Integrating EBD Across the Dental School Curriculum

The San Antonio Experience
HOW DID WE GET TO WHERE WE ARE NOW?

• Acknowledgment of barriers to keeping up to date
• NIH/NIDCR R25 Education Research Grant to develop:
  • Student training
  • Faculty training
  • Resident training
  • Critically Appraised Topics (CATs) Initiative
PROBLEM:
PRACTITIONERS ARE NOT KEEPING UP TO DATE

2014 NPBRN Study:
Found only 62% concordance between published research and clinical practice behaviors

#1: SLOW TRANSFER OF RESEARCH INTO PRACTICE

Original research → Publication → Biomedical databases → Textbooks → Clinical implementation

16 – 23 Years

#2: EXPLOSION OF NEW KNOWLEDGE

There is too much to read!

National Library of Medicine catalog
- Items indexed under ‘Oral Health’ = 7,626 in 2016
Clinicians need to keep abreast of the rapid advances in dentistry (a daunting task for busy practitioners) & constantly evaluate their clinical practice against an evolving information base.

Bottom line: Science changes Dental practice changes
#4: TOO MUCH MISINFORMATION

- Experts often disagree
- Experts may not be up-to-date in their knowledge of your clinical question
- Experts may simply disagree with the current evidence & instead prefer to stick with their own preferred mode of treatment
Patients may arrive armed with information downloaded from the Internet.

Practitioners need to be able to advise patients about the most appropriate options & back up their advice with available evidence.

From Medscape Medical News

Physicians Worry About Misinformed Patients in Internet Age

Robert Lowes

November 4, 2011 — The Internet puts solid health information at a patient’s fingertips, but 2 new studies suggest that too many of those fingertips stray into questionable territory.

In a survey from Wolters Kluwer Health, 78% of physicians said that lack of time is one of the most common challenges for physician-patient communication. The next biggest problem in this regard — cited by 53% of physicians — is misinformed patients.

The phone survey, conducted in August, included more than 300 US physicians, roughly split between primary care physicians and specialists.

The survey sheds more light on the increasingly larger role — for good and ill — that the Internet plays in healthcare. The Pew Research Center reports that 78% of adults use the Internet, and of these, 83% look up health information online.
#5: COMPETING PROBLEMS OF PRIVATE PRACTICE

- Overhead costs
- Staffing issues
- Accounting and taxes
- OSHA
- Chart notes
- Laboratory work
- Patient no-shows
- Keeping up-to-date
WE SAW THE NEED FOR A **NEW EDUCATIONAL MODEL**

**TRADITIONAL APPROACH**

Read everything you can
Try to remember it
‘Just in case’ learning

**OUR APPROACH**

Focus on your patients’ problems
Find information as needed
‘Just in time’ learning
2008: NIH/NIDCR GRANT

- Dr. John Rugh established a school-wide Evidence-Based Practice Program with the aid of a four-year NIH R25 Education Research Grant, ‘Bridging Oral Health Science, Education & Practice’

  - R25 central hypothesis: The Critically Appraised Topic (CAT) will serve as a mechanism to infuse science and critical thinking skills into dental education at all levels.

- Our CATs Initiative is currently supported in part by a U.S. Health Resources and Services Administration (HRSA) Grant
EVIDENCE-BASED PRACTICE PROGRAM

• Faculty, students, and residents are trained to:
  1. ask focused clinical questions
  2. search the biomedical research literature for most recent & highest level of evidence
  3. critically evaluate the evidence
  4. make clinical judgments about the applicability of the evidence for their patients

• Students/residents demonstrate competency in these "just-in-time" learning skills through writing a concise one-page Critically Appraised Topic (CAT) on a focused clinical question

• OUR GOAL: To provide our graduates with life-long learning skills that will enable them to keep up to date and equip them with the best patient care skills during their 30-40 years of practice.
UTHSCSA CATS INITIATIVE

**DSI**
- EBD & Informatics Instruction
  - 4 hrs.

**DSII**
- EBD & CATs Instruction
  - 16+ hrs.

**DSIII**
- CATs Requirement in Clinical Courses and Case Conferences

**DSIV**
- CATs Requirement in Clinical Courses and Case Conferences

**Residencies**
- Research Methodology & CATs Instruction
- CATs Requirement in Clinical Courses
# DS2 EVIDENCE BASED DENTISTRY

<table>
<thead>
<tr>
<th>FALL (16 hour, graded course)</th>
<th>SPRING (~2 months, non-graded)</th>
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TEACHING EXAMPLE #1

Formulate a focused (PICO) question: Diagnosis

The KaVo website states:
- ‘The DIAGNOdent pen is a hand-held laser caries detection aid. DIAGNOdent aids in the detections of caries. Even very small lesions are detected at the earliest stage, enabling you to protect and preserve the tooth substance’

Formulate a PICO question to help you find the best evidence about the accuracy of DIAGNOdent in detecting early dental caries.

<table>
<thead>
<tr>
<th>P</th>
<th>In dental patients…</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>…how effective is DIAGNOdent…</td>
</tr>
<tr>
<td>C</td>
<td>…compared to tactile examination…</td>
</tr>
<tr>
<td>O</td>
<td>…in the detection of occlusal caries limited to enamel?</td>
</tr>
</tbody>
</table>
TEACHING EXAMPLE #2

Find the strongest evidence

Conduct a PubMed search, using the following question and the search principles covered in class, on the following clinical question:

- For an otherwise healthy adult with fever blisters, how effective is acyclovir compared to placebo in reducing frequency and pain of recurrent episodes?

Use both a MeSH-based PubMed search AND a PubMed Clinical Queries search.

Find both (1) a systematic review AND (2) a randomized controlled trial whose abstract indicates that the paper addresses the question.

<table>
<thead>
<tr>
<th>Systematic review</th>
<th>PMID:</th>
<th>Author:</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>PMID:</td>
<td>Author:</td>
</tr>
</tbody>
</table>

What is the MeSH term for fever blister?
FIND THE STRONGEST EVIDENCE

- META-ANALYSIS OR SYSTEMATIC REVIEW
- RANDOMIZED CONTROLLED TRIAL
- COHORT STUDY
- CASE SERIES
- CASE STUDY

**TIME**

1967 - 2005 - 2014
FIND THE STRONGEST EVIDENCE

26 million citations of scientific articles
STEP 2: FIND THE STRONGEST EVIDENCE

Search PubMed/Trip with filters to find the strongest evidence

*FAST*

Hierarchy of evidence:
- Meta-Analysis
- Systematic Review
- Randomized Controlled Trial
- Cohort studies
- Case Control studies
- Case Series/Case Reports
- Animal research/Laboratory studies
Assess the strength of evidence

On the following pages are five abstracts. Read each abstract and determine its study design. According to the Evidence Pyramid presented in class, decide where each of these studies would fit on the Pyramid. Write the letter of each abstract in the appropriate blank below.

<table>
<thead>
<tr>
<th>D</th>
<th>Highest on Evidence Pyramid</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Second-highest on Evidence Pyramid</td>
</tr>
<tr>
<td>A</td>
<td>Third-highest on Evidence Pyramid</td>
</tr>
<tr>
<td>C</td>
<td>Fourth-highest on Evidence Pyramid</td>
</tr>
<tr>
<td>E</td>
<td>Lowest on Evidence Pyramid</td>
</tr>
</tbody>
</table>
Critically evaluate the evidence

Given the attached article, evaluate the evidence (abstract) for validity and importance.

**EVALUATE THE BEST EVIDENCE**

<table>
<thead>
<tr>
<th>Last Name of First Author:</th>
<th>Hujoei</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year:</td>
<td></td>
</tr>
<tr>
<td>PMID:</td>
<td></td>
</tr>
<tr>
<td><strong>Intervention:</strong></td>
<td>Infant formula consumption</td>
</tr>
<tr>
<td><strong>Comparison:</strong></td>
<td>Breast milk or cow’s milk consumption</td>
</tr>
</tbody>
</table>

**VALIDITY**
- Is this a SR of RCTs? [ ] Yes [x] No [ ] Can’t Tell
- Comprehensive, detailed search for relevant trials? [x] Yes [ ] No [ ] Can’t Tell
- Individual studies assessed for validity? [x] Yes [ ] No [ ] Can’t Tell
- Number of trials: 19 observational studies (17 were included in the meta-analysis)
- Number of patients: approx. 17,249, with approx. 8,454 included in analysis (see page 845, right column)
- Meta-analysis done? [x] Yes [ ] No [ ] Can’t Tell

**IMPORTANCE**
- Magnitude of I > C: (range if not MA) (Standard Mean Difference if available) Include CI or p value
  - 17 studies reported odds ratios (ORs) and were included in the meta-analysis. Infant consumption of formula was associated with higher prevalence of enamel fluorosis in the permanent dentition compared to a diet of breast milk (OR = 1.81; 95% CI: 1.44 to 2.26). The results of the studies were heterogenous (legend below Figure 2 reads, "Readers should use caution in interpreting the summary estimates on the forest plot owing to the significant heterogeneity of the selected studies") and there was evidence of publication bias, so the combined OR listed above should be interpreted with caution.
CRITICALLY APPRAISED TOPICS

Students must demonstrate competency with these ‘just-in-time’ learning skills through writing a concise one-page Critically Appraised Topic (CAT) on a focused clinical question.
# DS2 EVIDENCE BASED DENTISTRY

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COMPONENTS OF A CAT

- Parallel the skills taught in the fall semester DS2 course

ORAL HEALTH EVIDENCE-BASED PRACTICE PROGRAM

View the CAT

Title  Periodontal Therapy Does Not Improve A1c Levels in Diabetic Patients with Periodontal Disease

Clinical Question  In patients with periodontal disease and Type II Diabetes, what is the effect of periodontal therapy on HbA1c levels, as compared to the patients’ HbA1c levels prior to periodontal therapy?

Clinical Bottom Line  Periodontal therapy does not have an impact on A1c levels in diabetic patients with periodontal disease. A large-scale, well-controlled randomized controlled trial supports this. Their findings do not support the use of non-surgical periodontal therapy in diabetic patients for the purpose of lowering HbA1c levels.

Best Evidence

<table>
<thead>
<tr>
<th>PubMed ID</th>
<th>Author / Year</th>
<th>Patient Group</th>
<th>Study type (level of evidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 94346989</td>
<td>Engstrom/2013</td>
<td>257 Type 2 diabetes with chronic periodontal disease</td>
<td>Randomized Controlled Trial</td>
</tr>
</tbody>
</table>

Key results  There was not a significant difference for change in HbA1c levels between the group receiving periodontal treatment and the control group (-0.05%(95%CI, -0.23% to 0.12%); P = .55).

Evidence Search  (["periodontal diseases"[MeSH Terms] OR "periodontal"[All Fields] AND "diseases"[All Fields]] OR "periodontal diseases"[All Fields] OR "periodontal"[All Fields] AND "disease"[All Fields] OR "periodontal disease"[All Fields]) AND ("diabetes mellitus"[MeSH Terms] OR "diabetes"[All Fields] AND "mellitus"[All Fields]) OR "diabetes mellitus"[All Fields]) OR "diabetes insipidus"[MeSH Terms] OR ("diabetes"[All Fields] AND "insipidus"[All Fields]) OR "diabetes insipidus"[All Fields]) OR Randomized Controlled Trial

Comments on Validity: This study was a large scale (n=257), multicenter, and well-controlled randomized controlled trial. Additionally, the risk for bias is low. Perspective: This is the largest study on this topic to date. It also takes into account medical management of the participants’ diabetes. These results differ from a number of small studies and systematic reviews showing a positive relationship. This difference is likely due to increased bias and confounding in the small sized studies combined with a lack of evaluation of diabetes management. CAT 619 addresses a similar issue. The above study was completed after the publication of CAT 619. This study was completed on a much larger patient base than those used in previous studies. Additionally, this study took into account changes in medical management of patients diabetes. It provides clear evidence that periodontal therapy does not impact diabetic patients HbA1c levels.

Applicability  This study is applicable to dentists who treat diabetic patients. While the periodontal benefits of periodontal therapy are indisputable, claims regarding its effects on HbA1c are not supported by the results of this study.

Specialty/Discipline (General Dentistry) (Periodontics)

Keywords  Diabetes, Periodontal Surgery, HbA1c
Welcome to CATs Library

Critically Appraised Topics

Welcome to the UT Health Science Center San Antonio School of Dentistry Oral Health searchable CAT library. A CAT is a "Critically Appraised Topic" related to a clinical dental problem. Our students and faculty work together to find and report the strongest, most recent, and most relevant evidence pertaining to dental diagnosis and treatment. This online library rapidly provides users with up-to-date evidence-based answers to focused clinical questions. The CATs are updated as new research is published. This online library rapidly provides users with up-to-date evidence-based answers to over 1000 clinical questions.

We invite you to search the CAT library by keyword or browse by dental specialty area. You will find a place on each CAT to leave a brief comment if you wish. Your comment may be related to your clinical experience and/or to new published evidence related to the question. Your comment will become a part of the CAT that subsequent users will be able to read.

We invite you to leave general comments about the library by clicking on the Contact Us button to the left. Leave a suggestion or just let us know what you think.

The CATs Oral Health Library was established with a grant from the NIDCR, NIH R24DE09663 and is currently supported, in part by U.S. Health Resources and Services Administration Grant D84HP19993.
OUR CATS LIBRARY WENT ONLINE **MAY 15, 2011**

- Worldwide source for up-to-date oral health knowledge for the public and profession
~1,100 CATS IN LIBRARY
Search or Browse our CATs Library

Search by word
Search for CATs that contain key words from the title, clinical question, clinical bottomline, key results, applicability, and keywords

Search by author/co-authors/mentor
Search for CATs that contain names of the author, co-authors or faculty mentor

Browse by Dental Specialty/Topic
Show list of CATs under the selected specialties below.

- Public Health
- Oral Medicine/Pathology/Radiology
- Endodontics
- General Dentistry
- Oral Surgery
- Orthodontics
- Pediatric Dentistry
- Periodontics
- Prosthodontics
- Restorative Dentistry
- Basic Science
- Dental Hygiene
- Behavioral Science

Search by CAT number

Browse all CATs
KEEPPING THE CATS UP TO DATE

<table>
<thead>
<tr>
<th>#2</th>
<th>18708737</th>
<th>Rutkunas V / 2008</th>
<th>8 articles</th>
<th>systematic review; meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key results</td>
<td>Immediate implant loading methods produced equal outcomes to that of conventional implant loading methods.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Evidence Search
"Dental Implants"[Mesh] AND "Denture, Overlay"[Mesh] AND (English[lang] AND systematic[sh])

Comments on The Evidence
Both of these systematic reviews clearly state that neither immediate or conventional loading of implants is better than the other. Both methods produced clinically acceptable outcomes.

Applicability
As implant retained mandibular overdentures become the standard of care, this will be valuable to students and clinicians present two clinically acceptable treatment options for immediate or conventional overdentures.

Specialty
(General Dentistry) (Prosthodontics) (Restorative Dentistry)

Keywords
dental implants, overdenture, implant retained overdenture, implant loading.

Comments on the CAT
(RESERVED FOR PRACTICING DENTISTS' and/or FACULTY COMMENTS ON PUBLISHED CATs)
by Charles Hermsch on 06/28/2011
Comments on the CAT
(FOR PRACTICING DENTISTS' and/or FACULTY COMMENTS ON PUBLISHED CAT's)

by Stacey Carawan (San Antonio, TX) on 04/12/2012
I searched PubMed on this topic in April 2012. The articles listed in the CAT and in the previous comments are of the highest level and most recent evidence on this topic. The previously mentioned publications are also the most applicable to the clinical question as stated in the CAT.

by Tom Cockerell, D.D.S. (Fort Worth, Texas) on 09/02/2011
I have had a CBCT for a little over two years in my office. I began to find incidental findings of periapical lesions. The improved diagnostic sensitivity for lesions on asymptomatic teeth is accompanied with an unexpected requirement to inform the patient and recommend treatment. One has to think through the implications of apical lesions.

by Terry Glenn (San Antonio, TX) on 07/13/2011
A study published in the J Endod by Estrela in 2008 (PMID: 18291274) also supports the increased accuracy of CBCT for detection of apical periodontitis (AP). In this study 888 imaging exams of patients with endodontic infection were selected and analysis was performed to assess the diagnostic accuracy of the panoramic and periapical images compared to CBCT. Prevalence of AP was significantly higher with CBCT.

by Matthew Dietrich (Helotes, TX) on 07/12/2011
Recent studies, although with similar or lower levels of evidence than the Low article, support the findings of that CBCT has a higher sensitivity than traditional periapical radiographs for detecting apical periodontitis.
# UTHSCSA CATS Initiative

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<td>DSI</td>
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<td>Research Methodology &amp; CATs Instruction</td>
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![ımage](image-url)
Subjective

CC: I would like my front teeth to look better

Pt happy with shape of teeth, but stain removed
EBD/CATS INITIATIVE: CURRENT STATUS

- 2016: 8th year of operation
- 87 faculty trained as CATs Mentors
- 1,106 dental students & residents trained
- 1,100 CATs published online
Let’s try some questions from UTHSCSA EBD courses…
Participants answer 5-10 EBD questions - individually then as a group (table)
EBD/CATS INITIATIVE: PROGRAM OUTCOMES

- Outcomes assessment

STUDENT FEEDBACK

• Comments from Dr. Rugh
TEXAS DENTAL JOURNAL “CAT OF THE MONTH”

- 154 student and faculty co-authors 2011–2016
- Indexed in PubMed
INTERNATIONAL JOURNAL OF EVIDENCE-BASED PRACTICE FOR THE DENTAL HYGIENIST

- Look up number of student & faculty co-authors
- Indexed in PubMed
LINKS TO OUR CATS

Clinical Practice Guideline for Pit- and-Fissure Sealants

Updated clinical practice guideline on the efficacy and safety of pit- and-fissure sealants to prevent or arrest caries in children and adolescents. Learn more.

Featured Guideline: Management of Patients with Prosthetic Joints

New clinical practice guidelines conclude that, in general, prophylactic antibiotics are not recommended prior to dental procedures to prevent prosthetic joint infections.

Click here for more information

The following links open in a separate browser window. You may need to disable your pop-up blocker for these links to work properly.

Organizations

Journals

Databases to Locate Evidence

Tools to Locate and Interpret Evidence

Critical Appraisal and Evidence Analysis

- Appraisal Tools—Critical Appraisal Skills Programme (UK)
- AMSTAR (Assessment of Multiple Systematic Reviews)
- PRISMA Statement
- CONSORT Statement (Consolidated Standards of Reporting Trials)

- CATs (Critically Appraised Topics - University of Texas Health Science Center, San Antonio)

Critical Appraisal Skills Programme

Critical Appraisal Tools (Centre for Evidence-Based Medicine, UK)

Critical Analysis Tools (SUNY Downstate)

Critical Appraisal Tools (International Center for Allied Health Evidence)

Meta-analysis of Observational Studies in Epidemiology (MOOSE): A Proposal for Reporting

Evidence-Based Medicine Toolkit (University of Alberta)

Systematic Reviews
INDEXED BY TRIP DATABASE

- UK-based clinical search engine for evidence-based content
- CATs are typically in top 10 items returned for searches on oral health topics
TRIP DATABASE

- TRIP = Turning Research Into Practice

‘Evidence-based synopses’ Highest level on TRIP
TRIP DATABASE

342 results for “sleep apnea oral appliances”, by quality

   info@guidelines.gov (NGC) 2016

2. Oral appliance to treat obstructive sleep apnea has inconclusive effect on blood pressure
   ADA Center for Evidence-Based Dentistry 2014

3. The Cardiovascular Health Benefits of Using Oral Appliance Therapy for Obstructive Sleep Apnea Typically Outweigh the Risks of Tooth Movement and Malocclusion
   UTHSCSA Dental School CAT Library 2015

4. Oral Appliances for Obstructive Sleep Apnea May Cause Transitory Symptoms of Temporomandibular disorder
   UTHSCSA Dental School CAT Library 2014

5. Oral appliance to treat obstructive sleep apnea has inconclusive effect on blood pressure
   ADA Center for Evidence-Based Dentistry 2014
30% of users are from outside United States
GOOGLE ANALYTICS
GOOGLE ANALYTICS

Visitors to our CATs

Google: 20%
trip database: 45%
UT Health Science Center: 30%
Other: 5%
RECOGNITION FOR OUR EBD PROGRAM

2012: 1st place University of Texas Academy of Health Science ‘Innovation Award’ (2012)

2016: Dr. John Rugh wins ADA Evidence-Based Dentistry Award (Accomplished Faculty)
FUTURE INITIATIVES

CATs as an interprofessional education tool = ‘iCATs’
Add image of TDJ IPE CAT
THANK YOU!
KELLY C. LEMKE, DDS