Common Plaque Accumulation Patterns in Dental Students Captured with Plaque Control Heat Map-Development of a Novel Visual Tool


BACKGROUND

Although the O’Leary plaque score and the average plaque index are the most common values used to quantify plaque control, they both have many limitations and are not very useful in providing information for the clinician to in turn help the patient improve their oral hygiene habits. The O’Leary Plaque Score fails to capture the spatial relationship of most problematic teeth surfaces nor can it indicate plaque reductions locations if or when it occurs. There is a lack of quantitative assessment in that it does not capture oral hygiene improvements in one area that reduces the plaque index of surface significantly. The objective of this study is to report common plaque accumulation patterns in dental students using a newly developed individualized plaque control heat map to facilitate customized oral hygiene therapy.

The plaque control heat map (PCHM) combines the O’Leary’s plaque control record (PCR) and plaque index (PI) to capture spatial relationship and quantitative analysis of oral hygiene levels. Hot spot areas are identified as areas with higher numbers of plaque indices. Customized oral hygiene therapy is critical to address those specific hot spots with hands on instruction that are tailored for each individual.

METHODS AND RESULTS

Study reviewed and approved by Institutional Review Board (HUM0012801)

Clinical rotation with 128 dental students using disclosing agent for PCHM

Screening for completeness and quality of records: n= 99 PCHM included in study

Record plaque indices using criteria of 0.3 for each tooth surface.

Heat map plaque control indices of all tooth surfaces pooled together and identify areas with highest PI averages

Find plaque score as percentage: Positive plaque surfaces recorded and divided by total # teeth surfaces present

Table 1. Correlation between tooth surface area and plaque score averages

<table>
<thead>
<tr>
<th>Color</th>
<th>PI</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td></td>
<td>No plaque in gingival area</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Film of plaque on FGM # tooth, only recognized by running probe</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Moderate accumulation of plaque within pocket on the FGM # tooth seen by naked eye</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Accumulation of sub-gingival plaque and adjacent tooth</td>
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1. Plaque indices were highest in following areas: • posterior buccal areas of the maxillary molars (PI=0.817) • lingual surfaces of mandibular molars (0.804) • buccal of mandibular molars (0.819) • mandibular incisor lingual surfaces (0.758)

2. Of each tooth and all surfaces, the interproximal areas always have higher degree of plaque index.

3. Crossover areas including buccal interproximal areas of tooth #6 (0.710) and #27 (0.806) were also high.

4. Average plaque score of 59.96% and plaque index average of 0.63 was obtained.

5. No correlation between the O’Leary plaque score and the plaque index average was found in these subjects.

DISCUSSION

• A heat map provides a quantitative assessment that helps both patients and providers visualize the problematic areas of plaque control.

• Rather than putting simply shading in the tooth surface where there is a presence of plaque in the original plaque control record, a heat map marks each surface with the plaque index, which is a quantitative value.

• In this way, plaque reductions can be quantified and assessed at future appointments to see if there oral hygiene improvements and compliance of patients to follow instruction.

CONCLUSIONS

1. Demonstrated representative plaque accumulation patterns in dental students with plaque control heat map (PCHM).

2. More information can be extrapolated from PCHM to provide basis for customized oral hygiene instructions.

3. PCHM can offer a direct visual aid for both novice clinician and patient education to recognize trouble areas and monitor the improvement throughout the process of a successful oral hygiene therapy.

4. Future studies and technology developments are needed to optimize its practicability and generalizability.

REFERENCES
