Evaluating Clinical Quality Assurance and Quality Events: EVT Coding & Oral Health Assessment

Dr. Sean G. Boynes
What is Quality?

• Quality is described as the degree to which the entire set of characteristics of a product, process, or service satisfies established, predicted, or obvious needs.

• In dentistry there is little consistency in the use of quality measures.

• Differing ideas of what it really is and can be based on individual or group interpretations.
  - In health care, previous descriptions are generally confined to “standard of care”

Jockstad et al. (2001); Shugars & Bader (1996); Poorterman et al. (1998)
What is Quality Assurance?

- Quality assurance (QA) contains the progression of:
  - Quality assessment,
  - Identification of issues,
  - Developing a strategy for resolving problems,
  - Implementation of changes.

Poorterman et al. (1998); Jones et al. (2007)
What is Quality?

• What we should want with QA/QI:
  o Sound data that provides information for operational and clinical decision making
  o Provides information on and allows positive impact for **TRIPLE AIM**
    • Population Health
    • Experience of Care
    • Per Capita Cost
  o Ultimately leads to:

**Practice Translation**
What do you measure, right now?

- Gross Charges
- Net Revenue
- Expenses
- Number of visits
- Revenue per visit
- Cost per visit
- # of Unduplicated Patients
- # of New Patients
- # of Transactions
- Broken Appointment Rate
- Emergency Rate
- Payer Mix Percentages
- Scope of Service
- # FTE Providers
- # FTE Billing Staff
- A/R past 90 days
- # of Completed Treatments
- # of children receiving sealants (under 21)
- # of sealants applied
- % Children seen receiving a preventive service
Quality Versus Quantity

• Dentistry traditionally measures quantitative information.
• Works well for financial well being and evaluating access to care
  o Necessary but may not fully reflect clinical care
• Difficult to use this data to alter patient outcomes or determine success/failure of clinical changes, education programs, community outreach
• Difficult to make alterations to plans, protocols, and policies
• How good is the clinical dental care we are providing?
IDEA: EVT Coding
Quality Event Codes

- What is a quality event?
  - An occurrence or consequence relating to the patient's oral health either as a result of oral health care or patient habits/behavior that may result in negative patient outcomes
    - Complications, adverse events, failures

- Quality Event Codes = EVT Codes (EVT)

- **Aim** is to provide baseline statistics for event reports as a means to gauge, improve, and enhance total quality assurance.

- **Objective** is to determine if relationships exist between event report rates and delivery of care, location of treatment, procedure type, oral health risk, provider, or encounter type or number.
Why EVT Coding?

• We (CSCDM) previously completed several small, clinically specific studies to evaluate quality of care such as: safety and efficacy/successful outcomes

• Needed to streamline evaluation
  o Are we doing what we say we are doing?
  o Are we clinically competent?
  o How are we effecting patient outcomes?
  o HOW CAN WE AFFECT PATIENT AND COMMUNITY OUTCOMES.
Background: How we implemented EVT Coding

- Idea was to develop a system that could review data over three years and provide a simplified method of review (*The Prospective Snapshot*)
- Identify quality events that occurred over a period of one year to create a baseline that could be used for quality improvement
- Decided to use evaluations to determine percentage of incidence (COE, POE, OE3, and specific LOE)
  - Thus, during examinations how often are these things seen, reported, or recorded.
  - Can also be thought of as how often do these occur with each treatment plan.
A standardized format was used to input a tracking code into electronic dental software (DENTRIX ENTERPRISE™).

- The study involved a one year analysis.
- EVT (Quality Event) codes were predetermined and with each occurrence were inserted as a “dummy code” into the EDR.
- Reports were run at the end of the analysis period to determine incidence.
- Specific codes were further evaluated to provide a more positive impact on quality assurance.
106 Total Codes*
  *8 codes are Rx codes

Categorical Arrangement
  - Anesthesiology
  - Behavior Management
  - Community Outreach
  - Endodontics
  - Implantology
  - Operative/Restorative
  - Oral Surgery
  - Orthodontics
  - Patient Compliance
  - Periodontology
  - Preventive Care
  - Prosthodontics
  - Systemic
COMMUNITY OUTREACH
EVTNOTB (No Toothbrush)

PATIENT COMPLIANCE
EVTACREST (Replace restoration new sfc caries)
EVTACRESTX (Extraction due to new sfc caries)
EVTACASCADE (Loss of sealant due to caries)
EVTPLAQ (Prophy needed within 3 mos due to plaque/calcus build up)
EVTREPAIR (Composite repair needed due to compliance issues)

PREVENTIVE
EVTACALRAD (radiographic calculus detected within 6 mos of prophylaxis)
EVTACEAL18M (sealant loss more 18 months)
EVTACEAL1Y (loss of sealant 6-12 months)
EVTACEAL18L (loss of sealant 1Y-18mos)
EVTACEAL6M (Loss of sealant within 6 mos)
EVTACALSEAL (high occlusion on sealant requiring adjustment – add’l encounter)

PROSTHODONTICS
EVTACRCC (re-cement crown less than 6 mos)
EVTACRCC1 (re-cement crown 6m – 1Y)
EVTACRCC2 (re-cement crown 1Y – 2Y)
EVTACBMAR (open margin on crown/bridge from lab)
EVTACDNSR (multiple ulcerations due to poor denture fit less than 3 months from placement)
EVTADTNR (dentine relining needed within 3 mos of placement)
EVTACBSHIT (inadequate fit of crown/bridge from lab requiring replacement)
EVTACDENT (inadequate fit of denture requiring re-send to lab or complete replacement)

BEHAVIOR MANAGEMENT
EVTN2O (loss of appointment – N2O ineffective)
EVTUNC (uncooperative patient 1st visit – no care)
EVTUNC2 (uncooperative patient 2nd visit – no care)

EVTUNC3 (uncooperative patient 3rd visit – no care)

ANESTHESIOLOGY
EVTBCBIT (cheek bite)
EVTBLTIT (tongue bite)
EVTBLIT (lip bite)
EVTINANES (inadequate anesthesia – add’l injection)
EVTNUMB (pain report due to feeling numb – add’l encounter)
EVTTRIS (trismus report)
EVTANSB (bleeding with injection)
EVTHEMA (hematoma with injection procedure)
EVTPROAT (prolonged anesthesia)
EVTBNBK (undesired nerve block)
EVTSEDMD (mild complication with sedation care)
EVTSEDMO (Moderate complication with sedation care)
EVTSEDSDV (severe complication with sedation care)

ORAL SURGERY
EVTDRYSOK (dry socket)
EVTSURGE (removal of suture – incomplete dissolve)
EVTBRKOS (broken tooth needling referral to OMFS)
EVTOSBD (significant bleeding from extraction requiring more than standard procedure (s) to stop)
EVTISINUS (sinus exposure during extraction)
EVTRENS (reattachment of frenum following frenectomy)

ENDODONTICS
EVTFCAP (failed pulpotomy w/in 1Y)
EVTFCAP2 (failed pulpotomy 1-2Y)
EVTFCAP3 (failed pulpotomy 2-3Y)
EVTFCAP4 (failed pulpotomy within 1Y)
EVTFRPOTY1 (failed pulpotomy within 1Y)
EVTFRPOTY2 (failed pulpotomy 1-2Y)
EVTFRCT1 (failed RCT w/in 3 mos)
EVTFRCT1 (failed RCT 3 mos – 1Y)
EVTFRCT2 (failed RCT 1Y-2Y)

SYSTEMIC
EVTHTPALP (heart palpitations during care)
EVTHTHYPO (hypoglycemia)
EVTNAVO (nausea and vomiting)
EVTTHOSP (activation of EMS or patient to hospital for emergency event)

OPERATIVE/RESTORATIVE
EVTFC1Y (failed SSC within 1Y)
EVTFC2 (failed SSC 1-2Y)
EVTFR2Y (failed restoration 6m-1Y)
EVTFR2Y1 (failed restoration 1Y-2Y)
EVTFR3Y (failed restoration 2-3Y)
EVTFRSW (complete loss of filling w/in 3 months)
EVTFRSWT (complete loss of filling 3 mos – 1Y)
EVTHTIOC (high occlusal contact on restoration)
EVTMOVH (restoration with overhang present)
EVTSPAIN (pain from restorative procedure, add’l encounter)
EVTREPA (composite repair during to operative issue)
EVTFC6M (failed SSC within 6 mos)
EVTFR3M (failed restoration less than 3 mos.)
EVTFR6M (failed restoration 3-6 mos)

ORTHODONTICS
EVTBRKL (missing or loose brackets w/in 1 month)
EVTBRKL1 (missing or loose brackets 1-3 months)
EVTBRKL2 (missing or loose brackets 3-6 months)
EVTBRKL3 (missing or loose brackets 6m-1Y)
EVTBRKL4 (missing or loose brackets 1Y-2Y)
EVTBRKL5 (missing/loose bracket 2-3Y)

EVTORCAP (orthodontic relapse within one year after appliance/braces removal)
EVTORCAP2 (orthodontic relapse 1-2Y after appliance/braces removal)
EVTORCAP3 (orthodontic relapse 2-3Y after appliance/braces removal)
EVTBAND (orthodontic appliance band breakage)
EVTORCAR (caries observed with appliance/braces removal)
EVTORREM (significant remineralization w/ appliance/braces removal)
EVTORFM (mild malocclusion present at end of orthodontic treatment)
EVTORFO (moderate malocclusion present at end of orthodontic treatment)
EVTORFST (severe malocclusion present at end of orthodontic treatment)

PERIODONTOLOGY
EVTTHLSS (loss of teeth/teeth due to failed periodontal therapy)
EVTTFRE (Graft rejection & failure w/in 3 mos of placement)
EVTTFRE1 (Graft rejection & failure w/in 3 mos of placement)
EVTTFRE2 (Graft rejection 6mos-1Y)
EVTPOCKET (presence of persistent residual periodontal pockets after 1Y from perio therapy initiation)
EVTMOBIL (increase in tooth mobility grade after 18 mos from perio therapy initiation)
EVTLENGTH (failure of crown lengthening)

IMPLANTOLOGY
EVTIMFAIL (failure of implant within 3 mos)
EVTIMFAIL1 (failure of implant 3-6 mos)
EVTIMFAIL2 (failure of implant 6m-1Y)
EVTIMFAIL3 (failure of implant 1Y-2Y)
EVTIMFAIL4 (failure of implant 2-3Y)

RX CODING
EVTANIT (antibiotic Rx)
EVTVAL (valium Rx)
EVTTHAL (halcion Rx)
EVTBUP (buprenorphine Rx)
EVTODIP (opioid Rx)
EVTST (steroid Rx)
EVTFLUO (fluoride Rx)
EVTCHL (chlorhexidine Rx)
EDR & EVT Code Entry

- Creation of Dummy Coding / Tracking Codes
Clinical Entry

Or, if the EVT Code is known, one can manually enter.
EVT Reports

- Clicking on the DXONE icon will open the report selection window. Analysis -> Production Summary (Report that is ran when EVT Codes in Adjustment Categories).
If you set up a new “category” of which to assign tracking codes (ex. “event codes”), this is where you would choose the correct category as a filter.

You can filter the report by ADA codes (previously listed as tracking codes).

Bill Type (Best filter for information we have)

Include patient names in filter. Once this is clicked, the Report Type needs to match.
# Production Summary

6/1/2013 - 5/31/2014 Procedure Date

**Clinics:** <ALL>

**Provider:** <ALL>

**Billing Types:** <ALL>

<table>
<thead>
<tr>
<th>Report Date: 6/2/2014</th>
<th>Report Generated By: RILEYA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantity</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>-----------------</td>
<td>----------</td>
</tr>
<tr>
<td>EVTUNCP - Uncooperative pt - first visit</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
<tr>
<td>EVTUNCP2 - Uncooperative Pt - second visit</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
</tr>
<tr>
<td>EVTUNCP3 - Uncooperative Pt - third visit</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
</tr>
</tbody>
</table>
EVT Analysis

• 2473 total evaluations
• 571 Quality Events recorded
• 39 of 98* EVT codes reported
  o *Does not include Rx codes for this analysis
• 23.1% EVT code rate
# EVT Category Report

<table>
<thead>
<tr>
<th>EVT Category</th>
<th>Number of Reports</th>
<th>% of EVT</th>
<th>% of EVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Outreach</td>
<td>206</td>
<td>36.1%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Patient Compliance</td>
<td>168</td>
<td>29.4%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Preventive</td>
<td>106</td>
<td>18.6%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Restorative/Operative</td>
<td>40</td>
<td>7.0%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>35</td>
<td>6.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Behavior Management</td>
<td>9</td>
<td>1.6%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Endodontics</td>
<td>7</td>
<td>1.2%</td>
<td>0.3%</td>
</tr>
<tr>
<td>EVT CODE</td>
<td>Number of Reports</td>
<td>% of EVT</td>
<td>% of EVAL</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>EVTNOTB</td>
<td>206</td>
<td>35.1%</td>
<td>8.3%</td>
</tr>
<tr>
<td>(No Toothbrush)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVTCARSEAL</td>
<td>55</td>
<td>9.6%</td>
<td>2.2%</td>
</tr>
<tr>
<td>(Loss of sealant due to caries)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVTSEAL1Y</td>
<td>45</td>
<td>7.9%</td>
<td>1.8%</td>
</tr>
<tr>
<td>(Loss of sealant 6-12 months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVTPLAQ</td>
<td>44</td>
<td>7.7%</td>
<td>1.8%</td>
</tr>
<tr>
<td>(Additional prophylaxis needed due to plaque/calculus build up within 3 months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVTCAREST</td>
<td>40</td>
<td>7.0%</td>
<td>1.6%</td>
</tr>
<tr>
<td>(Replace/Loss of restoration due to new surface caries)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## EVT Report

### COMMUNITY OUTREACH

<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTNOTB</td>
<td>No toothbrush reported at home (No toothbrush/shares with other family members/no toothbrush at all residence locations)</td>
<td>206</td>
<td>8.33%</td>
</tr>
</tbody>
</table>
Quality Application / Practice Translation

• No toothbrush report is actually part of our performance improvement plan
• Tracking this since 2012
• Decrease from 30.1% (FY2012) to 13.3% (FY2013) to 9.4% (FY2014) [*based on patient #]
  o 8.3% (based on total evaluation #)
• Try to get as many toothbrushes into community as possible
• Use location data (zip code or billing type (school name)) to determine highest need areas
  o Use limited resources to fullest potential
  o Focus on health fairs in area
  o Local festivals
  o Other community outreach avenues
Process of Quality Evaluation

After selecting the date range, there are many filters to work with to get the report needed. Some that I find most useful are:

- If you set up a new “category” to assign tracking codes to (ex. “tracking codes”, “event codes”), this is where you would choose the correct category as a filter.
- You can also filter the report by selecting which “ADA” codes (you would have your tracking codes listed as ADA codes)
- Bill Type is one of the biggest reporting filters, keep this in mind when determining how your office defines this and why.

This filter will provide names of patients listed with the tracking code. Once the decision is made to filter the report using Category Selection or ADA Code Selection, the Report Type needs to match (lower left selection).
## EVT Report

### PATIENT COMPLIANCE

<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTCARSEAL</td>
<td>Loss of sealant due to caries (sealant still present)</td>
<td>55</td>
<td>2.22%</td>
</tr>
<tr>
<td>EVTPLAQ</td>
<td>Patient needs additional prophylaxis within three months due to plaque/calculus build up</td>
<td>44</td>
<td>1.78%</td>
</tr>
<tr>
<td>EVTCAREST</td>
<td>Loss/replacement of restoration due to new surface caries</td>
<td>40</td>
<td>1.62%</td>
</tr>
<tr>
<td>EVTREPAIR</td>
<td>Composite repair contained to enamel due to patient compliance issues</td>
<td>22</td>
<td>0.89%</td>
</tr>
<tr>
<td>EVTCAREXT</td>
<td>Extraction due to new surface caries on tooth with previous restoration</td>
<td>7</td>
<td>0.28%</td>
</tr>
</tbody>
</table>
Quality Application/Practice Translation

• Patient compliance can be the heaviest burden for a dental program
• How do you transform culture or social determinants, remove denial, change priorities?
• Knowledge
  o “Sometimes I’m confused by what I think is really obvious. But what I think is really obvious obviously isn’t obvious...” (Michael Stipe)
  o “Information is not knowledge” (Albert Einstein)
• Educational Protocols
  o Community Outreach
  o Chairside/Clinical
  o During front office patient contact / the subliminal method
  o Through community leadership
## EVT Report

### PREVENTIVE

<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTSEAL1Y</td>
<td>Loss of sealant 6-12 months</td>
<td>45</td>
<td>1.82%</td>
</tr>
<tr>
<td>EVTSEAL6M</td>
<td>Loss of sealant within 6 mos.</td>
<td>26</td>
<td>1.05%</td>
</tr>
<tr>
<td>EVTSEAL18</td>
<td>Loss of sealant more than 18mos – less than 3 years</td>
<td>21</td>
<td>0.85%</td>
</tr>
<tr>
<td>EVTCALRAD</td>
<td>Radiographic calculus detected less than 6 months of prophylaxis</td>
<td>7</td>
<td>0.28%</td>
</tr>
<tr>
<td>EVTHISEAL</td>
<td>High occlusion on sealant resulting in additional encounter</td>
<td>4</td>
<td>0.16%</td>
</tr>
<tr>
<td>EVTSEA18L</td>
<td>Loss of sealant 1 year – 18 months</td>
<td>3</td>
<td>0.12%</td>
</tr>
</tbody>
</table>
Sealant Retention Rates

• Most evidence states: expected sealant retention rate at approximately 45-65%.
  o A 52.7% retention rate was found with school based placement on children from low income backgrounds

• Most research downplays retention.

• Identified variables include:
  o Patient cooperation
  o Isolation techniques
  o Age of patient
  o Operator experience
  o Tooth location
  o Field of view
  o Number of operators

Mertz Fairhurst et al. (1984); Feigal (1998); Muller-Bolla et al. (2013)
Quality Application/ Practice Translation

• Even though retention was at approx. 85%: CSCDM felt event to address is loss of sealant

• We replace each sealant that is lost (3 year maintenance)
  o Increase time
  o Cost of materials
  o Caries susceptibility
  o Lost revenue

• First make sure all personnel are following evidence based care for placement – interview/ask
  o (prn Training)

• Next step is to identify variables & possible issues to improve these percentages
  o Manually looked at patient base – overweight/obese patients made up approximately 50% of patient’s with lost sealants in first year
    • Obesity/weight a complicating factor in dentistry
    • PRACTICE TRANSLATION—patients that fit Obese/OW status when possible have team to place sealants
  o New technique out of a Texas based school program using Hydrogen Peroxide with cotton tip applicator [prior to etching] for better retention

Boynes et al. (2013); Cheymol (2000); Ebbeling et al. (2002)
<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTHIOC</td>
<td>High occlusal contract restorative; additional encounter</td>
<td>17</td>
<td>0.69%</td>
</tr>
<tr>
<td>EVTFR2Y</td>
<td>Failed restoration 1Y-2Y</td>
<td>7</td>
<td>0.28%</td>
</tr>
<tr>
<td>EVTFR1Y</td>
<td>Failed restoration 6m-1Y</td>
<td>4</td>
<td>0.36%</td>
</tr>
<tr>
<td>EVTPAIN</td>
<td>Pain from procedure requiring additional encounter</td>
<td>4</td>
<td>0.16%</td>
</tr>
<tr>
<td>EVTFR3Y</td>
<td>Failed restoration 2Y-3Y</td>
<td>3</td>
<td>0.12%</td>
</tr>
<tr>
<td>EVTREPA</td>
<td>Composite repair due to operative issue</td>
<td>2</td>
<td>0.08%</td>
</tr>
<tr>
<td>EVTFC1Y</td>
<td>Failed SSC crown pedo within 1 Y</td>
<td>1</td>
<td>0.04%</td>
</tr>
<tr>
<td>EVTFC2</td>
<td>Failed SSC crown pedo 1Y – 2Y</td>
<td>1</td>
<td>0.04%</td>
</tr>
<tr>
<td>EVTOVHG</td>
<td>Interproximal restoration with overhang observed at additional encounter</td>
<td>1</td>
<td>0.04%</td>
</tr>
</tbody>
</table>
Quality Application/Practice Translation

• While there are many other aspects to quality care with operative procedures – the dental profession tends to focus on success/failure of fillings
  o About 60% of all operative work done is attributed to the replacement of restorations.

• While most aspects of operative care QA are limited in literature, annual failure rates with fillings can be ascertained

• The structure of these studies’ designs make it difficult to apply with the EVT coding as a direct comparison
  o Limitation in that until concrete benchmarks are established would have to use total fillings placed as comparison and manually calculate using other software.

Mjor (1989)
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Evaluation period/study design</th>
<th>Materials tested</th>
<th>Evaluated restorations</th>
<th>AFR\textsuperscript{b}/outcome/survival rate of composite</th>
<th>Factors associated with composite failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Da Rosa Rodolpho et al., 2011 [3]</td>
<td>22 years, RL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: between 1.5% and 2.2%</td>
<td>Tooth type, cavity size, material</td>
</tr>
<tr>
<td>Opdam et al., 2010 [12]</td>
<td>12 years, RL</td>
<td>Composite vs. amalgam</td>
<td>Large Class II</td>
<td>AFR: 1.68%</td>
<td>Caries risk</td>
</tr>
<tr>
<td>Fokkinga et al., 2008 [104]</td>
<td>17 years, PL</td>
<td>Composite</td>
<td>Endodontically treated teeth with or without a prefabricated metal post</td>
<td>AFR: 2.8% (restoration level) and 1.2% (tooth level)</td>
<td>No factors associated</td>
</tr>
<tr>
<td>Bernardo et al., 2007 [8]</td>
<td>7 years, PL</td>
<td>Composite vs. amalgam</td>
<td>Class I and II</td>
<td>AFR: 3.0% (total-etch)</td>
<td>Secondary caries</td>
</tr>
<tr>
<td>Opdam et al., 2007 [24]</td>
<td>9 years, RL</td>
<td>Composite</td>
<td>Class II with a total-etch technique or with glass-ionomer lining</td>
<td>AFR: 3.3% (glass-ionomer lining)</td>
<td>Presence of a lining, caries risk</td>
</tr>
<tr>
<td>Opdam et al., 2007 [13]</td>
<td>5 and 10 years, RL</td>
<td>Composite vs. amalgam</td>
<td>Class I and II</td>
<td>AFR: 1.7% (5 years) and 1.8% (10 years)</td>
<td>Amount of restored surfaces</td>
</tr>
<tr>
<td>Soncini et al., 2007 [9]</td>
<td>5 years, PL</td>
<td>Amalgam vs. composite/compomer</td>
<td>Children aged 6–10 with more than one posterior restoration</td>
<td>AFR: 2.98%</td>
<td>Number of restorations, cavity size</td>
</tr>
<tr>
<td>Lindberg et al., 2007 [105]</td>
<td>9 years, PL</td>
<td>Composite/composite-compomer open sandwich</td>
<td>Class II</td>
<td>AFR: 1.1%</td>
<td>No factors associated</td>
</tr>
<tr>
<td>Gordan et al., 2007 [55]</td>
<td>8 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 0%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Da Rosa Rodolpho et al., 2006 [2]</td>
<td>17 years, RL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 2.4%</td>
<td>Tooth, cavity type, cavity size</td>
</tr>
<tr>
<td>Burke et al. and Lucarotti et al., 2005 [27–29,37]</td>
<td>Up to 10 years, RS</td>
<td>Amalgam, composite and glass-ionomer</td>
<td>Class I and II</td>
<td>AFR: 8.4% (5 years) and 5.7% (10 years)</td>
<td>Operator: age, country of qualification, employment status; Clinical: cavity size, root filling; Patient: age, charge-paying status, practice assiduity</td>
</tr>
<tr>
<td>Nagasiri et al., 2005 [106]</td>
<td>5 years, RL</td>
<td>Composite, amalgam and OZE</td>
<td>Endodontically treated molars</td>
<td>AFR: 12.4%</td>
<td>Remaining coronal tooth structure</td>
</tr>
<tr>
<td>Mannocci et al., 2005 [107]</td>
<td>5 years, PL</td>
<td>Amalgam/composite with post, endodontically treated tooth</td>
<td>Class II</td>
<td>AFR: 2%</td>
<td>More root fracture with amalgam, more secondary caries with composite</td>
</tr>
<tr>
<td>Opdam et al., 2004 [40]</td>
<td>5 years, RL</td>
<td>Composite</td>
<td>Class I and II placed by dental students</td>
<td>AFR: 2.6%</td>
<td>Operator: year of graduation; Clinical: proximal contact status Not investigated</td>
</tr>
<tr>
<td>Andersson-Wenckert et al. 2004 [30]</td>
<td>9 years, PL</td>
<td>Composite and glass-ionomer, open sandwich</td>
<td>Class II</td>
<td>AFR: 3.2%</td>
<td></td>
</tr>
<tr>
<td>Coppola et al., 2003 [39]</td>
<td>5 years, RS</td>
<td>Composite vs. amalgam</td>
<td>Posterior restorations with 2 surfaces at least</td>
<td>Average longevity: 42 months</td>
<td>Dentist experience</td>
</tr>
<tr>
<td>Hayashi and Wilson, 2003 [108]</td>
<td>5 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 3.76%</td>
<td>Marginal deterioration, cavomarginal discoloration</td>
</tr>
<tr>
<td>Author, year</td>
<td>Evaluation period/study design</td>
<td>Materials tested</td>
<td>Evaluated restorations</td>
<td>AFR(^b)/outcome/survival rate of composite</td>
<td>Factors associated with composite failure</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------</td>
<td>------------------</td>
<td>------------------------</td>
<td>---------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Palleseen &amp; Qvist, 2003 [25]</td>
<td>11 years, PL</td>
<td>Composite, direct vs. indirect</td>
<td>Medium to large Class II</td>
<td>AFR: 1.45%</td>
<td>Tooth type</td>
</tr>
<tr>
<td>Turkun et al., 2003 [76]</td>
<td>7 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 0.82%</td>
<td>No factors associated</td>
</tr>
<tr>
<td>van Nieuwenhuysen et al., 2003 [26]</td>
<td>5-22 years, RL</td>
<td>Amalgam, composite and crowns</td>
<td>Posterior extensive restorations</td>
<td>Average survival time: 7.8 years</td>
<td>Clinical: tooth type, extension of restoration, pulpal vitality, use of base material; Patient: age, 3-year period of treatment</td>
</tr>
<tr>
<td>Busato et al., 2001 [109]</td>
<td>6 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 2.5%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Gaengler et al., 2001 [31]</td>
<td>10 years, PL</td>
<td>Composite with glass ionomer cement</td>
<td>Class I and II</td>
<td>AFR: 2.6%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Kohler et al., 2000 [51]</td>
<td>5 years, PL</td>
<td>Composite</td>
<td>Class II</td>
<td>AFR: 5.5%</td>
<td>Caries risk</td>
</tr>
<tr>
<td>van Dijken, 2000 [110]</td>
<td>11 years, PL</td>
<td>Composite, direct inlays/onslays and restorations</td>
<td>Class II</td>
<td>AFR: 1.6% (inlays/onlays) and 2.5% (direct restorations)</td>
<td></td>
</tr>
<tr>
<td>Wassel et al., 2000 [111]</td>
<td>5 years, PL</td>
<td>Composite, direct vs. inlay</td>
<td>Class I and II</td>
<td>AFR: 1.5%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Lundin and Koch, 1999 [112]</td>
<td>5 and 10 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 2% (5 years) and 2.1% (10 years)</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Raskin et al., 1999 [41]</td>
<td>10 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 8.6%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Wilder et al., 1999 [113]</td>
<td>17 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 1.4%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Collins et al., 1998 [73]</td>
<td>8 years, PL</td>
<td>Composite</td>
<td>Class I and II</td>
<td>AFR: 1.71%</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Mair, 1998 [74]</td>
<td>10 years, PL</td>
<td>Composite vs. amalgam</td>
<td>Class II</td>
<td>100% of success</td>
<td>Not investigated</td>
</tr>
<tr>
<td>Nordbo et al., 1998 [75]</td>
<td>10 years, PL</td>
<td>Composite</td>
<td>Saucer-shaped Class II</td>
<td>AFR: 3.0%</td>
<td>Not investigated</td>
</tr>
</tbody>
</table>

Studies using secondary data are highlighted in gray.

- R: retrospective; P: prospective; L: longitudinal; S: secondary data acquisition.
- AFR: annual failure rate.
Restoration Failure

- Reported annual failure rates (AFR): 0-12.4%
- 90% of the clinical studies indicated that annual failure rates between 1% and 3% can be achieved with Class I and II posterior composite restorations (although these evaluations tend to review with ideal conditions during study analysis)

- Variables do exist that can cause AFR to increase:
  - Tooth type and location
  - Cavity size
  - Experience of operator
  - Number of surfaces (each additional surface may increase failure rate by 40%)
  - Patient behavior during care visit
  - Socioeconomic status
  - Caries Risk
  - Bruxism
  - Materials used (minor effect with a cascading change)

Demarco et al. (2012); Hickel & Manhart (2001); Lucarotti et al. (2005)
Opdam et al. (2007); Manhart et al. (2004)
EVT & Restoration Failure

• Total failure data: 14 events
• Mean yearly total fillings placed in analysis period: 1302

• **AFR: 1.1%**
  - AFR: 1.2% (w/ 16 events if composite repair data is included)

• *Limitation of AFR with this data set is that we are comparing using 5 year data and this analysis looks at 3 years of data*
## EVT Report

### ANESTHESIOLOGY

<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTINANES</td>
<td>Inadequate anesthesia; requiring additional injection</td>
<td>21</td>
<td>0.85%</td>
</tr>
<tr>
<td>EVTLBIT</td>
<td>Self-inflicted soft tissue injury – Lip Bite</td>
<td>7</td>
<td>0.28%</td>
</tr>
<tr>
<td>EVTNUMB</td>
<td>Pain report due to feeling numb; additional encounter</td>
<td>4</td>
<td>0.16%</td>
</tr>
<tr>
<td>EVTCBIT</td>
<td>Self-inflicted soft tissue injury – Cheek Bite</td>
<td>1</td>
<td>0.04%</td>
</tr>
<tr>
<td>EVTTBIT</td>
<td>Self-inflicted soft tissue injury – Tongue Bite</td>
<td>1</td>
<td>0.04%</td>
</tr>
<tr>
<td>EVTTRIS</td>
<td>Trismus Report</td>
<td>1</td>
<td>0.04%</td>
</tr>
</tbody>
</table>
Quality Application/Practice Translation

• Due to previous anesthesia study, this data allows us to evaluate success/failure of clinical changes.

• Reveals a decrease in overall anesthesia complication rate (5.3% to 3.4% [1.9% improvement!])

• Saw an increase in “inadequate anesthesia-need for additional injection” (1.2% to 2.0%)

• Clinical changes
  o ADHD and Obese/Overweight patients receive OraVerse®
  o Elimination of the mandibular inferior alveolar nerve block as standard injection for mandibular procedures

Boynes et al. (2013)
## BEHAVIOR MANAGEMENT

<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTUNCP</td>
<td>Uncooperative first visit (no procedures billed – excludes D9920)</td>
<td>4</td>
<td>0.16%</td>
</tr>
<tr>
<td>EVTUNCP2</td>
<td>Uncooperative second visit (no procedures billed – excludes D9920)</td>
<td>3</td>
<td>0.12%</td>
</tr>
<tr>
<td>EVTUNCP3</td>
<td>Uncooperative second visit (no procedures billed – excludes D9920)</td>
<td>1</td>
<td>0.04%</td>
</tr>
<tr>
<td>EVTN2O</td>
<td>Loss of appointment – nitrous oxide inadequate to complete care</td>
<td>1</td>
<td>0.04%</td>
</tr>
</tbody>
</table>
## EVT Report

### ENDODONTIC

<table>
<thead>
<tr>
<th>EVT Code</th>
<th>Description</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVTFCAP</td>
<td>Failed pulp cap within 1 Y</td>
<td>4</td>
<td>0.16%</td>
</tr>
<tr>
<td>EVTFCAP3</td>
<td>Failed pulp cap within 2Y-3Y</td>
<td>2</td>
<td>0.08</td>
</tr>
<tr>
<td>EVTFCAP2</td>
<td>Failed pulp cap 1Y-2Y</td>
<td>1</td>
<td>0.04%</td>
</tr>
</tbody>
</table>
Quality Application/Practice Translation

- 0 failed pulpotomies
  - AFR Total Range: 0.3%-18.1%
  - According to evidence based care 5-8% AFR can be achieved
  - *CSC did a decreased number of pulpotomies; instead using evidence based care recommendations of more indirect pulp caps (use of CaOH or BioCap)
- CSC: Failed pulp caps: 7 events (AFR: 2.9%)
  - AFR Range: 0-6.2%
  - According to evidence based care 2-4.5% AFR can be achieved
  - *Limited number of research reports evaluating pulp capping as a singular investigative procedure

Farooq et al. (2000); Nirschl & Avery (1983); McDonald & Avery (1994)
## Pulpotomy

Farooq et al. (2000)

### Table 1. Pulpotomy Studies in Chronological Order

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample size</th>
<th>Inclusion criteria</th>
<th>Follow-up</th>
<th>Type of IPT</th>
<th>Sample size at conclusion</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redlig et al. 1968</td>
<td>40</td>
<td>Deep caries</td>
<td>18 months</td>
<td>Single visit</td>
<td>40</td>
<td>85% 90%</td>
</tr>
<tr>
<td>Rolling &amp; Thystrup 1975</td>
<td>98</td>
<td>Carious exposure</td>
<td>36 months</td>
<td>Single visit</td>
<td>86</td>
<td>70%</td>
</tr>
<tr>
<td>Marawa et al. 1975</td>
<td>125</td>
<td>Carious exposure</td>
<td>36-60 months</td>
<td>1/5 dilution formocresol pulpotomy</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>Willard 1976</td>
<td>30</td>
<td>Deep caries with or without Elicited pain</td>
<td>6-36 months</td>
<td>4 minute formocresol pulpotomy</td>
<td>77%</td>
<td></td>
</tr>
<tr>
<td>Schroder 1978</td>
<td>33</td>
<td>Coronal chronic pulpitis</td>
<td>24 months</td>
<td>Pulpotomy with Ca(OH)₂ base</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>Wright &amp; Widmer 1979</td>
<td>184</td>
<td>Vital &amp; non-vital pulpotomy</td>
<td>30 months</td>
<td>Oxypara or formocresol pulpotomy</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Mejare 1979</td>
<td>81</td>
<td>Coronal chronic pulpitis total chronic pulpitis</td>
<td>30 months</td>
<td>5 minute formocresol pulpotomy</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>Fukas &amp; Birnstein 1981</td>
<td>77</td>
<td>Carious exposure</td>
<td>4-36 months</td>
<td>1/5 dilution formocresol pulpotomy</td>
<td>70</td>
<td>94%</td>
</tr>
<tr>
<td>Bovee &amp; Dermaat 1982</td>
<td>137</td>
<td>Carious exposure Pulpitis Necrosis or abscess</td>
<td>4-36 months</td>
<td>Tempophore pulpotomy One visit and two visit</td>
<td>87%</td>
<td></td>
</tr>
<tr>
<td>Hellig et al. 1984</td>
<td>17</td>
<td>Coronal chronic pulpitis</td>
<td>3-6 months</td>
<td>Pulpotomy with Ca(OH)₂ base</td>
<td>88%</td>
<td></td>
</tr>
<tr>
<td>Hicks et al. 1986</td>
<td>164</td>
<td>Caries trauma</td>
<td>24-87 months</td>
<td>Dry cotton pellet then ZOE with formocresol</td>
<td>94%</td>
<td></td>
</tr>
<tr>
<td>Van Amerongen et al. 1986</td>
<td>152</td>
<td>Carious exposure</td>
<td>6-84 months</td>
<td>5 minute formocresol pulpotomy</td>
<td>78%</td>
<td></td>
</tr>
<tr>
<td>Fukas et al. 1990</td>
<td>53</td>
<td>Carious exposure</td>
<td>25 months</td>
<td>2% glutaraldehyde</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td>Fei et al. 1991</td>
<td>83</td>
<td>Carious exposure</td>
<td>12 months</td>
<td>1/5 dilution formocresol pulpotomy</td>
<td>96% FeS 1000%</td>
<td></td>
</tr>
<tr>
<td>Tsai et al. 1993</td>
<td>258</td>
<td>Carious exposure</td>
<td>36 months</td>
<td>5% &amp; 2% buffered &amp; unbuffered glutaraldehyde</td>
<td>Overall success rate 79%</td>
<td></td>
</tr>
<tr>
<td>Mack &amp; Dean et al. 1993</td>
<td>164</td>
<td>Carious exposure</td>
<td>1-60 months</td>
<td>Electro-surgical pulpotomy</td>
<td>99%</td>
<td></td>
</tr>
<tr>
<td>Robertus 1996</td>
<td>205</td>
<td>Vital pulp Non-vital pulp</td>
<td>6-91 months</td>
<td>5 minute formocresol pulpotomy</td>
<td>Vital 99% Non-vital 85%</td>
<td></td>
</tr>
<tr>
<td>Fishman et al. 1996</td>
<td>47</td>
<td>Carious exposure</td>
<td>6 months</td>
<td>Electro-fuluration 47 pulpotomy and ZOE</td>
<td>77% Ca(OH)₂ 81%</td>
<td></td>
</tr>
</tbody>
</table>
## Table 2. IPT Studies in Chronological Order

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample size</th>
<th>Inclusion criteria</th>
<th>Follow-up</th>
<th>Type of IPT</th>
<th>Sample size at conclusion</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aponte\textsuperscript{9} 1966</td>
<td>30</td>
<td>Deep caries</td>
<td>6-36 months or more</td>
<td>Indirect pulp cap with Ca(OH)\textsubscript{2} base</td>
<td>30</td>
<td>100%</td>
</tr>
<tr>
<td>Kerkhove\textsuperscript{8} 1967</td>
<td>56</td>
<td>Deep caries</td>
<td>12 months</td>
<td>Indirect pulp cap with Ca(OH)\textsubscript{2} Base or ZOE base</td>
<td>56</td>
<td>89%</td>
</tr>
<tr>
<td>Nordstrom\textsuperscript{7} et al. 1974</td>
<td>25</td>
<td>Deep caries</td>
<td>3 months</td>
<td>Indirect pulp cap with Ca(OH)\textsubscript{2} Or 10 % SnF</td>
<td>?</td>
<td>85%</td>
</tr>
<tr>
<td>Sawusch\textsuperscript{6} 1982</td>
<td>136</td>
<td>Deep caries</td>
<td>12-24 months</td>
<td>Indirect pulp cap with Ca(OH)\textsubscript{2} (Dycal) base</td>
<td>?</td>
<td>96%</td>
</tr>
<tr>
<td>Nirschl and Avery\textsuperscript{24} 1983</td>
<td>35</td>
<td>Deep caries</td>
<td>6 months</td>
<td>Indirect pulp cap with Ca(OH)\textsubscript{2} base</td>
<td>?</td>
<td>94%</td>
</tr>
</tbody>
</table>
Looking at the Future

- **Oral Health Risk Assessment (OHRA Score)**
- An important aspect to total quality assurance
- Used as a measuring tool along side EVT Coding
  - There is a symbiotic relationship
  - One helps support the other
- A standardized process used to score each patient’s risk to poor oral health outcomes
- Developed by merging available CRA forms and using same time data
- Provides a numerical value to the patient’s oral health (caries) risk
## Oral Health Risk Assessment Form

### Contributing Conditions:

<table>
<thead>
<tr>
<th>Flavor Exposure (through drinking water, supplements, professional applications)</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional applications for more than two years prior to score of low risk.</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consumption of Sugar Foods or Drinks</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient admits to consumption at regular intervals more than twice per day and does not brush and/or rinse with water after consumption is considered high risk.</td>
<td>Primarily at meal times</td>
<td>Frequent or prolonged exposure</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dental History: established patient of record, receiving regular dental care in a dental office</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timed for periods or comprehensive evaluations four times over a two year period.</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dental Knowledge: basic understanding of home oral hygiene (daily brushing habits, frequency of dental visits, understanding of cause of cavity) Measure parent's knowledge if child is 6 years of age or younger</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Health Conditions:

<table>
<thead>
<tr>
<th>Health Conditions</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uro-Genital Edema</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Mental disorder/disease that can affect oral health</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>[Drug/Alcohol abuse, eating disorders, problems relating to denial/medical assistance]</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diabetes</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Stable A1C</td>
<td>A1C &gt;9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Special Needs</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seizures</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Clinical Conditions:

<table>
<thead>
<tr>
<th>Clinical Conditions</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cavitated or Non-Cavitated (Decayed)</td>
<td>No new carious lesions over last 24 months</td>
<td>1 or 2 new carious lesions over last 24 months</td>
<td>&gt;3 or more new carious lesions over last 24 months</td>
</tr>
<tr>
<td>Carious Lesions or Restorations (Visually or radiographically evident)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visible plaque</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Visible calculus</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Unusual tooth morphology</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Exposed root surfaces</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Periodontal attachment loss</td>
<td>No</td>
<td>&gt;5mm</td>
<td>&gt;7mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recurrent decay with previous restorations, failed previous restorations, failed previous dental restoration.</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>1 or 2 failed/failed restorations</td>
<td>&gt;3 or more failed restorations</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dry Mouth (Xerostomia)</th>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Not actively seeking or within 6 months of recommended treatment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Assessment Scores:

- Assessment Score of 15 or Higher = Significant Oral Health Risk (Treat as High Caries Risk)
- Assessment Score of 25 or Higher = Recommended Patient to be Placed on 3 Month Recall Status

*Max Value of 55*
Oral Health Risk Assessment Score

- **Characteristics of Assessment**
  - Contributing Conditions
    - Fluoride Exposure
    - Sugar Consumption
    - Dental Home
    - Dental Knowledge
    - Parental Characteristics
  - Health Conditions
    - Chemo/Rad Therapy
    - Psychological Conditions
    - Diabetes
    - Cardiovascular Disease
    - HIV/AIDS
    - Special Needs
    - Tobacco
  - Clinical Conditions
    - Active Caries
    - Plaque
    - Tooth Morphology
    - Root exposure
    - Dental History
    - Attachment Loss
    - Quality of previous dental care
    - Dry Mouth
    - Timely completion of care

  Each Line Item Scored as:
  - Low = 0
  - Moderate = 1
  - High = 5

  **Pediatric Scale**

  - **High Risk:** 16 or Higher
  - **Moderate Risk:** 7-15
  - **Low Risk:** 6 or Lower
OHRA Scoring

- Used as a companion with EVT Coding to help shape clinical and operational decision making
- Evaluate performance of program as a whole
- Determine areas of highest need

**Pediatric Scale:**
- High Risk: 16 or Higher
- Moderate Risk: 7-15
- Low Risk: 6 or Lower

![Graph showing OHRA Scoring data from FY2012 to FY2014, including New Patients, Recall Patients, and Cumulative counts, with a Pediatric Scale indicating risk levels.]
OK, So now what?

- First analysis of its type that looks at a snapshot of a year with multiple year data (why we needed to pair with AFR)
- Need larger government/reputable organization supported study with larger sample size to create initial benchmark data and validate measurement tool
- This process can still be used to gauge quality improvement and practice translation
  - Compare and contrast clinics
  - Identify areas of need and areas if needed improvement
  - Evaluation of clinical policies and protocols (or changes in policy/procedure)
  - Compare and contrast providers (Accountability)
Future Considerations

• EDRs currently are **WAY BEHIND** where we need them to be!!!!!!!!!!!!!!!!!!!
  - Extreme limitations with reporting of “Dummy codes”
  - Really focus on practice management and not really on clinical translation

• Currently cannot run comparative reports between codes, which requires manual evaluation and additional software (SNS, JMP, EXCEL)
  - Increases time of evaluation
  - Limited geographical information

• No built-in checks and balances to evaluate data entry
  - Have to have own audit procedures and process

• Extremely limited with comparative medical evaluation to improve integration of care
  - Meaningful use for dental lacks imagination and creativity
  - Leads to checking boxes and not to real patient impact
Barriers to Total Quality Implementation

- Changes the scope of service provision for the dental profession
- Everything built for volume and providing as many “high value” services as possible
- Fear of change/ Fear of evaluation / Fear of accountability
- A financial system geared to fee for service or volume of encounters
  - Funding sources
- Last several decades of focusing on quantitative output as success for “quality”
  - LED TO A MISUNDERSTANDING OF WHAT QUALITY MEANS
The Triple Aim

Gauging Impact from this Analysis
Triple Aim Impact

- **EXPERIENCE OF CARE**

  - Patient Growth
    - Year 2: 201% Growth
    - Year 3: 148% Growth

  - Patient Satisfaction
    - 97% “Top Box [GREAT/GOOD]” on 19 line-item (Portable) or 24 line-item (Fixed) satisfaction survey

- Quality of Care
  - Below or at low range level of Complications / AFR / Retention
    - Anesthesia
    - Restorative
    - Sealants (Preventive)
    - Endodontics
    - Oral Surgery
Triple Aim Impact

**POPULATION HEALTH**
- Defined as the health outcomes of a group of individuals, including the distribution of such outcomes within the group.
- Linking thread is the common focus on trying to understand the determinants of health of populations (why are some people healthy and others are not?)
- Guiding principle is an increased focus on health outcomes (as opposed to quantity, processes, and products) and on determining the degree of change that can actually be attributed to ‘our’ work.

**Inter-linkage of EVT Coding**
- Impact of community outreach and changes on patient compliance to cost and/or AFR/retention

**Measuring tool (OHRA)**
- Using EVT Coding to impact clinical and operational decision making to reduce the oral health risk of the populations we serve
- Using EDR to identify areas/regions/locations of susceptibility and evaluate cultural and educational issues/impacts/changes

Evans et al. (1994); Kindig & Stoddart (2003); Health Canada (1998); Lavis et al. (2002)
## Triple Aim Impact

### POPULATION HEALTH (Example: School Based Care)

<table>
<thead>
<tr>
<th>Description</th>
<th>Overall</th>
<th>County</th>
<th>County</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of students seen at schools with services provided</td>
<td>20.4%</td>
<td>18.9%</td>
<td>18.1%</td>
<td>35.5%</td>
</tr>
<tr>
<td>Encounters per student</td>
<td>2.97</td>
<td>2.53</td>
<td>3.00</td>
<td>3.37</td>
</tr>
<tr>
<td>Percentage needing extractions</td>
<td>18.1%</td>
<td>18.6%</td>
<td>19.0%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Percentage reporting no toothbrush at home</td>
<td>9.4%</td>
<td>9.9%</td>
<td>12.2%</td>
<td>5.8%</td>
</tr>
<tr>
<td>OHRA Scores</td>
<td>21.0</td>
<td>21.0</td>
<td>20.0</td>
<td>21.1</td>
</tr>
<tr>
<td>(High Risk)</td>
<td>(High Risk)</td>
<td>(High Risk)</td>
<td>(High Risk)</td>
<td>(High Risk)</td>
</tr>
</tbody>
</table>
Triple Aim Impact

- **COST PER PATIENT**

![Graph showing cost per patient over time with a downward trend line.](imageURL)

- **US Dollars ($)**
- **Time**
  - Feb-11 Sep-11 Apr-12 Oct-12 May-13 Nov-13 Jun-14

- **Cost per patient**
- **Linear (Cost per patient)**
References


References

Any Questions?