Bridging Oral Health Science, Education & Practice: A CATs Initiative

NIH R25 DE18663

JOHN D RUGH

ADEA
87th Annual Session
Washington DC
March 3, 2010
As Dental Educators & Scientists,

What is our overarching Aim?
Ultimately........... To improve the oral health of the population.
Two Basic Strategies

1) Research to generate new knowledge

2) Transfer the new knowledge to new Dentists, Practicing Dentists and the Public
How are we doing?

1) Developing new Knowledge........................ A-
2) Transferring new Knowledge:
   To new Dental Students......................... B-
   To practicing Dentists......................... D
   To the Public....................................... D-
What’s the Problem?
Problem: Practitioners are not always Up-to-Date

Nov 2009
A shocking number of physicians are clueless about basic moves that could save your life

Is Your Doctor Out of Date?

Sharon Sakson was walking into her kitchen to make a sandwich one February afternoon when a sudden burst of what felt like indigestion made her change her mind. She went to bed, hoping the pain would pass quickly. Instead, Sakson, then 51, lay there for hours, listening to a sensation in her chest become so intense, she could barely breathe. Finally, the agony subsided, but when it returned the following day, a friend insisted on calling an ambulance. At the hospital, doctors informed the Pennington, New Jersey, resident that she'd had a heart attack.
Transfer of Research into Practice

- Original Research
- Submission: variable
- Acceptance: 0.5 year
- Publication: 0.6 year
- Bibliographic Databases: 0.3 year
- Review, Paper, Textbook: 6-13 years
- Implementation: 9.3 years

Total Elapsed Time: 16.7 - 23.4 Years

E.A. Balas, S.A. Boren. *Managing Clinical Knowledge for Health Care Improvement. Yearbook of Medical Informatics 2000*
94% of the 62 studies found decreasing competence for some tasks, with increasing physician age.
Time in Practice and Quality of Care

Conclusions:

“...physicians who have been in practice for more years and older physicians possess less factual knowledge, are less likely to adhere to appropriate standards of care, and may also have poorer patient outcomes.”

What’s Going On?

1) Explosion of new knowledge

2) Half-life of current knowledge
   3-8 years
Explosion of new knowledge

Problem:

*There is just tooooooo much to read!*
"We need new Educational models to fix this"
Professional Education:

Knowledge BANK

INFORMATION TECHNOLOGY

MEMORIZE FACTS & THEORIES
“Read Everything”

Journals Guidelines
CE
Study Clubs
Marketing

“INFORMATION AS NEEDED” Model

Focus on problems your patients have
...........rather than trying to keep with everything.
Professional Education:

Knowledge BANK

INFORMATION TECHNOLOGY

IT & PROBLEM SOLVING TOOLS

Journals
Guidelines
CE
Study Clubs
Marketing

Patient Care

“INFORMATION AS NEEDED” Model
Proposed Solution

Student & Faculty Preparation of “Critically Appraised Topics” (CATs)

Teach Students skills of:
1. Asking focused clinical questions,
2. Quickly and efficiently finding the strongest evidence using a hierarchical search strategy,
3. Critical appraisal of the evidence and

The aim is to promote lifelong learning skills
Critically Appraised Topics (CATs)

1) Ask a Question
2) Search
3) Appraise
4) Write CAT

Critically Appraised Topic (CAT)

PubMed
A service of the National Library of Medicine and the National Institutes of Health

Clinical Encounter

Student

Faculty

UTHSCSA
**UTHSCSA CATs INITIATIVE***

**Central Hypothesis:**

The CAT will serve as a mechanism to infuse science & critical thinking skills into dental education at all levels.
CATs Initiative DS2s 2009-10

**FALL 2009**
- **INTD 6010**
  - EBD/CATs Basics
  - 16 hrs

**SPRING 2010**
- **Mini CAT Exercises**
  - 5 Clinical Courses 10-20min
- **Full CAT**
  - INTD 6088 4hrs
- **Search OSCE**
  - INTD 6088 30 min

**SUMMER 2010**
- **FAST CATs**
  - ACAD Detailing
  - 24 hrs
- **COSTAR**
  - Research Program
- **CTSA PBRN**
  - Clinical Research

UTHSCSA
DIAGNOdent Caries Detector

The DIAGNOdent can find cavities that other dental instruments can miss.

The device is designed as an adjunct to a traditional oral examination in the detection of occlusal decay. Teeth that are suspicious for caries are ideal candidates for survey with the device.

Key Benefits:
- A laser examination tool for the early detection of caries.
- Even very small lesions can be detected at the earliest stages.
- Over 90% accuracy.
- Earlier treatment - Better outcomes.

A printable DIAGNOdent leaflet for download is available: [Here](#)

A PowerPoint presentation for the DIAGNOdent is available: [Here](#)
1) Formulating a focused (PICO) question: Diagnosis

Example #1

Clinical Question
The KaVo website states:

“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.”

Assignment:
Formulate a PICO question to help you find the best evidence about the accuracy of DIAGNOdent in detecting early dental caries. Email your PICO question to........@UTHSCSA.EDU.

P: In dental patients...
I: ....how effective is DIAGNOdent...
C: ...compared to the gold standard histology...
O: ...in the detection of proximal dental caries limited to enamel?
Clinical Question
The KaVo website states:
“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.”

PICO Question
In dental patients, how effective is DIAGNOdent compared to the gold standard histology in the detection of proximal dental caries limited to enamel?

Skill Assessment
Using PubMed, identify 3 appropriate terms to search for the strongest evidence related to the PICO question.
1.
2.
3.
3) Find the strongest evidence

- SYSTEMATIC REVIEW
- RANDOMIZED TRIAL
- COHORT STUDY
- CASE SERIES
- CASE STUDY

TIME

1967  2002  2008
Hierarchical Search Strategy

PubMed “Limits”

1) Meta–Analysis (under “Type of Article”)
2) Systematic Review (under “Subsets”)
3) RCT (under “Clinical Queries”)

META-ANALYSIS
Systematic Review of randomized clinical trials

RANDOMIZED TRIAL

COHORT STUDY

CASE SERIES

CASE STUDY
4) Assessment of the evidence

Ranking of Journals - OSCE
Assessing Strength of Evidence

- CASE STUDY
- CASE SERIES
- COHORT STUDY
- RANDOMIZED TRIAL
- META-ANALYSIS
- Systematic Review
CATs Initiative DS2s 2009-10

FALL 2009

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SUMMER 2010

- FAST CATs
  - ACAD Detailing
    - 24 hrs
- COSTAR
  - Research Program
- CTSA PBRN
  - Clinical Research

UTHSCSA
60 Faculty CAT Mentors

- Students and Faculty Co-Author the CATs
- Two Students per Faculty
Welcome to CATs Home Page

Welcome to the UTHSCSA Dental School CAT library. A CAT is a “Critically Appraised Topic” related to clinical dental practice. Our students and faculty work together to find and report the strongest, most recent, and most relevant evidence pertaining to a clinical question about dental diagnosis or treatment. They summarize the evidence and try to provide the best possible answer in a one page format we call a CAT.

We invite you to search the CAT library by key words or browse by dental specialty area. You will find a place on each CAT to leave a brief comment if you wish. Your comment will become a part of the CAT that subsequent users will be able to read.

If you don’t find the answer you are looking for, you can submit your question to the Kitty Pool. We’ll try to find a student-faculty team to do the research and post a CAT. 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 CAT Library is supported in part by a grant from the NICDR.
**Submit your CAT**

<table>
<thead>
<tr>
<th>Destination</th>
<th>CATs Library</th>
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<td>Your name</td>
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<td>Co-author(s)</td>
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<td>Faculty mentor</td>
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<td>Title</td>
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<td>Clinical Question</td>
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<td>Clinical Bottom Line</td>
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<tr>
<td>Best Evidence/References</td>
<td>(you may have up to 5 entries, 1 required)</td>
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</tbody>
</table>

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<tr>
<th>PubMed ID</th>
<th>Author / Year</th>
<th>Patient Group</th>
<th>Study type (level of evidence)</th>
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<tr>
<td>#1</td>
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</table>

**Key Results**
**View the CAT**

**Destination** library

**Date of submission** 01/07/2010

**E-mail** simont@uthscsa.edu

**Name** Kevin Packard

**Co-author(s)** Tiffany Simon

**Faculty mentor** Ridley O. Ross

**Title** Clinical Longevity of Single-Tooth Implants Versus Tooth-Supported Fixed Partial Dentures

**Clinical Question** In a middle-aged patient with a single edentulous space, is the clinical longevity of a single-tooth implant superior to a fixed partial denture to replace the missing tooth?

**Clinical Bottom Line** There are currently no studies to suggest single tooth implants are superior to fixed partial dentures.

**Best Evidence References** (you may view more info by clicking on the PubMed ID link)

<table>
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<tr>
<td>#1 18437792</td>
<td>Salinas TJ, 2007</td>
<td>Patients with single implant-supported crowns or fixed partial dentures</td>
<td>Systematic Review</td>
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**Key results** This systematic review of the scientific literature failed to demonstrate any direct comparative studies assessing clinical performance of single implant-supported crowns and tooth-supported fixed partial dentures. The analysis suggested differences at 60 months between survival of implant-supported single crowns and natural tooth-supported fixed prostheses when resin-bonded and conventionally retained fixed prostheses were grouped. This difference disappeared when implant-supported single crowns were compared with conventionally retained fixed partial dentures at 60 months. For other time periods, direct comparative data were unavailable.
This systematic review of the scientific literature failed to demonstrate any direct comparative studies assessing clinical performance of single implant-supported crowns and tooth-supported fixed partial dentures. The analysis suggested differences at 60 months between survival of implant-supported single crowns and natural tooth-supported fixed prostheses when resin-bonded and conventionally retained fixed prostheses were grouped. This difference disappeared when implant-supported single crowns were compared with conventionally retained fixed partial dentures at 60 months. For other time periods, direct comparative data were unavailable.

Evidence Search

Comments on The Evidence
While there are many studies that assess the longevity of fixed partial dentures and single tooth implants independently, there are currently not any studies which directly compare them within the same parameters. A large clinical study is needed which directly compares the two under the same conditions.

Applicability
Until further research is performed which directly compares the longevity of fixed partial dentures to single tooth implants, the course of action depends upon the experience and preference of the clinician and patient.

Specialty
(Prosthodontics)

Keywords

Comments on the CAT

Return to Search Page
In patients requiring single-tooth replacement, what are the outcomes of implant- as compared to tooth-supported restorations?

Salinas TJ, Eckert SE.
Mayo Clinic, Department of Dental Specialties W4, 200 First Street SW, Rochester, MN 55905, USA.

Erratum in:

PURPOSE: The study provides a systematic review of the literature to determine the long-term survival characteristics of single implant-supported crowns and fixed partial dentures. MATERIALS AND METHODS: A search of the MEDLINE, EMBASE, and Cochrane Collaboration databases was conducted to identify articles that compared survival and success of fixed partial dentures and single implant-supported crowns. In addition to comparative cohort studies, articles that pertained specifically to single implant-supported crowns or fixed partial dentures were included in this review. Inclusion criteria for implant and fixed partial denture articles included a minimum 2-year study, primary publication in the English language, a minimum of 12 implants, implants designed to osseointegrate, and inclusion of data regarding implant and prosthetic performance. Data were analyzed using cumulative proportions of survival and success for both prosthetic types and for individual implants. Wilson score method was used to establish 95%
# 76 CATs to Date

<table>
<thead>
<tr>
<th>Title</th>
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<tr>
<td>The Continued Use of Dental Sealants for the Prevention of Dental Caries in the Permanent Teeth of Children and Adolescents</td>
<td>11/04/2009</td>
<td>Patrick Miklos, DDS</td>
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<td>Influence of infection at the time of root filling on the outcome of endodontic treatment of teeth with apical periodontitis</td>
<td>11/11/2009</td>
<td>Pacheco, Marc</td>
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<td>Pulse Oximetry is More Reliable (but currently less practical) for Determining Pulp Vitality than Cold Testing</td>
<td>11/11/2009</td>
<td>Steven Schmoldt</td>
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<td>Single-visit and multiple visit endodontics provide same healing rates in healthy patients</td>
<td>11/11/2009</td>
<td>Steven J Schmoldt</td>
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<td>Dental Implants in the Diabetic Patient</td>
<td>11/11/2009</td>
<td>Peter M. Pedalino</td>
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<td>Adjunctive aids for oral cancer examinations do not provide earlier diagnostic effectiveness</td>
<td>11/11/2009</td>
<td>Deana Cook</td>
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<td>Systemic metronidazole is an effective adjunct to S&amp;RP in generalized aggressive periodontitis patients.</td>
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Search and Browse our CATs Database

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

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

Browse by Dental Specialty

Show list of CATs under the selected specialties below.

- Community Dentistry
- Dental Diagnostics
- Endodontics
- General Dentistry
- Oral Surgery
- Orthodontics
- Pediatric Dentistry
- Periodontics
- Prosthodontics
- Restorative Dentistry
- Basic Science

https://cats.uthscsa.edu/
Clinical Longevity of Single-Tooth Implants Versus Tooth-Supported Fixed Partial Dentures

Clinical Question: In a middle-aged patient with a single edentulous space, is the clinical longevity of a single-tooth implant superior to a fixed partial denture to replace the missing tooth?

Clinical Bottom Line: There are currently no studies to suggest single tooth implants are superior to fixed partial dentures.

Best Evidence:

References (you may view more info by clicking on the PubMed ID link)

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Key results: This systematic review of the scientific literature failed to demonstrate any direct comparative studies assessing clinical performance of single implant-supported crowns and tooth-supported fixed partial dentures. The analysis suggested differences at 60 months between survival of implant-supported single crowns and natural tooth-supported fixed prostheses when resin-bonded and conventionally retained fixed prostheses were grouped. This difference disappeared when implant-supported single crowns were compared with conventionally retained fixed partial dentures at 60 months. For other time periods, direct comparative data were unavailable.

Evidence Search: Limits: Systematic Reviews "Dental Implants, Single-Tooth\Mesh" Limits: Systematic Reviews "Dental Implants, Single-Tooth\(\text{Mesh}\)" "Denture, Partial, Fixed\(\text{Mesh}\)"

Comments on The Evidence: While there are many studies that assess the longevity of fixed partial dentures and single tooth implants independently, there are currently not any studies which directly compare them within the same parameters. A large clinical study is needed which directly compares the two under the same conditions.

Applicability: Until further research is performed which directly compares the longevity of fixed partial dentures to single tooth implants, the course of action depends upon the experience and preference of the clinician and patient.

Specialty: (Prosthodontics)

Keywords: "Denture, Partial, Fixed\(\text{Mesh}\)") "Dental Implants, Single-Tooth\(\text{Mesh}\)"

Comments...
Visit 5 Dental Alumni offices and to discuss and receive feedback on CAT.

+ 1 Hr CE Credit!
+ DS Credit
## Data Collection Plan

<table>
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<th>Group</th>
<th>Spring/Summer 2008</th>
<th>Year 1 2008-2009</th>
<th>Year 2 2009-2010</th>
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**Data Collection Plan**

- **Group Spring/Summer 2008**
  - Year 1 2008-2009
  - Year 2 2009-2010
  - Year 3 2010-2011
  - Year 4 2011-2012

- **2006-2007 Cohort**
  - DS1 Year
  - (Spring 2008) Student Course Evaluations
  - Focus Group (May 2008)
  - OSCE (Test run)
  - DS2 Year

- **2007-2008 Cohort**
  - (Current DS2s)
  - (September 2008) Baseline KACE at beginning of DS2 CATS course
  - KACE Post-test
  - Student Course Evaluations
  - (March 2009) Focus Group
  - (May 2009) OSCE
  - DS2s Year

- **2008-2009 Cohort**
  - (New DS1s matriculating in)
  - (July 2008)
  - KACE Reliability testing
  - (October 2008) Pre and Post-test reliability
  - DS1 Year

- **Year 2 2009-2010**
  - (Spring 2010) Fresno Test of EBP Competence
  - Focus Group

- **Year 3 2010-2011**
  - (Fall 2010) KACE
  - (Spring 2011) Fresno Test of EBP Competence
  - Focus Group

- **Year 4 2011-2012**
  - (Fall 2011) KACE
  - (Spring 2012) Fresno Test of EBP Competence
  - Focus Group
Aim #2: Faculty Development.

• Provided 26 hours of faculty development resulting in 842 faculty contact hours.
• 73% of the school’s course directors have received instruction on EBP
Aim #5: Disseminate Findings

- Invited Presentations Dealing with CATs Program........16
- Research Abstracts & Posters Presented (2009)............12
- Abstracts Submitted for 2010 AADR Meeting
  (Washington, D.C.)..............................................................9
- Abstracts for IADR Spain.......................................................2

“15 of 23 Abstracts are student research projects! “
The CAT will serve as a mechanism to infuse science & critical thinking skills into dental education at all levels and provide a recruitment tool for new scientists.
Thank you!

NIH/NIDCR
John Hatch
Tom Deahl
Mabel Hernandez
Pattie Nield
Bill Hendricson
Erhan Kartaltepe
Birgit Glass
Gary Guest
Ken Kalkwarf

Naomi Sever
Elizabeth Wallmann
Jim Summitt
Kevin Gureckis
Bjorn Steffensen
Linda Levy
Debra Stark
Rita Parma
Bill Rose
Steve Matteson

+60 CATs Faculty Mentors
THANK YOU!

QUESTIONS?

COMMENTS?

CONCERNS?

OTHER OPTIONS?
Discussion
Implementation Challenges
Teaching CATs

• Faculty Time/Priorities
• Technology
• Library Online Limits (Ovid vs. PubMed)
• Quality of CATs
• Student writing skills
• Controversial CATs (3rd molar extraction)
• Control of Plagiarism
• Focus on science “User” rather than “Doer”