Caries modeling discussion. Notes from the email string a few months ago:

From Dr. White:

Primary and Recurrent (secondary) are easily defined.  Primary is caries occurring on tooth surfaces.  Recurrent (secondary) caries are caries that occur on tooth surfaces that have been previously restored, i.e. adjacent to a restoration.  If you need a citation or better definition for this let me know.

Active and non-active are also easily observable clinically and definable.  See table 3 in the attached paper and copied below.

In my view, we can certainly have caries terms without active and non-active, however, we MUST have activity as this is the standard in dentistry.  So many people simply don’t want to deal with activity, however, it is the standard in cariology.

The issue of an accurate diagnosis is not one of terminology, it is one of education.  Caries activity are used in the ADA classification of caries and in ICDAS and ICCMS.

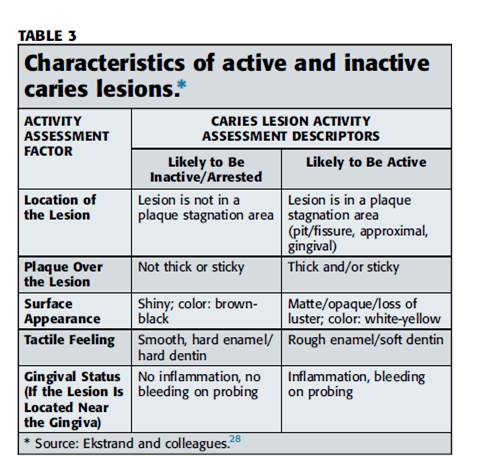
We all struggle with activity in rendering a diagnosis.  Simply put, if a patient has moderate or high caries risk, without sufficient prevention and has enamel lesions, they are active.  If a patient has low and moderate caries risk and has and uses prevention with white spot lesions, the lesions are considered non active.  If there are enamel lesions without evidence of progression clinically or radiographically or both, then these are non-active lesions.  If there are enamel lesions with evidence of progression clinically or radiographically or both, then these are active lesions.  These are just some general principles.  The surface characteristics are what are used most for determining activity in the ADA classification and ICDAS classification system, based on clinical examination.

All of the above are for clinicians understanding of activity, from a terminology perspective, we simply need to have the terms.

Tooth, site, activity and extent are all needed for a caries diagnosis.  Activity is used (and taught) currently, and not having activity continues to be a significant omission.  The goal is to have the very best terms in SNOMED.

IF as a compromise, we want to have as parents, caries diagnosis without activity, as options for those who don’t want to deal with activity, that would be ok with me.  As long as we have the children of these terms having the granularity of active and non-active.

We need to have activity for those of who use it and to conform with modern caries diagnosis.



From Mark Jurkovich in response:

I am not sure that I am comfortable with this.  Please help me understand this a little better.

Primary and secondary are observations and very easy clinically to identify the difference.  I have no problem when they are properly defined.  I am still not quite sure if primary caries would be a finding, disorder, or morphologic abnormality or all of the above.

 My problem is with active/non-active. I struggle with them.  I know the cariologist's have a definition, but struggle with the idea that these are (accurate) observations, or findings as they are simply the best opinion (differential diagnosis) of a clinician.  Thus, I see this as possibly combining two concepts from different hierarchies.  It is again my opinion that it is very important for dentistry to begin to understand active vs non-active and I am not sure that clinicians can properly make those determinations yet or we are at a point where we can make these with any level of validity.

Am I correct in my reasoning?  If not or you see this differently, please explain it for me.  If my reasoning is rational, is this the best way for us to go?

I just don't see how we can parse Active primary caries so it will follow compositional grammar without potentially mis-representing the concept to "game" the system

From Dr. Jorgensen responding to Dr. Jurkovich questions:

The ones I noted are:

|  |
| --- |
| Active Primary Caries |
| Non-active Primary Caries |
| Active Secondary Caries |
| Non-active Secondary Caries |

Further questions from Dr. Jurkovvich:

I absolutely agree with you regarding primary and secondary caries.  In fact, these have the definitions you cite, when stating primary caries or secondary caries as morphologic abnormalities, but not if we refer to them as primary dental caries.  This term is a disorder and a synonym of enamel caries. I do not believe that to be correct.

The clarity of the definitions (basically caries associated with (secondary) or not associated with (primary) a current restoration in the tooth) makes this a much easier term to work with.

I am also aware of both classification systems and absolutely want to represent the various pieces of what we know or how we currently classify caries and make it available within SNOMED CT.  NO resistance from me, just want to get it right going forward.

Your explanation of active/non-active is precisely what I am getting at.  Your description talks about the many factors we consider in determining caries risk to help us evaluate activity (among other factors).  Additionally, determining hard vs soft and color differences are simply not as concrete as what we use to describe primary and secondary.  In my mind, primary and secondary are absolutes and (usually) easy to identify.  Active/non-active is much more an opinion that is based on many factors, therefore much more of a differential diagnosis, again in my mind.

To my way of thinking, this creates several potential (possibly theoretical however) problems:

1)  We would be combining two different concepts into a single concept (I am OK with that), but creating quality definitions might be very difficult. for primary active, primary non-active, secondary active and secondary non-active, particularly since there are differences in how we (and the chart you included) interpret activity depending on whether it is enamel or dentin related.

2) The current terms for primary and secondary caries as well as when activity is added are morphologic abnormalities which is part of the body structure concept tree within SCT. To date, we have just one parent for each of the terms, caries, which leads to necrosis, which eventually leads to body structure.  If we instead wish to have this as a disorder (Dental caries), we have five parents, including bacterial infection and  that includes infection and oral lesion, which may make deeper analytics into relationships with other diseases much easier from a developing of algorithms standpoint.

3)  As we add attributes (building blocks) to further refine and allow for greater granularity, we need to make sure these follow compositional grammar rules and that they can be properly parsed. Though I have not tested it, I would think that we would be able to do this, whether we consider caries a morphologic abnormality or a disorder.

4)  It might be important to ask cariologists internationally if they are comfortable with listing caries as a morphologic abnormality rather than a disorder.

5)  The clean up of caries related terms as well as determining which terms really need to be fully defined will change, based on the approach taken above.

A suggested approach to issues above, as proposed by Dr. White

I agree with what you have uncovered, Primary is simply not in the right place, this can be corrected.

As a suggestion:

Dental caries with children being Primary and Recurrent caries (along with Arrested Caries that is already there)

Primary caries with a child primary active caries

Recurrent caries with a child recurrent active caries

Arrested caries with a child arrested primary caries

Arrested caries with a child arrested recurrent caries

Further clarification from Dr. White:

I had not considered the morphologic abnormality.

For me the term is all a disorder as it describes dental caries.  Considering what we have done with periodontal disease, the more granular terms are all children of periodontitis.

We may have painted ourselves into a corner, with the extent of disease.

I am still learning about the relationships, and we can both see what the editors have to say.

For me, dental caries is the disorder and the additional descriptions are part of the defining the disorder.

My suggestion is to define each of the components of the terms separately and then put them together.

Primary-Caries occurring on tooth surfaces.

Recurrent-Caries occurring on the tooth surfaces adjacent to a restoration.

Active-A caries lesion that is progressing, continuing to lose tooth structure (mineral) that is in a plaque stagnation area, has thick and/or sticky plaque over the lesion surface.  The surface appearance is matt/opaque/loss of luster.  The surface has a tactile feeling of rough on the enamel and soft on the dentin.  If the lesion is located near the gingiva, the gingiva is inflamed and with pleading on probing.

Non-active-A caries lesion that is not progressing, arrested, not losing tooth structure (mineral) that is not in a plaque stagnation area, and the plaque on the surface is not thick or sticky.  The surface appearance is shiny.  Tactile feeling is smooth and hard for enamel and dentin.  If the lesion is near the gingiva there is no inflammation and no bleeding on probing.

So, Primary active caries is:  Caries occurring on tooth surfaces where the lesion is progressing, continuing to lose tooth structure (mineral) that is in a plaque stagnation area, has thick and/or sticky plaque over the lesion surface.  The surface appearance is matt/opaque/loss of luster.  The surface has a tactile feeling of rough on the enamel and soft on the dentin.  If the lesion is located near the gingiva, the gingiva is inflamed and with pleading on probing.

A suggested approach from Dr. Warren:

I believe dental caries should be a disorder as it would be used to record a diagnosis. From my understanding (please correct me if I’m wrong), morphologic abnormalities are used as attribute values to define concepts and would not be used in patient records in the place of concepts from the clinical finding hierarchy i.e. disorders. So morphologic abnormality concepts are for refining other concepts rather than to be used as concepts in a record themselves. I noted that 80967001 | Dental caries (disorder) is fully defined having the associated morphology attribute with value 65413006 | Caries (morphologic abnormality).

<https://confluence.ihtsdotools.org/display/DOCEG/6.6.1+Morphologic+abnormalities+vs.+Findings>

So having caries in the morphological abnormality sub-hierarchy and the disorder sub-hierarchy are needed.

Having the below added as morphologic abnormalities will allow these to be used as defining characteristics rather than as terms a clinician would select.

Active secondary dental caries

Active primary dental caries

Non-active secondary dental caries

Non-active primary dental caries

I agree that active and inactive caries statuses pose a risk of not being 100% accurately used by dentists. However, they are terms useful to diagnose types of caries and document their status. As previously mentioned in the email thread, 80967001 | Dental caries (disorder) concept has a child concept of arrested caries already 80753001 | Arrested dental caries (disorder).

I agree with Mark, the concept 80353004 | Enamel caries (disorder) has an incorrect synonym of ‘primary dental caries’. This synonym would need to be retired and a new concept would need to be produced as a child of 80967001 | Dental caries (disorder).

Visually this could look like:

Dental Caries (disorder)

-       Primary caries (disorder)

o   Primary active caries (disorder)

-       Secondary caries (disorder)

o   Secondary active caries (disorder)

-       Arrested caries(disorder)

o   Arrested primary caries (disorder)

o   Arrested secondary caries (disorder)