally, the varying payment mechanisms in different countries may have different needs and set different requirements as they become more involved in obtaining and using the data.

Even with these different approaches there are some common factors in most dental communities around the world. These are the teeth, the division of each tooth in sections (surfaces), common findings and procedures. All in all registrations related to the odontogram represent the wast majority of clinical registrations in a dental general practice.

6.1 Structure of the odontogram

The odontogram can range from very simple presentations (fig.1) to far more advanced (fig.2). To some extent the more advanced implementations contains more information, but in principle it follows the same basic structure - the structure of the teeth. The main difference is in the visual representation, and in some cases the level of granularity. There may also be a difference in the amount of data included as a more advenced odontogram might facilitate a broader spectrum of anatomical localizations connected to the tooth, and thereby making it possible to connect a broader spectrum of findings and procedures to the teeth.
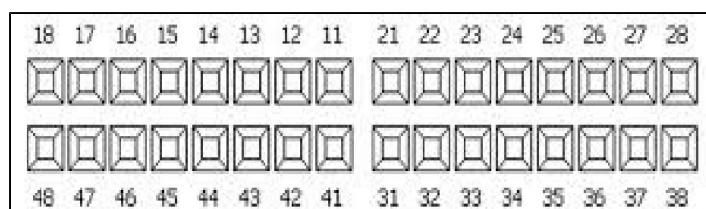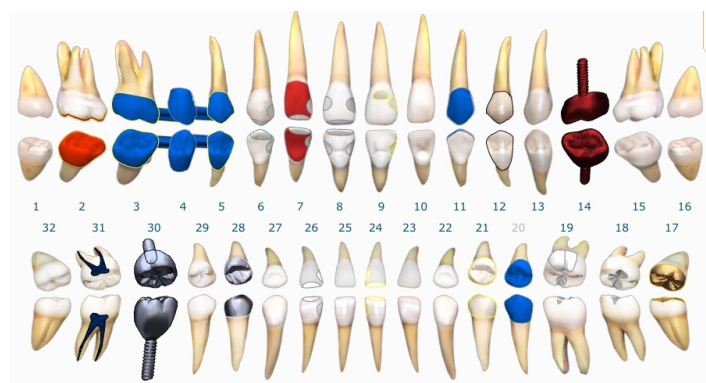

Fig.1

Fig. 2

In order to provide the graphical interface to the user the vendor need to have a structured database for all elements included in the visualization. Eventhough this structure is prorietary it provides the necessary information to exchange data. As illustrated by the two figures there are no SNOMED CT concepts displayed directly in the user interface. Vendors may use standardized or, more commonly user defined, text in the text-part of the interface. The information elements of the odontogram could be stored proprietarily, and still SNOMED CT concepts can be used for information exchange. But SNOMED CT concepts could also to great extent be used to populate the odontogram.

6.2 From structure to concepts

Using SNOMED CT to represent the odontogram requires the structure of the EDR to be mapped to the correct concepts. SNOMED CT terms can be shown to the user as text-boxes to help with correct understanding, but often this is not necessary - and may be counter-productive. For example when it comes to surfaces of a tooth. These are easily and unambigously shown graphically to the user, and the textual description would only interrupt the presentation.The text related to a finding or procedure should on the other hand at some time be shown to the user to ensure correct understanding. Either by displaying a SNOMED CT term or using a mapped interface-terminology.

Figure 3 shown an example screenshot of a structurally registrered diagnosis represented in a spreadsheet using SNOMED CT consepts.
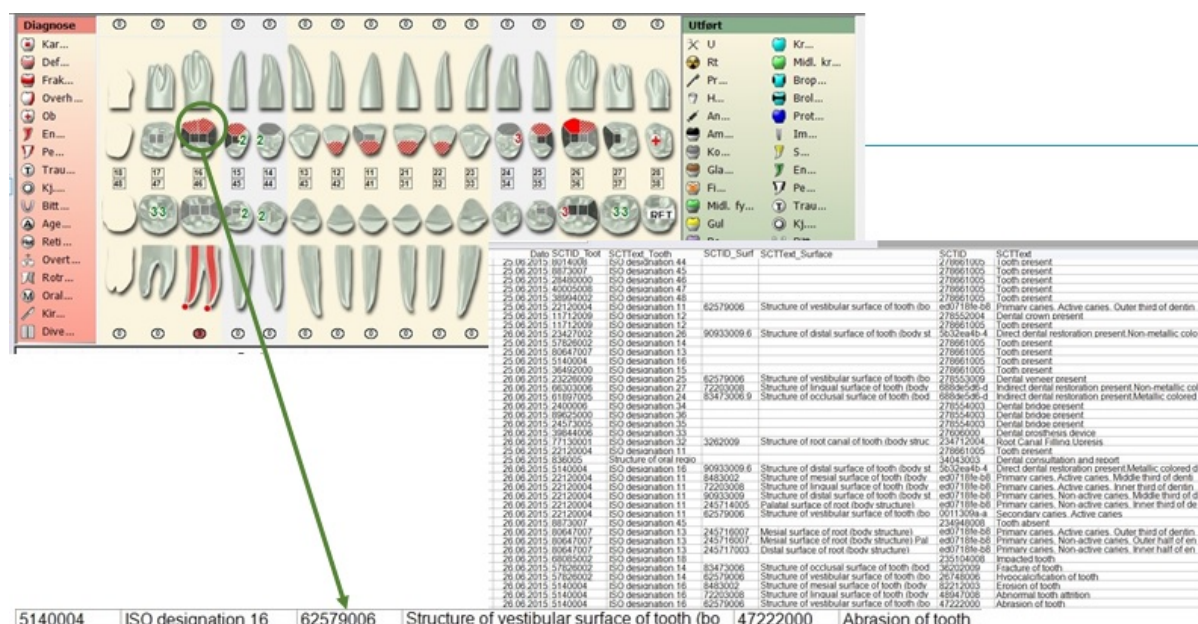

Fig.3

As seen in figure 3 the tooth, surface and finding are stored as different concepts, and not combined to å complex expression. The relationship, storage and exchange of these elements will be governed by the information model. It is probably not optimal to combine everything into one expression.

So far the approach has been to have a structure of 3 elements:

- Anatomical region (tooth)
- Region(s) on the tooth (if applicable)
- Finding/procedure.

6.3 The use of expressions

Not all findings/procedures can be represented by a single concept, and the implementation therefore is based on the use of expressions. At this time the aim has been to limit the need for expressions to the combination of two concepts. The introduction of expressions greatly reduces the amount of concepts needed, and in some cases it could ease the implementation, storage and exchange.

The use of expressions relates to:

- Caries-finding
- Reason for tooth loss
- Procedures

For more information on the use of expressions, please refer to the guide on Expression Constraint Language.

6.4 Procedures and restorations present

Procedures will probably benefit the most from use of expressions. A dentist will chart a procedure in several different states. As a finding of a past procedure - finding an "old" restoration, when planning a procedure, when performing a procedure etc. To avoid concept explosion, and to ease implementation, it is recommended that any dental procedure is represented by the use of the appropriate concept from the procedure hierarchy combined with a qualifier value.

7 Obtaining the Release

The SNOMED CT Odontogram refset is available from SNOMED International and is maintained and updated in line with the SNOMED CT International release which is currently 6 monthly.

Access within SNOMED International member countries is provided by the Member National Release Centre in each country, via the relevant Member page. Affiliates of IHTSDO in non-member countries can access the refset through their Member Licensing and Distribution Service (MLDS) account. Please contact info@ihtsdo.org for more information if required.

8 Feedback

As mentioned previously, dentistry and dental clinicians only infrequently use any form of diagnostic terminology. The number of user interfaces is, therefore, very limited. Currently there has been no usability testing completed of this refset.

It is also recognized that this is not an exhaustive set of terms dental clinicians might use. It may not be suitable for dental specialists or general dentists who limit their practices to such areas as dental implants or treatment of specific conditions such as sleep apnoea. It is expected that, as adoption increases, the refset will need updating and incorporate additional SNOMED CT content. It may also be helpful to develop refsets for the limited number of recognized dental specialties.

Please provide feedback on usage of this refset to info@snomed.org with Odontogram Refset in the subject box

9 Technical Notes

RF2 package format

The RF2 package convention dictates that it contains all relevant files, regardless of whether or not there is content to be included in each particular release. Therefore, the package contains a mixture of files which contain both header rows and content data, and also files that are intentionally left blank (including only a header record). The reason that these files are not removed from the package is to draw a clear distinction between:

1. ...files that have been deprecated (and therefore removed from the package completely), due to the content no longer being relevant to RF2 in this or future releases, and
2. ...files that just happen to contain no data in this particular release (and are therefore included in the package but left blank, with only a header record), but are still relevant to RF2, and could therefore potentially contain data in future releases.

This allows users to easily distinguish between files that have purposefully been removed or not, as otherwise if files in option 2 above were left out of the package it could be interpreted as an error, rather than an intentional lack of content in that release.

Approvals

Final Version	Date	Approver	Comments
1.0	27 Mar 2018	Penni Hernandez	Approved
1.0	27 Mar 2018	Jane Millar	Approved
1.0	28 Mar 2018	Lesley MacNeil	Approved

Draft Amendment History

Version	Date	Editor	Comments
0.1	01 Feb 2018	Andrew Atkinson	Initial draft
1.0	27 Mar 2018	Jane Millar	Final updates

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