

Consortium of Operative Dentistry Educators

(CODE)



REVISED
REGIONAL REPORTS
FOR
FALL 2005

<http://netserv.unmc.edu/code/codeFrame/html>

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Consortium of Operative Dentistry Educators (CODE)

Forward - Larry D. Haisch, D.D.S.
National Director

On February 24, 2005, CODE held a National/International meeting during the annual meeting of the Academy of Operative Dentistry in Chicago.

Dr. Richard Simmons, Associate Dean for Academic Affairs and Research, Arizona School of Dentistry and Oral Health, presented a program entitled “**Ethics in the Dental Profession - Quo Vadis?**” followed by questions and discussion. It was a timely and thought provoking presentation as would have been anticipated. Thank you to the Academy of Operative Dentistry for providing the time slot and space for the meeting.

I had the privilege to attend the Regions I and V meetings at the UNLV School of Dental Medicine and the Columbia University School of Dental And Oral Surgery, respectively. Great meetings with good discussion and sharing of information. Thank you to everyone for the great hospitality.

The members of CODE must continue to spread the word about CODE and work to provide input to Licensure Boards on Restorative Dentistry. Continue to encourage/invite members of the Licensure examining boards to attend the Fall Regional meetings. Invite our colleagues in the Armed and Public Health Services to our meetings - both Regional and National.

Support of CODE by payment from the schools for annual dues is excellent, although not without follow-up efforts by the National office. The same can be said for the collection of the Fall Regional Reports - always a challenge but just part of the annual process.

The web site (<http://netserv.unmc.edu/code/codeFrame/html>) continues to be the location of “all you wish to know and then some” for CODE. Thanks to Dr. William Johnson (UNMC-COD) for continuing to be the webmaster and doing timely updates and enhancements. **NOTE:** Update your schools’ directory via the active [“Please help update”](#) link in the main menu.

I would like to thank all the Directors and the meeting hosts (Drs. Ray Tozzi, Charles “Ned” Hill, Anthony Ziebert, James Summitt, Gary Wieczkowski, Richard Lichtenthal and Roosevelt Smith), the Operative Section of ADEA and, especially, the general membership for helping to make CODE what it is and what it accomplishes.

Minutes of National 2005 CODE Meeting

The well attended meeting (45+ Participants) was held Thursday, February 24, 2005 from 4:00 m to 6:00 pm at the Fairmont Hotel in Chicago, Illinois. **Announcements of open operative positions were made by meeting attendees. Web master, Dr. William Johnson, also reminded members the listing of open faculty positions on the CODE web site will be provided free to all member institutions.**

Send announcements to : wwjohnson@unmc.edu.

The presentation, **Ethics in the Dental Profession - Quo Vadis?** By Dr. Richard Simonsen, was informative and thought provoking. An excellent discussion followed. The presentation is one which would be of interest for students and faculty of dental schools

Synopsis: Ethical standards in the profession are under challenge from several quarters. The “cosmetic” bandwagon seems to have brought out the worst in some manufacturers of dental materials. These manufacturers are tempted to market heavily advertised, yet untested, materials targeted at expanding their share of the market, only to have the products fail. It also brings out the worst in some colleagues who over promote themselves, and the weekend courses they have taken, as making them more qualified to carry out extensive, and sometimes unnecessary, full-mouth reconstruction with untested materials on patients who have not been given full disclosure. This presentation discusses some of the issues involved and the role of academia in alerting students to the pitfalls of the path to quick riches.

ORIGINS OF C.O.D.E (Consortium of Operative Dental Educators)

Project ACORDE (A Consortium of Restorative Dentistry Education)

The date usually cited as the starting point for the development of Project ACORDE is 1966. That year, in Miami, the Operative Dentistry Section of AADS formed a committee charged to plan for the cooperative development of teaching dental materials.

In July of 1971, the Dental Health Center, San Francisco, invited faculty from 14 dental schools to explore the feasibility of reaching consensus of a series of operative dental procedures. The outcome of the meeting suggested that it was feasible to achieve broad-based agreement on basic procedures: task analyses could be developed in which consensus could be reached on essential details of methods and instrumentation. The Project ACORDE committee was charged with the responsibility for coordinating curriculum development efforts on a national level in November of that year. Prominent in this project development were Bill Ferguson, David Grainger and Bob Wolcott.

The Broad Goals and Functions of this committee were:

1. To gain agreement among all participating dental schools on the teaching of operative dentistry functions and gain acceptance by all schools.
2. To produce materials which can be universally accepted and utilized for teaching dental students and expanded function auxiliaries.

During 1974, a 15 module package entitled Restoration of Cavities with Amalgam and Tooth-colored Materials was presented.

The preparation package entitled Cavity Preparations for Amalgam and Tooth-colored Materials became available for distribution in March of 1976.

Project ACORDE was found to have produced three major benefits for dental education:

1. It opened new channels of communication among dental educators.
2. It suggested uniform standards of quality for the performance of restorative skills.
3. It produced numerous lesson materials which were useful both for teaching students and as models of developers of other lessons.

The benefit, most frequently cited by dental school faculty, was communication. The primary example of the communication begun by Project ACORDE, which has lasted well beyond the initial project, is CODE (Consortium of Operative Dentistry Educators). CODE has as its goal, the continuation of meetings for the purpose of information exchange among teachers of operative dentistry. Regional CODE meetings are held annually with minutes of each session recorded and sent to the national director for distribution. This system is a direct spin-off of Project ACORDE.

The first annual session of CODE was held in 1974/75.

The Early Years (1974-1977)

As founding father of the concept, Robert B. Wolcott of UCLA assumed the role of national coordinator and appointed Frank J. Miranda of the University of Oklahoma as national secretary. A common agenda to be provided to all six regions was established at this time. The first regional meetings were held in the winter of 1974. During the first three years of operation, each region devised a system of rotation so that a different school hosted the regional meeting each year, thus providing a greater degree of motivation and bringing schools closer together in a spirit of fellowship and unity. Each region submitted suggestions for future agendas, thereby insuring a continued discussion of interesting and relevant topics. A collection of tests or a test bank was started in early 1976. This bank consisted of submitted written examination questions on specified topics that were compiled and redistributed to all schools.

The Transition Years (1977-1980)

The first indication that the future of CODE was in jeopardy came in 1977, the first year that a national report could not be compiled and distributed. As the result of the efforts of a committee chaired by Dr. Wolcott, the original concept was renewed in 1980. Its leadership had been transformed from the structure of a national coordinator and secretary to a standing subcommittee under the auspices and direction of the Section of Operative Dentistry of the AADS.

The Reaffirmation Years (1997 - 1998)

During the 1997 meetings of both the Operative Dentistry Section Executive Council and the Business meeting of the Section, interest was expressed about reorganizing CODE and aligning it more closely with the Section. During the following year, fact finding and discussions occurred to formulate a reorganization plan. The plan was submitted for public comment at the 1998 meeting of the Operative Dentistry Section Executive Council and the Business meeting of the Section. At the conclusion of the business meeting the reorganization plan was approved and implemented.

Reaffirmation of CODE official title (2003)

CODE changed its name from *Conference of Operative Dentistry Educators* to *Consortium of Operative Dentistry Educators* due to a ratification vote at the Fall 2003 Regional CODE meetings.

The Future of CODE

The official sponsorship by the Section of Operative Dentistry of ADEA (formerly ADDS) and the revised administrative structure of CODE are both designed to insure its continuance as a viable group. The original concepts, ideas and hopes for CODE remain unchanged and undiminished. Its philosophy continues to be based on the concept of dental educators talking with each other, working together, cooperating and standardizing, when applicable, their teaching efforts and generally socializing in ways to foster communication. There is every reason to believe that organizations such as CODE, and those developed in other fields of dentistry, will continue to crumble the barriers of provincialism and provide the profession with a fellowship that is truly national in scope.

National Coordinators/Directors

1974 - 1982	Robert B. Walcott (UCLA)
1982 - 1986	Thomas A Garmen (Georgia)
1986 - 1989	Frank Miranda (Oklahoma)
1989 - 1998	Marc Gale (Florida)
1998 - to present	Larry Haisch (Nebraska)

ORGANIZATION OPERATION

The Section of Operative Dentistry of the American Dental Education Association has “oversight” responsibility for sustaining and managing CODE.

- The national director will be appointed by the executive council for a three-year term, renewable not to exceed two consecutive terms.
- The director will be selected from a list of one or more individuals nominated by the CODE Advisory Committee after input from the regions.
- The director will perform the functions and duties as set forth by the council.
- The director will be a voting member of the council who will be expected to attend regional CODE meetings and the annual meeting of the council and section.

A CODE Advisory Committee will assist the national director with his/her duties.

- A CODE Advisory Committee will consist of one member (regional director) from each of the six regions plus 1 or 2 at-large members.
- Each regional director is selected by their region. The at-large member(s) may be selected by the national director and/or the executive council.
- The terms are three years, renewable, not to exceed two consecutive terms.
- The national director serves as chair of the Advisory Committee.

The annual CODE Regional meetings will serve as the interim meeting of the section. Some section business may be conducted at each CODE Regional meeting as part of the National agenda.

Regional Directors:

- Will be a member of ADEA and the section of Operative Dentistry
- Will oversee the conduct and operation of CODE in their respective region while working in concert with the national director
- Will have communication media capabilities including e-mail with the capability of transmitting attachments
- Will Attend the region’s meeting
- Ensure that meeting dates, host person and school are identified for the following year
- Do follow-up assist on dues “non-payment” by schools
- Ensure that reports of regional meetings are submitted **within 30 days** of meeting conclusion to the national director
- Ensure that individual school rosters (operative based) are current for the region
- Identify a contact person at each school
- Assist in determining the national agenda
- Other, as required

CODE ADVISORY COMMITTEE
(Revised 11-15-05)

	Region	Regional Director	Phone/E-mail	Term (3 years)
I	Pacific	Dr. Edmond R. Hewlett UCLA Los Angeles, CA	310-825-7097 eddyhedent@ucla.edu	2006-2008
II	Midwest	Dr. R. Scott Shaddy Creighton University Omaha, NE	402-280-5226 shaddy@creighton.edu	2006-2008
III	South Midwest	Dr. Alan H. Ripps LSU New Orleans, LA	540-619-8548 aripps@lsuhsc.edu	2004-2006
IV	Great Lakes	Dr. William Gray UWO London, Ontario, Canada	519-661-2111 william.gray@fmd.uwo.ca	2004-2006
V	Northeast	Dr. Richard Lichtenthal Columbia University New York, NY	212-305-9898 rml1@columbia.edu	2005-2007
VI	South	Dr. Kevin Frazier MCG Augusta, GA	706-721-2881 kfrazier@mail.mcg.edu	2005-2007
II	At-Large	Dr. Poonam Jain SIU Alton, IL	618-474-7073 pjain@siu.edu	2005-2007
II	National Director	Dr. Larry D. Haisch UNMC Lincoln, NE	402-472-1290 lhaisch@unmc.edu	2005-2007
II	Web Master	Dr. William W. Johnson UNMC Lincoln, NE	402-472-9406 wwjohnson@unmc.edu	

**Consortium of Operative Dental Educators (CODE)
2005-2006**

Paid - Regions and Schools

✓ = Paid Member as of November 11, 2005

67 schools (10 Canada, 57 United States)

<u>Region I (Pacific) -11</u> ✓ Alberta - Canada ✓ Arizona ✓ British Columbia - Canada ✓ Loma Linda ✓ Nevada ✓ Oregon ✓ Pacific ✓ UCLA ✓ UCSF ✓ USC ✓ Washington	<u>Region II (Midwest) - 10</u> ✓ Colorado ✓ Creighton ✓ Iowa ✓ Manitoba - Canada ✓ Marquette ✓ Minnesota ✓ UMKC ✓ Nebraska ✓ Saskatchewan - Canada ✓ Southern Illinois
<u>Region III (South Midwest) - 7</u> ✓ Baylor ✓ Louisiana State ✓ Mississippi ✓ Oklahoma ✓ Tennessee ✓ UTHSC - San Antonio ✓ UTHSC - Houston	<u>Region IV (Great Lakes) - 10</u> ✓ Case Western ✓ Detroit Mercy ✓ Illinois ✓ Indiana ✓ Michigan ✓ Ohio State ✓ Pittsburgh ✓ SUNY - Buffalo ✓ West Virginia ✓ Western Ontario - Canada
<u>Region V (Northeast) - 18</u> ✓ Boston ✓ Columbia ✓ Connecticut ✓ Dalhousie - Canada ✓ Harvard ✓ Howard ✓ Laval - Canada ✓ Maryland ✓ McGill - Canada ✓ Montreal - Canada ✓ New Jersey ✓ NYU ✓ Pennsylvania ✓ SUNY - Stony Brook ✓ Temple ✓ Toronto - Canada ✓ Tufts ✓ US Naval Dental School	<u>Region VI (South) - 11</u> ✓ Alabama ✓ Florida ✓ Georgia ✓ Kentucky ✓ Louisville ✓ Meharry ✓ North Carolina ✓ Nova Southeastern ✓ Puerto Rico ✓ South Carolina ✓ Virginia

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The National Agenda for 2005

was established after review of the suggestions contained in the reports of the 2004 Fall Regional meetings and National CODE Meetings and from the Regional CODE Directors.

Thank you to the Regional CODE Directors and the membership for making recommendations to establish the National Agenda. Each Region is encouraged to also have a Regional Agenda.

Each school attending the Regional Meetings is requested to bring their responses to the National Agenda in written form AND electronic media. This information is vital to the publication of the Annual Fall Regional Report.

Continue to invite your colleagues, who are Dental Licensure Board examiners and your Military and Public Health Service colleagues who head/instruct dental education programs to your Regional meetings.

Each Region should select next year's meeting site, date or tentative date during your Fall Regional CODE meeting so this information may be published in the Annual Fall Regional Report.

The Regional meeting reports are to be submitted to the National Director in **publishable format** as an attachment to e-mail.

The required format and sequence will be:

- 1. CODE Regional Meeting Report Form****
- 2. Summary of responses to the National Agenda.**
- 3. Individual school responses to the National Agenda**
- 4. The Regional Agenda summary and responses.**
- 5. CODE Regional Attendees Form****

****** (Copies may be obtained from the Web site:
<http://netserv.unmc.edu/code/codeFrame.html>).

Mail a hard copy of the report to the National Director. Both electronic and hard copy versions are to be submitted **within thirty (30) days** of the conclusion of the meeting.

National CODE Meeting:

The meeting will be held **Thursday, February 23, 2006 from 4:15 pm to 6:00 pm** at the Fairmont Hotel in Chicago, Illinois. Suggestions as to how to make this meeting productive and efficient are requested.

National Directory of Operative Educators:

The CODE National Office maintains the National Directory of Operative Educators as a source for other professionals. It is imperative that the information be as current as possible.

To update your university's directory listing of th the CODE website, <http://netserv.unmc.edu/code/codeFrame.html>, and click on the red link, "Please help update," found under the CODE menu on the left side of the screen. Make any necessary changes and click "submit form".

Please have each school in your Region update the following information for the National Directory of Operative Educators:

School name and complete mailing address

*Individual names: (full time), phone #, fax #, e-mail address
of faculty who teach operative dentistry.*

*(This could be individuals in a comp care program, etc. if
there is no defined operative section of department.)*

Include this information with the Regional Report by mailing a hard copy to the National Office of CODE. All update information received by mail will be forwarded by the National Office to the Webmaster for inclusion on the Web site.

Your help and cooperation in accomplishing the above tasks helps save time and effort in publishing the Annual Fall Regional Report in a timely fashion.

Thank you,
Larry D. Haisch, D.D.S.
National Director, C.O.D.E.
UNMC College of Dentistry
40th & Holdrege Streets
Lincoln, Ne 68583-0750

E-mail: lhaisch@unmc.edu
Office: 402-472-1290
Fax: 402-472-5290

2005 NATIONAL CODE AGENDA

(Please cite the evidence were applicable)

- I. How is "Evidence based teaching and clinical practice in Restorative Dentistry" being introduced?
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?
How are the changes incorporated into the curriculum?

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

- II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rational/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?

What technique is taught to repair an open proximal contact in a newly placed resin composite?
What is the evidence for this method?

What technique is taught to repair an open proximal contact in an old resin composite?
What is the evidence for this method?

Are bevels part of routine posterior resin composite preparations? Where?
What is the evidence for the bevels and the location?

In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?
What is the evidence for this?

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?
If so, describe and comment.

What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.

- III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school? (*See ADA web-site: use topic search*)
- IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?
(*Reference: CODE 2000 Annual Regional Report - posted on CODE web site*)
<http://netserv.unmc.edu/code/codeFrame.html>
- V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?
Have your calibration efforts improved inter-rater agreement between faculty?
What outcome measures have you used to track the efficacy of your calibration?
Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.
(*Reference: CODE 1999 Annual Regional Report - posted on CODE web site*)
<http://netserv.unmc.edu/code/codeFrame.html>

Regional CODE Agenda

To be established by the respective Region and Regional Director. Please also report on responses to the Regional Agenda from all participants.

Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations?

(*Reference: ADA news, July 11, 2005; Vol 36, No.13*)

Suggestions for CODE.

What can the organization do to improve its effectiveness?

What is suggested to improve the Web site?

<http://netserv.unmc.edu/code/codeFrame.html>

Other comments?

CODE REGIONAL MEETING REPORT FORM

REGION: _____

LOCATION AND DATE OF MEETING: _____

CHAIRPERSON:

Name: _____

Phone #: _____

Address: _____

Fax #: _____

E-mail : _____

List of Attendees:

Please complete the CODE Regional Attendees Form (following page)

Suggested Agenda Items for Next Year:

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: _____

Phone #: _____

Address: _____

Fax #: _____

E-mail : _____

Date: _____

Please return all completed enclosures to
Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;
40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

CODE Region _____ Attendees Form

NAME	UNIVERSITY	PHONE #	FAX #	E-MAIL ADDRESS

CODE REGIONAL MEETING REPORT FORM

REGION: I (Pacific)

LOCATION AND DATE OF MEETING:

UNLV School of Dental Medicine Las Vegas, NV

November 3-4, 2005

CHAIRPERSONS:

Name: Ray Tozzi. C. "Ned" Hill

Phone #: 702-774-2673

Address: 1001 Shadow Lane MS 7410

Fax #: 702-774-2501

Las Vegas NV 89106-4124

E-mail :
Raymond.Tozzi@ccmail.nevada.edu

List of Attendees:

Please complete the CODE Regional Attendees Form (following page)

Suggested Agenda Items for Next Year:

1. Provisional restorations
2. QA process for laboratory-fabricated restorations
3. Intellectual property/copyright issues of teaching materials
4. Active learning
5. Teaching technologies (e.g WebCT) - helping students make leap from 2D to 3D
6. Do board exams drive what we teach of vice-versa?

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: Dr. Karen Gardner

Phone #: 604-822-3566

Address: University of British Columbia

Fax #: 604-526-7998

2199 Westbrook Mall

E-mail : drkg@interchange.ubc.edu

Vancouver, BC, Canada

Date: October 19 - 20, 2006

Please return all completed enclosures to
Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;
40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

**2005 NATIONAL CODE AGENDA
REGION I
SUMMARY RESPONSES TO NATIONAL AGENDA**

- I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other?
Please identify and evaluate source(s) and value of source(s).
With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?
How are the changes incorporated into the curriculum?
How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?**

Issues of the need to continually assess the knowledge base, maintain/update the database, and to teach students how to assess the literature are regarded by all as key. We must also be cognizant of the perception by students that we (faculty) occupy the highest level in the evidence hierarchy. The Cochrane Group and the Web of Science were offered as sources to consider along with Pub MED. Approaches to introducing EBD into the restorative curriculum varied widely.

Incorporation of new information into curricula is being accomplished both by integration of new material into existing main courses and via elective courses. Decisions on what to adopt are generally made by some type review committee on an ad hoc basis. The general tendency, however, is to stay with tried and true protocols for maximum predictability.

- II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rational/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

Cuspal replacement with composite resin is generally not taught as part of mainstream curricula, and when done clinically is typically driven by cost, patient's refusal of amalgam, or use as a transitional restoration. No good evidence base exists on this issue. The topic also generated discussion on differing comfort levels between what we teach and what we do.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

Most schools repair proximal contacts on new (< 24 hrs. old) posterior composites, but there was less agreement on repairing older ones. An Operative Dentistry journal was described - it examines a series of prep designs and least dependable was the slot. It found that due to polymerization shrinkage, the slot prep should be oval. WREB will require mechanical retention for slot preps for amalgam and composite.

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

Bevels – most follow principles put forth in T. Hilton's chapter of Summit's text.

In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?

What is the evidence for this?

Break proximal contact – many factors must be considered, esp. caries risk status. On the WREB exam, points are deducted for any unbroken proximal contacts on posterior preparations.

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

Repair v. replace: In school settings we often redo vbs. Repair to give students experience. Also, tend to have poorer recall/follow-up in school setting, so we tend to err toward replacement. Issues include complexity of restoration, who "owns" (is responsible for) the repaired restoration, informed consent – risk/benefit communication – full disclosure is KEY. Repair v. replace is empirical! Decisions should be based decision on biologic risk to tooth. The only evidence on this question is empirical – need consensus based and EB.

Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?

If so, describe and comment.

Bonded cores – insufficient ferrule is the most commonly cited factor in failures. Many schools don't do them at all, preferring cast post/cores.

What is the longevity of bonding agents for resin composites and amalgam?

Based on the literature, how long can the bond be expected to last in vivo? Respond in context of bonding to various substrates.

Longevity of bond – all generally acknowledge that dentin-resin bond degrades over time. 3-step etch/rinse products are regarded as showing better longevity, at least in vitro. A discussion ensued on Pashley and Tay's work on simplified adhesives and their tendency to act as semi-permeable membranes due to their aqueous composition, potentially putting the bonded interface at risk for nanoleakage and hydrolytic degradation. Also discussed Pashley/Tay's work on degradation of collagen by host enzymes in the resin interdiffusion zone produced by newer simplified adhesives and the possible prevention of same by treatment of the preparations with chlorhexidine.

- III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?**

Amalgam – We discussed conflicting views regarding safety of amalgam and need for measures to protect environment from relatively small amount of mercury introduced by dental use. All schools continue to use amalgam, although to varying degrees.

- IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?**

CRA – All either have programs in place or development. General agreement that as in the private practice sector, incentives are necessary (students, like practitioners, must be "paid") in order for routine application of CRA protocols to occur.

- V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?
Have your calibration efforts improved inter-rater agreement between faculty?
What outcome measures have you used to track the efficacy of your calibration?
Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.**

Calibration – Approaches and uses of technology vary widely. Variations of an objective structured clinical examination (OSCE) on tooth preparation errors were discussed. The point was made that emphasis on “ideal” preparation forms discounts the fact that every preparation should be ideal for the given situation.

2005 NATIONAL CODE AGENDA

REGION I RESPONSES

(Evidence cited where applicable)

Region I School Abbreviations

UA	University of Alberta	OHSU	Oregon School of Dentistry
ATSU	Arizona School of Dentistry	UOP	University of the Pacific
UBC	University of British Columbia	UCLA	University of California - LA
LLU	Loma Linda University	UCSF	University of California - SF
UNLV	University of Nevada	USC	University of Southern California
	UW		University of Washington

This year's meeting had the best attendance of any in recent memory, with all Region I institutions represented except for UOP and the University of Alberta. We are deeply grateful to our hosts Ray Tozzi, Ned Hill, and the UNLV School of Dental Medicine for their efforts and hospitality.

- I. **How is "Evidence based teaching and clinical practice in Restorative Dentistry" being introduced?**
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other?
Please identify and evaluate source(s) and value of source(s).

UA: No responses noted

ATSU: The school has a comprehensive wireless internet access infrastructure which dovetails with the high computer literacy and electronic orientation among contemporary dental students. Students learn to discriminate between different qualities of evidence in a journal study club. A student-run Operative study club meets monthly to review various topics, with attendees tending to be very enthusiastic.

UBC: In operative, journal articles from well recognized journals e.g.: Operative Dentistry, J Dent Rest., the Australian Dental Journal etc. are used to demonstrate and support why certain concepts are taught.
Informational Sources:

1. *Fundamental Concepts of Operative Dentistry* – a contemporary approach, by Summitt et al. an outstanding text (except for the excessive use of pins). The section on posterior direct composite restorations as written by Hilton is very well done.
2. *Journal of Operative Dentistry* – we attempt to use articles from the journal wherever they are relevant in the operative course. However, the journal does a lot of on materials which is another course in our curriculum.

3. *Journal of Dental Education* – articles presented in the journal related to evidence education will be mentioned throughout the course as well. It would be helpful to have more research done in the area of evidence based education which could then be presented in this journal
4. *European Journal of Dental Education* – an outstanding journal which any educator in dental education should be familiar with. Interesting to get the European perspective on amalgam, composites etc which are also presented to the students in an attempt to support UBC's commitment to a global education.
5. *Data Bases* – Pub Med and Web of Science. In conducting literature reviews, increasingly I am finding more information (especially international) on the Web of Science

LLU: We use text books, journals, CD/DVD – video presentations seem to be the most effective communication tool. We have a new DVD on tooth preparations and associated restorative procedures. The content has associated links to extensive supporting dental literature, although these references need to be updated.

UNLV: UNLV utilizes faculty in-service to introduce Evidence-based Dentistry to our faculty. Our lecture series is referenced with articles and sources such as Blackwell Synergy, Science Direct, PubMed, as well as our standard texts.
Dr. Victor Sandoval teaches a course in EBD. EBD is used in the Restorative department as a faculty calibration tool, i.e. as an aid in developing courses for faculty in different disciplines. Using the WebCT program, all faculty will be calibrated and graded on their level of calibration. Drs. Ray Tozzi and Ned Hill are responsible for collecting the necessary literature to comprise an evidence base for the calibration program.

OHSU: We are working to be sure that all of our teaching and clinical practice is as evidence based as we can make it. This is a large task. We review the literature with our Biomaterials and Biomechanics Division, and are working through the course content a bit at a time to try to make each lecture is evidence based utilizing our text and current literature both printed and online. Additionally, faculty in our 3rd-Year Biomaterials course conduct “you make the call” exercises with the students, e.g. presenting them with a Class II lesion and directing teams of students to develop evidence-based processes to manage the condition.

UOP: No responses noted

UCLA: These issues are discussed as they arise at periodic faculty meetings or via email canvassing. Decisions made by Division Chair after consideration of faculty input, consultation with any designated key faculty individuals, and review of pertinent evidence in the current literature. Once introduced, feedback from faculty/students/patients, where applicable, is monitored to assess outcomes and modify the curriculum as indicated. (Examples : Diagnodent, new impression materials; ALSO – School of Dentistry Equipment Committee). (See following manuscript by R.G. Stevenson for an in-depth discussion of EBD in the school environment. *This manuscript has been edited for spacial reasons by the Editor*)

The Educational System's Integration of Evidenced-Based Principles: What are the Obstacles in the Dental School Environment? (

Richard G. Stevenson III, D.D.S., UCLA School of Dentistry, September 2005

INTRODUCTION

The overwhelming majority of Dental Schools in North America utilize competency- based curricula. (1, 2) Very few dental schools, however, have implemented Problem Based Learning (PBL). (3) The PBL system is time intensive, requires significant faculty resources, and relies on the ability of facilitators to meet educational objectives with small groups of students. In dental schools, Evidenced-Based Dentistry (EBD) has been subject to the same lack of implementation as PBL. While the concept of EBD is easily understood, the mechanics of its implementation in patient care is not. (4) When the teaching of EBD occurs, it is taught as a didactic course with little implementation within clinical courses whose purpose is patient care. Factors that slow the integration of EBD into the clinical curricula are multi-factorial and include: EBD implementation in dental practices, clinical faculty and administrators, post and pre-doctoral students, educational resources, and available curriculum time. The purpose of this paper is to describe obstacles that retard EBD implementation into clinical curricula and to provide solutions that UCLA School of Dentistry is pursuing with the work of transitional and clinical researchers.

OBSTACLES – current problems faced in implementation

EBD implementation in dental practices

Evidence-Based Dental Practice has been introduced to the dental profession as a corollary to the medical model of Evidence-Based Practice (EBP). (5) Theoretically, this model facilitates the transfer of best evidence into clinical practice and decision-making. Its purpose is to modify practice resources in providing best care to patients. Physicians, as well as dentists, recognize the usefulness of EBP, but note barriers to its successful implementation in private practice. Two major barriers include the dissemination of best evidence in research formats and placing the responsibility of obtaining, implementing, and evaluating the outcomes of best evidence on the clinician alone. Both barriers do not facilitate the use of best evidence by clinicians in private practice. Most clinicians (95%) would prefer practice-friendly dissemination formats than performing systematic reviews from “scratch,” the predominate method by which EBD is taught to dental practitioners. (5) Thus, EBD is not a routine part of dental practice, nor is it considered a viable option for shared decision-making in comparing competing therapies or treatment services.

Clinical faculty and administrators

In the U.S., clinical faculty members are composed of clinician educators and part-time dentists. The number of part-time clinical faculty far exceeds their full time counterparts, 6,377 part-time in comparison to 4,864 full-time clinical faculty (1999). (6) Most part-time clinical faculty members are engaged in some form of private practice. To fill current and future demand for clinical faculty, administrators are demonstrating a preference for part-time clinicians. This preference is guided by a perceived benefit of researchers with limited clinical responsibilities over clinicians whose teaching responsibilities limit a primary focus on research and grant procurement. This is problematic in providing pre and postdoctoral students with consistent educational experiences that are based on concepts and rationally-derived, evidence supported information. It is estimated that from 1998 to 2008, the number of full and part-time faculty that will leave or retire from dental education ranges from 3,255-5,465, a considerable turnover of faculty. (7, 8) Replacement of clinical faculty by administrators will primarily come from private practice. Disadvantages to a continuous turnover results in investing considerable time in new faculty education and training, limiting the ability to cover all aspects of clinical dentistry and its application to students

providing patient care. If EBD is not a viable, routine decision-making tool in private practice, it is debatable how its benefit to the clinical curriculum may be achieved by part-time faculty, especially those who have the responsibility for chairing clinical courses. Firstly, an appropriate and tested method acceptable by dental practitioners does not exist to implement EBD in private practice. Secondly, a clinical curriculum that effectively and efficiently teaches its implementation into patient care does not exist. And finally by demonstration, dentists do not consider this clinical decision-making tool, as constituted, useful or achievable in private practice.

The Ever-Changing Dental Student

Students have changed over the last 20 years, along with the generation from which they emerged. According to Kennedy (2004), the typical dental student craves mentoring and a flexible and changing environment with a steep, upward learning curve. (9) While today's student requires constant skills improvement, they are under tremendous pressure to complete requirements and graduate on time. During the matriculating years, clinical requirements needed to pronounce a student "competent" are labor-intensive and not readily completed as is a written examination with a specified time completion interval. After graduation, many students opt for additional educational experiences. For example, current dental students planning on entering private practice is 50.4% compared to 58.1% in 1985, solo practice 4.1% in 2004 compared to 9.4% in 1985. In the last twenty years, more students have decided to apply for associate positions, 40.3% in 2004 compared to 34.4% in 1985. Those continuing on to advanced education have increased from 38.6% (2004) from 23.6% in previous years. (10) Students are a fickle group. When they perceive certain aspects of their education are not needed for their future plans, students may disassociate or minimize certain aspects of their dental curriculum. As constituted, EBD curriculum may have a difficult time relating to dental students who may understand concepts, but disallow its methodology, not having the ability to demonstrate its benefits in patient care.

Dental School Resources are Limited

Without question, Dental Schools in general are experiencing financial challenges, especially the state-supported schools. In 2003, the Education Commission of the States reported that on average, about one-half of the states reduced their appropriations to higher education by 5%. In the previous two years, state appropriations per full-time student fell 9%. In 2002, the American Dental Association reported a 2% decline in state appropriations for public dental schools. (7) While EBD has not been readily accepted as a clinical decision-making tool, the resources for implementation are known. These resources, including existing technology such as office-based computer systems and electronic charts, can be estimated. Other resources to effectively and efficiently connect office base resources with future implementation solutions are not. This barrier does not encourage administrators to shift limited resources to cover an emerging technology.

Curriculum Revisions

About the time of the release of the Institute of Medicine's report titled Dental Education at the Crossroads: Challenges and Change in 1995, the American Dental Association Council on Accreditation mandated that Dental Schools establish competency-based curricula, in lieu of the more traditional requirement-based systems. (1, 2, 11, 12) Changing or revising a dental school's curriculum takes an enormous effort from faculty, staff, and committees. While the majority of curriculum decision-makers are enthusiastic toward emergent technologies, their inclusion into a compact educational curriculum must withstand the test of competing, existing experiences. While school curriculum decision-makers have accepted didactic instruction in EBD, they must balance the needs of students, faculty, and the entire matriculating process in producing a competent dentist. Conceptually, the implementation of EBD into the clinical curriculum will require the cooperation and coordination of clinical disciplines. While EBD methodology is used only for those cases where decision-making is not intuitive, student experiences must still be tailored or simulated to include this useful tool. The problematic issue is that no clinical curriculum to achieve expected outcomes using this tool exists.

SOLUTIONS – what we've done and what we're doing

At the UCLA School of Dentistry, there exists a cadre of translational and clinician researchers who have contributed to the development of EBD and evidence-based dental practice (EBDP). From their efforts, a didactic course in EBD is required of first and second-year students. (13, 14) Third-year dental students are required to do an EBD component as part of another didactic course. (15) These researchers are also engaged in developing methodologies to implement EBD into private practice. Translational researchers are working on the EBD process and clinician researchers on achieving an EBDP.

In the first and second-years, students select a topic that includes developing a research question from a derived clinical question. Various analyses are done in performing a systematic review from which a

summary statement is reported. The third-year experience in EBD is integrated into the geriatric dentistry program where teams of students complete a case report, reporting on frail or functionally dependent older adults residing in nursing homes, that includes an EBD component on some aspect of the patient's treatment that is uncertain and requiring treatment options.

As part of an undergraduate initiative of the University, EBD is offered to undergraduates in the Student Research Program and as upper division Honor Courses. These courses provide undergraduates with a fully immersed experience in EBD leading to abstract development, poster presentation, and manuscript development and publication on a topic of their choosing. In these courses, concepts regarding EBD implementation in private practice are tested for future curriculum development.

Traditionally, evidence developed through basic and clinical research has been disseminated in a form acceptable to researchers. Evidence developed and used in clinical practice has been disseminated in a form understandable to the clinician. The criticism of these practices is new evidence critical to patient health has not been translated into private practice. The purpose of evidence-based dentistry (EBD) is translational research, bridging the gap between the development of information and its translation into private practice, using rigorous scientific methods. At the UCLA School of Dentistry, translational researchers are developing the engine that creates best evidence for use in private practice. This engine performs systematic reviews of current evidence developed by scientists and makes it usable for clinicians in private practice. Conversely, translational researchers work with clinicians to develop research questions from clinical questions regarding uncertainties in providing patient care. These questions may be of a quantitative and qualitative nature. The dissemination of best evidence is not only to clinicians, but also researchers. To researchers, best evidence is given in the form of summary statements that include the research process that meets rigorous standards. To the clinician, best evidence is provided in the form of clinical practice guidelines that provide treatment alternatives with probabilities of occurrence. These probabilities include decision, cost, and patient preferences estimates. These estimates are again updated with new evidence using Bayesian statistics.

Clinician researchers are those who direct dental care to older adults, particularly frail and functionally dependent older adults residing in their homes or institutions. These researchers are developing algorithms, or visual representations of protocols of geriatric dental care that include primary care issues. In these algorithms, clinical practice guidelines are incorporated to provide for shared decision-making in achieving optimum clinical decisions. Algorithms, clinical practice guidelines, and shared decision-making are being used to develop a knowledge-management software. It is proposed that this software be integrated with patient electronic charts in connecting with a central database. This database is proposed to be under the control and management of the American Dental Association. Using Internet technology, dentists may access this database through the patient's electronic chart, providing encrypted information in posing a clinical question regarding individual patient care. In real time, best evidence is provided to dentists that may be used to discuss treatment options. The outcomes of this shared decision-making are distributed to translational researchers in updating clinical practice guidelines. At UCLA School of Dentistry, both translational and clinician researchers are combining efforts in conceptualizing an effective and efficient EBDP.

CONCLUSION

Professional dentistry agrees that EBD is a useful clinical tool in shared decision-making for arriving at optimum clinical decisions. The implementation of EBD in didactic and clinical predoctoral curricula is problematic. At present, there exists a didactic educational component to teach EBD methodology to dental students. Clinical educational components, however, do not exist that are acceptable in private practice. Thus, faculty, administrators, students, and curriculum committees do not have adequate information or resources to implement EBD into clinical curricula, especially the ability to coordinate multiple clinical disciplines in its use. Without this, students and practitioners may not have the motivation to create change from traditional to evidence-based dental practice.

UCSF: During the 2 week "Introduction to Dentistry", new first year students have a 2 hour lecture in which EB is introduced and explained. After the session, the students are broken up into small groups and given a topic that is introduced during the lecture. The topic may be: Why should I have my child's teeth filled if they are only going to fall out anyway? or, Can tooth whitening hurt my teeth? They also have an orientation to the library. Each small group must do research and present a 1 page paper.

Small group work is very important and helps them learn to delegate and work together.

In the Fall of the first year, in the “Scientific Methods” course, they learn how to find, read and analyze research literature. They have lectures on correct research protocols. In small groups, they are given papers and studies to look at and analyze. The instructor (Fried) finds the papers and studies. The students are given an assignment and each group must write an evaluation and make a presentation. This small “Stream” tries encouraging other faculty to use EB learning in their course but it is difficult. There are too many faculty who will only lecture. Need to introduce more faculty to EB learning!!!

The new course director for PRDS 117 (preclinical operative) has incorporated evidence based research in his didactic course.

USC: Evidence based dentistry is being slowly introduced into curricula for Operative dentistry and Fixed Prosthodontics across the U.S. At USC we have recently implemented a new curriculum on adhesive techniques. This process involved an intensive literature review and discussion amongst several key faculty. The manual that was printed was based on literature and hands on exercises. Many Dental schools have taught Restorative Dentistry by tradition and have stuck with what works. There have been many materials introduced over the last few decades which have increased our choices as clinician. We need to base decisions for student teaching on literature not just on what is the best product of the month. At present our curriculum is being revamped, we will be looking at what we teach from a scientific perspective and finding evidence to support our techniques. Our experience has also been that students find lots of weak evidence sources if when they are assigned to collect evidence. Our faculty are now doing more of the literature review to assemble their evidence bases, and having the students focus more on interpreting the studies, particularly the controversial ones. Sources for information are peer reviewed journals, hands on courses and manuals.

UW: No formal EBD course. References (including reviews from the Cochrane Group) are provided for various principles in lectures. It is important to train students to evaluate scientific literature before sending them on a search for evidence.

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?

How are the changes incorporated into the curriculum?

UA: No responses noted

ATSU: These processes are in development. As we are a new school with many part-time faculty who have little/no teaching experience, they are all eager to show students how to “really” do various procedures.

- UBC:** Dr. Dorin Ruse, head of our dental materials division, will assist us in determining what should be included in the operative courses. This determination is always evidence based and clinically viable. We have clinical instructors that keep module coordinators abreast of all new trends occurring in the local dental community and this is also discussed with the dental materials division. The module coordinators will work in cooperation with the dental material division to incorporate changes into the curriculum.
- LLU:** Proposals are discussed in bi-weekly departmental meetings and if changes in materials are agreed upon they are sent to the student issue committee to initiate the change in student issue if applicable or directly to clinic supply.
- UNLV:** Materials Committee decides if a particular material/device should be trial introduced into the clinical setting. If it is worthy of continued it is developed into a pre-clinical material/device for instruction. Once a new material has been trial introduced in the clinical setting it is added to the curriculum by the faculty in pre-clinical courses.
- OHSU:** We are a rather traditional school that has realized that we must keep up with the times. Our assessment of the new product available is done by consensus in most cases. We are never the first to jump on the bandwagon in our pre-doctoral clinics, but are willing and able to lab test many new products. We are fortunate to have an awesome group of materials scientists with a high level of interest. Changes in our curriculum are difficult as it is crowded, but, we try to expose the students to new thoughts and products and materials in passing in our lectures. We will hold the first of what we hope are many "Technology Nights" to allow the students to put hands on CEREC 3D, Air Abrasion, Biolase, etc.
- UOP:** No responses noted
- UCLA:** New materials and techniques are commonly discussed within the formal curriculum as well as informally in guest lectures, study clubs, lunch & learns, etc. It is important to expose students to these areas while clearly pointing how they either (a) fit within the "fundamentally sound and supported" category, (b) don't fit, based on available evidence, or (c) currently lack the evidence to make such a determination.
- UCSF:** Manufacturers are invited to come and present new materials. New materials tried first by faculty. If new materials are suggested, the recommendation is sent to a standing 'Materials Committee'. This committee decides after evaluation cost/benefits. Materials and instrument for preclinical courses are recommended by course directors. Often new materials are offered at reduced rates to the Preclinical lab courses. They are usually tried out in preclinical labs before used in clinics.

Course directors meet regularly with faculty teaching in their courses to decide on changes to curriculum. UCSF just went through major change to the entire curriculum. We have completed the first year. The change was started by faculty to address problems and bring more integration. There was a committee that met for over a year to start the new curriculum supported and driven by the Dean's office. Much care was taken to engage and present changes to faculty and students. We have brought some copies of the "Owners Manual" for the new curriculum.

USC: First and foremost literature is consulted with regards to the new material. If it is absolutely a new material a few faculty members are identified to evaluate the material. Lab testing is performed. If lab results are successful the material is evaluated on the clinic floor on a limited basis. We need to work with leaders in the field and consult with faculty who have specific expertise in a subject area.

UW: We have a small committee represented by Dental Materials and Division heads. We like to initially assess new things at the preclinical level only, but this is not always practical. We will also occasionally assign a new product to a team of one faculty member and a small group of students for evaluation. We typically try to use the most foolproof techniques and protocols and adhere to the axiom of not being the first or last to try a new product/procedure.

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

UA: No responses noted

ATSU: No responses noted

UBC: Students are advised that they are ultimately responsible for their work. If they use materials which are not evidence based then they run the risk of liability should these materials prove to be defective. They are made well aware of the difference between clinical trials and evidence based.

LLU: Gather whatever evidence is available then make a "best guess" with faculty discussion.

UNLV: At UNLV an evidence-based approach must precede the presentation of any new or unproven procedures.

OHSU: We try to do so by telling the students just that “There is no long term evidence to support the use of...”. At OHSU we have no graduate restorative departments (AEGD, GPR or Pros) and so it is difficult to have a “more advanced” area to test new equipment and techniques. We are really about basic nuts and bolts in the pre-doctoral clinics.

UOP: No responses noted

UCLA: New materials and techniques are commonly discussed within the formal curriculum as well as informally in guest lectures, study clubs, lunch & learns, etc. It is important to expose students to these areas while clearly pointing how they either (a) fit within the “fundamentally sound and supported” category, (b) don’t fit, based on available evidence, or (c) currently lack the evidence to make such a determination.

UCSF: Preclinical lectures (new) cite research and studies that support techniques being taught. Techniques are taught by faculty who use techniques in practice. Our school has always been very conservative. We try to teach tried and true methods so that students can use reliable procedures that have been proven clinically. A new elective has been approved that introduces students to latest and new techniques. Evidence based decisions will be incorporated in the course. The students are encouraged to make their own decisions.

USC: Newest and latest techniques are evaluated, prior to being implemented the literature is consulted. The students are made aware of what is out there and how to judge a restorative material. Sometimes evidence is not readily available in this instance common sense has to be exercised.

UW: We periodically conduct a survey of full- and part-time faculty on various techniques. We teach the “UW way” in addition to alternative ways.

**II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rational/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

UA: No responses noted

ATSU: No responses noted

UBC: No, complex composites are discouraged due to the lack of strength and the leakage associated with composite. If a patient insists on a complex composite, they are required to sign an informed consent advising them they tooth should be crowned, that the restoration will not last and that there is a good possibility of requiring an RCT should they go ahead with a complex composite due to leakage. Students are given a journal article: (Molinaro, J.D., Diefenderfer, K.E., and Strother, J.M. (2002). *The influence of a packable resin composite, conventional resin composite and amalgam on molar stiffness. Operative Dentistry* (27) 516-524.) Additionally, they are referred to Hilton's guidelines for composite placement as presented in the Summitt text. Cuspal replacements with composite resin are performed in the clinic Only on the patients insistence and with informed consent.

LLU: Not taught in preclinic but occasionally done in clinic depending upon the occlusal environment – not for heavy occlusal situations.

UNLV: Cuspal replacement is done with indirect restorations or amalgam. However, clinically, we will replace a buccal cusp on an upper bicuspid with composite after the limitations have been explained to the patient. Intercuspal distance and the width of the isthmus determine cuspal replacement.

OHSU: (*This manuscript has been edited for spacial reasons by the Editor*)

Guidelines for Posterior Composites

Indications for composites in posterior teeth

Patients who are allergic or sensitive to metals Pit and fissure sealing

Class V restorations

Preventive resin restorations

Initial Class I and Class II lesions

Small to Moderate-sized Class I and Class II restorations

The following guidelines reflect the IDEAL situation for posterior composites:

Patient is not allergic or sensitive to resin-based materials

Patient demonstrates acceptable oral hygiene and home care¹.

Must be able to isolate tooth with rubber dam^{2, 3}

All cavity margins must be in sound enamel⁴

Preparation will be 1/3 or less of the intercuspal distance⁵

Restorations limited to mesial (MO) of first molar forward due to access and wear ^b Assess occlusion

- Occlusal vertical stops can be maintained on enamel
- Patient must not be a bruxer and teeth are not under heavy occlusal stress^{7,8} Restoration must not replace cusps'

The following guidelines reflect ACCEPTABLE conditions for posterior composites:

Patient is not allergic or sensitive to resin-based materials

Must be able to isolate tooth with rubber dam^{2, 3}

Assess occlusion

- Patient must not be a bruxer and teeth are not under heavy occlusal stress^{7,8}
- Possible to maintain a vertical stop on sound tooth structure^{9,10}
- Preparation will be 2/3 or less of the intercuspal distance¹¹⁻¹³
 - Remaining tooth structure should be judged to be self- supportive (i.e.. not relying on adhesive restoration to maintain unsupported cusp)
 - Restoration must not replace supporting cusps'

Restorations with margins near the CEJ may be restored with a restorative resin-modified glass ionomer (Vitremer) in the gingival increment ¹⁴

- Clinical situation demands a posterior composite (e.g. esthetics, pt demand for non-mercury restoration)

- Should not be in high-carries risk patient ¹⁵

Clinical Considerations for Posterior Composites

Use a glass ionomer liner on dentin surfaces if practical ¹⁶

Situations in which it is more permissible to "push" clinical indications

- Premolars"
- Patients who do not exhibit parafunction ¹⁸
- Motivated patients with good oral hygiene ¹⁹

Significant predictors for clinical failure of posterior composites are marginal discoloration and marginal deterioration²⁰

Z100/ScotchBond Multipurpose has shown excellent clinical performance ²¹

References

1. Secondary caries is primary reason for failure of posterior composites (Mjor IA, Jokstad A, J Dent 21:338-343, 1993)
2. Margins of class II composites placed w/o dam showed marginal leakage 4-6 weeks after placement in clinical study (Abdalla and Davidson, J Dent, 21:158-162, 1993)
3. Gingival margins below CEJ cannot be sealed under ideal conditions. (Hilton TJ, Schwartz RS, Ferracane JL, Quint Int, 28:135-144, 1997)
4. Wider cavities = higher failure rate and more marginal breakdown in clinical study of butt joint vs. beveled margins (Wilson et al., Dent Mater 7:92-98, 1991)
5. Wear increases as restorations are placed more distally: molars > premolars (Leinfelder KF, J Am Dent Assoc 127:743-748, 1996)
6. No data to support use of composites in these areas (J Am Dent Assoc 129:1627-1628, 1998)
7. All secondary caries in 10 yr study of posterior composites occurred at gingival margins of class II restorations; less than 20% of restorations were placed with rubber dam (Nordbo H et al, Quint Int, 29:5-11, 1998)
8. 67% of fractures, 75% of severe wear occurred in pts with moderate to severe parafunction (van Dijken JWC, J Dent, 28:299-306, 2000)
9. Low wear rate in 10 year study of posterior composites attributed to a requirement that all restorations maintain an occlusal stop on enamel (Nordbo H et al, Quint Int, 29:5-11, 1998)
10. Low wear rate in 17 year study of posterior composites attributed to the fact that almost every case had occlusal contact on tooth structure (Wilder AD et al, J Esthet Dent, 11:135-142, 1999)
11. 87% success of direct posterior composites restoring up to 2/3 intercuspal width over three years placed by dental students (Manhart J et al, J Prosthet Dent, 84:289-296, 2000)
12. 70% success of posterior composites over 10 years, some restoring at least ½ intercuspal width (Nordbo H et al, Quint Int, 29:5-11, 1998)
13. 76% success of posterior composites over 17 years, some restoring at least ½ intercuspal width (Wilder AD et al, J Esthet Dent, 11:135-142, 1999)
14. 95% success of "extensive" posterior composites over 3 years with "open" sandwich restorations using Vitremer/Z100; 52% of gingival margins apical to CEJ (van Dijken JWV et al, J Dent Res 78:1319-1325, 1999)
15. 67% of recurrent caries contiguous with RMGI base in extensive posterior composites over 3 years associated with poor oral hygiene patient (van Dijken JWV et al, J Dent Res 78:1319-1325, 1999)
16. Significant decrease in post-op sensitivity of paired class 1 composites when GI liner was placed on dentin surface prior to adhesive application vs. use of adhesive application alone (Akpata & Sadiq, Am J Dent 14:34, 2001)
17. " Mechanical failures occurred more often in molars compared to premolars (van Dijken, J Dent, 28:299-306, 2000)
18. 67% of fractures and 75% of severe wear in molar composite restorations occurred in patients with moderate to severe parafunction (van Dijken, J Dent, 28:299-306, 2000)
19. Only 7% failure over 10 years for posterior composite restorations placed in dental students (Mair LH, Quint Int 29:483-490, 1998)
20. Posterior composites with marginal deterioration at 3 years are 5.3 times more likely to fail at 5 years vs. those without marginal deterioration; posterior composites with marginal discoloration at 3 years are 3.8 times more likely to fail at 5 years vs. those without marginal discoloration; posterior composites with marginal discoloration AND marginal deterioration at 3 years are 8.7 times more likely to fail at 5 years vs. those with sound margins.
21. 85% survival of Z100, Tetric, Charisma posterior composite restorations at 6 years; all failures were in Tetric and Charisma, no Z100 restorations had failed (Busato ALS et al, Am J Dent, 14:304-308, 2001)

UOP: No responses noted

UCLA: Cuspal replacement with composite resin as a definitive restoration is not taught in the preclinic or typically done in the clinic, the rationale being that wear resistance of direct composite resin has not been proven to be adequate for this application. Large composite foundation restorations which replace cusps may occasionally be used as transitional restorations pending completion of other procedures (e.g. periodontal surgery) prior to definitive restoration placement.

(This manuscript has been edited for spacial reasons by the Editor)

Guidelines for Restoration of Class I and II Cavities with Direct Composite Resin in the UCLA Dental Clinic

Indications:

(In these instances, composite would be considered preferable to amalgam.)

- Initial treatment of small Class I and II carious lesions that can be restored more conservatively with composite resin than with amalgam.
- Cusp tip erosions/caries (Class VI) and enamel fractures where preparation for amalgam would undermine enamel and lesions size does not yet dictate a cast restoration.

Limitations:

(These apply when amalgam is suitable but the patient strongly prefers a tooth-colored material for appearance reasons, or when patient fears regarding mercury toxicity cannot be assuaged with education.)

- Class I:
Buccolingual dimension \leq one-half of the buccal-lingual intercusp distance.
- Class II:
Premolars or mesioocclusal of first molars only.
Buccolingual dimension \leq one-half of the buccal-lingual intercusp distance.
- General (These apply to all cases):
All margins must end in sound enamel.
Rubber dam isolation is mandatory.
Must obtain proper informed consent covering all benefits, risks, alternatives, and costs.

Contraindications:

- Cavities with buccolingual dimension $>$ one-half of the buccal-lingual intercusp distance.
- Class II's with gingival margin located in cementum.
- Inadequate access for or patient refusal of isolation with rubber dam.
- High caries risk/rate.
- Weakened or undermined cusps.
- Cracked tooth syndrome.
- Parafunctional habits as evidenced by heavy wear or previous restoration/tooth fracture.

For teeth not meeting these posterior composite criteria in patients requesting/demanding non-amalgam materials, restoration with gold or bonded tooth-colored inlays and onlays will be offered as alternatives.

UCSF: No. Cuspal coverage by amalgam, partial or full coverage crowns. Composite coverage inadequate to hold up under occlusal stresses. Very rarely done in clinic, more often Glass Ionomer used only as temporary measure. Rationale, glass Ionomer bonds better to dentin than composite. Provisional or Emergency coverage of fractured teeth that are sensitive or need TEMPORARY aesthetic solution, where patient cannot afford permanent, if patient came in for emergency visit- limited time available.

USC: Cuspal coverage is not taught with composite resin. Porcelain is favored over composite when cuspal coverage is required. With adhesive type preparations maximum tissue preservation is the objective. The decision to cover a cusp is made by evaluating the integrity of the cusp both at the base and the tip. Minor undercuts are blocked out with composite resin in order to preserve tooth structure. Until additional evidence surfaces to favor cusp replacement with composite porcelain will be used. There are many Creek studies with long term results of cuspal coverage with porcelain.

UW: For foundations (core buildups) only – not as the definitive restoration.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

UA: No responses noted

ATSU: No responses noted

UBC: Place more composite and close the contact. (NOTE: Does “newly placed” = the time of initial placement or within a few days post placement? After a few days, you only get mechanical retention and the restoration’s strength is reduced by at least 50 %.)

Frankenberger, R. et al (2003) Effect of preparation mode on Class II resin composite repair. Journal of Oral Rehabilitation 30; 559-564

Ozcan, M. et al. (2005) Effect of three surface conditioning methods to improve bond strength of particulate filler resin composites. Journal of Material Science: Materials in Medicine 16;21-27

LLU: Box preparation within the proximal box. Evidence is anecdotal and experiential.

UNLV: Our preference is to remove and replace. Delamination and separation at the bond occurs rapidly even in a slotted addition. Numerous articles have been written on the subject.

OHSU: Prep within existing composite and repair. Get better adhesion of repair composite when restoration has been recently placed (*Hilton TJ, Card AS, Ferracane JL. Effect of Composite Surface Repair Treatments on Superficial Interfacial Staining. J Dent Res 2005; 84:abst 276.*)

UOP: No responses noted

- UCLA:** Following isolation with rubber dam, a portion of the proximal aspect of the restoration is removed with a diamond at high speed adequate to permit matrix placement and insertion of new composite material. The prepared area and any involved tooth surfaces are re-restored with the conventional phosphoric acid/adhesive resin/composite procedure. There is ample evidence in the dental literature for the strength and durability of bonds between new composite to both recently placed and aged composite, most recently exemplified by *Bonstein et al. J Adhes Dent 2005 Spring;7(1):41-9*. This study and others also reports superior bond strength of the repair when the surface is prepared with a diamond.
- UCSF:**
1. Newly placed restorations can be re-etched, re-bonded and composite added (Anterior only)
 2. Contaminated or polished composites (Anterior Only) –Roughen existing composite, re-etch, re-bond and add composite
 3. Posterior composites must be redone even if newly placed.
- Evidence - Clinically difficult to add a properly contoured contact, need good matrix.
- USC:** Technique:
1. Rubber dam isolation
 2. Prepare small Class 2 cavity in existing composite.
 3. Roughen composite in area to be repaired with intra-oral microsandblaster.
 4. Etch surface of composite with 37% phosphoric acid for 20-30 seconds and wash for 15-20 seconds. The purpose of the etch is to clean debris. Apply silane to the composite (Purpose to act as a wetting agent, there is no evidence to support silane for bonding purposes).
 5. Adhesive resin is then applied, excess is suctioned off.
 6. Light cure adhesive
 7. Cure composite
 8. Air blocked with glycerin and cure again.
- Evidence is lacking to support the above.
- UW:** School responded by sending PDF file of Restorative Dentistry Clinical Reference manual. (*Manual is not included in this report for copyright reasons. Editor*)

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

UA: No responses noted

ATSU: No responses noted.

UBC: Replace the composite. Evidence as cited previously.

LLU: Same as new restoration if all margins are sound.

- UNLV:** We would replace rather than repair; unless it is a temporary repair for a tooth with a crown build-up. What is the evidence for this method?
Delamination and separation.
- OHSU:** Evaluate overall restoration condition. If defective restoration, recurrent caries, etc then consider replacement of entire restoration. If overall restoration is adequate, evaluate the status of composite-tooth margins. Condition of margins (marginal staining, marginal degradation) are predictive of future failure (*Hayashi M & Wilson NHF, Eur J Oral Sci 111:155 (2003)*). If margins exhibit marginal breakdown, then prep proximal portion of restoration to include exterior cavosurface margins and replace. If everything appears intact, margins in good shape, treat as for a newly placed composite. Evaluate occlusion. Although repaired composite will not be as strong as cohesive strength of composite, if done properly, it is possible to obtain repair bond strength 75-80% of composite cohesive strength (*Dias WR et al, Am J Dent. 2003 Jun;16(3):181-5*). If the repair interface will be protected from occlusion, then consider prep within existing composite. If repair will be subjected to occlusal forces, replace.
- UOP:** No responses noted
- UCLA:** Same as above based on the same evidence, unless there are any clinical or radiographic findings that justify replacement of the entire restoration.
- UCSF:** Must be replaced. Research has shown that contaminated old resin no longer bonds. Unable to tell what the old materials is. May not be compatible with new material. May have recurrent decay underneath. Once you touch it, "You own it"!
- USC:** Similar to our technique described previously if existing composite resin is adequate.
- UW:** School responded by sending PDF file of Restorative Dentistry Clinical Reference manual. (*Manual is not included in this report for spacial reasons. Editor*)

**Are bevels part of routine posterior resin composite preparations? Where?
What is the evidence for the bevels and the location?**

- UA:** No responses noted
- ATSU:** No responses noted
- UBC:** Yes, on the proximal walls and on the gingival floor.
Hilton, T. and Ferracaine, J. (1998). Cavity preparations factors and microleakage of class II composite restorations filled at intraoral temperatures. American Journal of Dentistry (11) 123-130.

- LLU:** Bevels are placed only on the facial and lingual of the proximal box. No bevels on the occlusal.
- UNLV:** We do not normally add bevels.
- OHSU:** Occlusal: never: Significantly increased wear of post comps placed into preps with beveled occlusal margins (*Lang L et al, JDR 74;165; abst 1226, 1995*)
 Proximal: always: (*Hilton T.J, Ferracane J.L. Cavity Preparation Factors and Microleakage of Class II Composite Restorations Filled at Intraoral Temperatures. Am J Dent 1999; 11:113-130.*)
 Gingival: location dependent: when adequate enamel remains for bevel placement, resin adaptation is enhanced (*Dietschi D et al, Quint Int 26:127-138 (1995)*)
- UOP:** No responses noted
- UCLA:** Bevels are placed on *accessible* proximal (buccal, lingual, gingival) enamel margins only. Occlusal margins are not beveled. Tom Hilton's chapter in Summitt's (Ed.) *Fundamentals of Operative Dentistry* text provides the rationale and cites the evidence in the literature for this protocol.
- UCSF:** Yes. At gingival (ONLY if in enamel and there is more than ½ mm enamel left at the gingival floor). At proximals in enamel.
- USC:** Yes bevels are used. Etched enamel rods on a beveled margin produce a better bonding surface due to diagonally sectioned enamel rods which can be etched more effectively. Enamel in the proximal wall should have a 45 degree bevel because prism direction is at right angles to the cavosurface. Occlusal bevels are deemed unnecessary because prism direction in the zone of the central fossa is inclined towards the fossa. By preparing occlusal section of the cavity with parallel walls the diagonal cut across the prisms long axis thereby achieves more effective etching. There are studies to show that there was no difference at the end of two years between beveled and non beveled occlusal margins in terms of color, microleakage, caries, wear or marginal adaptation. Occlusal beveling is only performed when occlusal surface is relatively flat.
- UW:** Bevel gingival and proximal enamel margins. No bevels per se on occlusal margins, but we do "trim" these margins as a prep finishing step to slightly round the margin to reduce the incidence of visible white lines along these areas after completing the restoration.

**In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?
 What is the evidence for this?**

- UA:** No responses noted
- ATSU:** No responses noted

- UBC:** In composite restorations
- LLU:** When it can be assured that visually that all the pathology is removed and margins are in sound tooth structure.
- UNLV:** In patients that are low caries risk. Maintaining tooth structure is imperative. What is the evidence for this? The incidence of demineralization or re-decay is almost non-existent in a low risk patient.
- OHSU:** Not aware of any research to answer this question. I believe it to be empirical, based on conservation of tooth structure. If breaking F/L contact would require removal of significant sound tooth structure, then it isn't indicated.
- UOP:** No responses noted
- UCLA:** These walls are left in contact when the clinical judgment is made that the compromise in resistance form that results from the removal of additional sound tooth structure solely for the purpose of eliminating said contact is more likely to result in a negative outcome than leaving it in contact with the presumed associated risk of secondary caries.
- UCSF:** Yes for both amalgam and composite.
Criteria: No caries present, Caries Risk Assessment low,
If decalcification present, patient's compliance to use fluoride to remineralize considered.
Evidence - If it is okay in anterior why not posterior?
Fits the model for Minimally Invasive Dentistry.
- USC:** The contact may be preserved if sound tooth structure, adequate access for preparation and restoration finishing exist. With adhesive type preparations where maximum tooth structure is preserved. Evidence - None, just based on principle of maximum preservation of tooth structure
- UW:** No responses noted

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

- UA:** No responses noted
- ATSU:** No responses noted
- UBC:** Composite- just get mechanical retention and strength is reduced by 50%.
Amalgam – freshly cut amalgam will expose silver that the mercury in freshly mixed amalgam will react with to produce an amalgam that is not quite as strong as the original but will service well.

- LLU:** We have some unpublished in -hours research to support that there is a significant bond between new amalgam and old amalgam. Composite is treated the same way.
- UNLV:** Additions generally fail at the joint between the repair and the old restoration. If we haven't done the restoration very recently, we replace all older restorations rather than repair.
- OHSU:**
- *Smales RJ, Hawthorne WS. Long-term survival of repaired amalgams, recemented crowns and gold castings. Oper Dent. 2004 May-Jun;29(3):249-53.*
 - *Setcos JC, Khosravi R, Wilson NH, Shen C, Yang M, Mjor IA. Repair or replacement of amalgam restorations: decisions at a USA and a UK dental school. Oper Dent. 2004 Jul-Aug;29(4):392-7.*
 - *Blum IR, Newton JT, Wilson NH. Br Dent J. 2005 Sep;Suppl:27-30. A cohort investigation of the changes in vocational dental practitioners' views on repairing defective direct composite restorations.*
 - *Blum IR, Mjor IA, Schrieffer A, Heidemann D, Wilson NH. Defective direct composite restorations--replace or repair? A survey of teaching in Scandinavian dental schools. Dent J. 2003;27(3):99-104.*
 - *Mjor IA, Gordan VV. Oper Dent. 2002 Sep-Oct;27(5):528-34. Failure, repair, refurbishing and longevity of restorations.*
- UOP:** No responses noted
- UCLA:** This is a complex issue. A decision to repair any restoration must be weighed in light the risks and benefits to the patient in each instance. A large body of anecdotal evidence suggests the frequent finding of occult (otherwise undetected) caries upon removal of aged composite restorations which display margin discrepancies staining. Evidence exists that new amalgam of composite can b e added to old in such a way that retention and seal can be achieved. Other strong evidence is lacking, and protocols for repair lack standardization. Additionally, the spectrum of associated factors (clinical, financial, patient management, etc.) encountered in these situations renders each one unique.
- UCSF:** Composites are replaced- they all leak. They leak more as they age. Amalgams corrode, tarnish and seal over time- less likely to leak. Amalgams more likely to be "patched" if:
- a) Have access
 - b) Follow MID
 - c) Every time you replace a restoration it is 10% larger
- However, in school students need to practice the procedures so they usually replace the entire restoration.
- USC:** Evidence to support clinical efficacy of repairs is anecdotal. Repair should be limited to patients who are regular attenders and have been deemed to be low caries risk and maintain a good standard of oral hygiene. Patients should be made aware of the risks of repair, benefits and alternatives through an informed consent process. There is lack of objective criteria on the performance of repairs post operative monitoring remains critical

UW: No responses noted

**Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?
If so, describe and comment.**

UA: No responses noted

ATSU: No responses noted

UBC: No responses noted

LLU: We have seen failures in both anterior and posterior teeth largely due to poor bonding technique and/or inadequate ferrule. Failure in anterior teeth is most frequently post fracture and in posterior teeth it is loosening of the post and core.

UNLV: No. We are mostly using fiber posts with dual cured resin core material. We haven't been doing enough to see failures.

OHSU: We use a traditional cast post and core in most circumstances. We have seen problems with composite cores coming lose in patients, but these were for the most part not placed here.

UOP: No responses noted

UCLA: Although we have not tracked the frequency of such failures, we have observed failures of composite foundations retained solely by adhesion to an extent that raises concern. Failures typically seem to occur in instances of inadequate ferrule or minimal bulk of remaining composite. Timing of failure is most commonly during prep refinement or removal of provisional crown. Failure of composite foundations retained by posts or pins is far less common.

UCSF: Not seen much because not taught. Still teaching cast dowel and core/ preformed metal posts. Limited exposure to carbon fiber posts. On the occasion when have been done and failed- usually the carbon fiber post has broken.

USC: Problems occur when insufficient ferrule exists. Problems that have been seen are the composite core debonding. Some faculty in their own private practices have seen fractures with fiber posts.

UW: No responses noted

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

UA: No responses noted

ATSU: No responses noted

UBC: No responses noted

LLU: In vitro evidence seems to point to about a year for bonding longevity. Clinical evidence seems to indicate longer success. We recommend mechanical retention in the proximal box in addition to the bonding for class II resin restorations.

UNLV: The longevity of bonding agent to composite has been proposed in the literature to be dependent on the hydrophilicity of the bonding agent. The more water permeability the shorter the dentin bond. Ranges are from 2years to 10years.

OHSU: Unknown in terms of # of years. It is known that the in-vivo adhesive-dentin bond degrades with time (*Hashimoto M et al, J Dent Res 79:1385 (2000)*) This study showed that the dentin-resin bond strength was reduced by about 50% after 1-2 years in-vivo, and then 50% of that strength by 2-3 years in-vivo. This doesn't answer the question of what bond strength is required for clinical success, nor the time until complete bond failure occurs. To our knowledge this question has not been answered. What this does is to confirm numerous in-vitro studies findings that the bond to dentin with modern adhesives will degrade with time, exposure to moisture and thermo-mechanical stress.

UOP: No responses noted

UCLA: An extensive body of work, notably that by Pashley, Tay, and Sano, has raised serious concerns over the longevity of newer simplified (self-etching, one or two steps) resin bonding products. These seem to be at risk for "nanoleakage" of water into the hybrid layer and eventual hydrolytic degradation. Traditional 3-step etch-and-rinse products have been shown by van Meerbeek and others to provide the most durable resin-dentin bond with the least technique sensitivity.

UCSF: Literature state bonding only lasts 3-5 years. Most retention of composite is due to micromechanical retention. Longevity also depends on agent used we teach 2 step technique- etch, prime, bond. Also use Amalgabond, Bonding superior to enamel vs. cementum and dentin.

USC: There are not many well controlled fatigue studies to illustrate how long a bond is expected to last. The older studies of Morin Delong and Douglas do not demonstrate initial cusp reinforcement with bonded techniques, however the cuspal reinforcement does not hold up over a period of time. It would seem that the combination of retention and resistance forms for both the remaining tooth and the restorative material mutually interact for longevity. A case in point is the concept of the first Maryland bridge that relied on bond strength alone without regard to resistance form in the preparation.

UW: No responses noted

**III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?**

UA: No responses noted

ATSU: Currently developing the school's position on this issue. Concerns by scientists outside of the dental research community over continued of amalgam as well as trends in European countries over this issue are regarded as important considerations.

UBC: Acceptable material in restorations that are being replaced, in large restorations (> 2 surfaces), where there is evidence of a high carries rate, and when the patient expresses a preference for amalgam over composite.

- Mercontainers for amalgam - sent to Green Company every 6 months.
Separate containers for capsules
- Merconvap wipes – cubicles
- Sponge under the amalgamator – changed every 6 months
- Suction cleansed with mercongel every week
- Suction traps cleaned every 2 weeks
- Everything is collected by Green Company
- New Clinic – will have a Hg separator in the water line

LLU: We teach the use of amalgam restorations and believe that it is the restoration of choice in many situations. If moisture control cannot be guaranteed for the duration of the material insertion then amalgam is the material of choice. Other indications may relate to financial issues and/or occlusion, access, etc.

UNLV: Amalgam usage is about 10% of the number of all restorations performed due to a lack of patient acceptance. Amalgam waste containers and recycling are in effect.

OHSU: We use amalgam as one of our posterior restorations, feel that it is an appropriate restoration. The ADA does not feel that it is harmful to patients, and its longevity is superior to resin, but not castings.
Our Health and Safety arm of the university has checked and approved our procedures. In the pre-clinic area, excess is placed in sealed containers, and traps are cleaned on a schedule and that scrap is recycled. In the clinical area, scrap is placed under a water/glycerin mix and the traps are cleaned on a schedule and that scrap is recycled. We have used mercury sniffers and can find no apparent problems.

UOP: No responses noted

UCLA: Amalgam restorative technique continues to be taught and practiced in the school as it has for many years. Our stance is that it remains an important option in the clinical decision making process due to its track record as a safe, efficacious, and cost effective material. BMPs include traps in each unit and scrap containers in the clinic.

UCSF: Amalgam is still taught as being very important, viable, widely used material. However, students will often do composite in areas where composite is not recommended- often they do not understand why.

BMP -

- 1) Amalgam waste including capsules is placed in airtight containers. When containers are full, the Department of Environmental Health and Safety collects them.
- 2) Amalgam caught in traps is also placed in these containers
- 3) Effluence:
 - a) all liquids are collected in separating tanks and released after monitoring that there are no more than 25 Parts per million
 - b) Solids are collected and disposed by EH&S.

USC: Amalgam is still a viable restorative material which provides longevity. There are no plans to discontinue its use. We use amalgam scrap containers in clinical and preclinical areas where amalgam is used. All of the amalgam waste goes into the scrap amalgam containers –when full, facilities picks up the container and leaves a new container from the pick up cubicle/area. A USC Biohazard specialist comes and picks up our full scrap amalgam containers for final disposal with the company that USC has a contract with the university for this purpose. Facilities Dept within the dental school handles the changing out of the traps (chair side and lab) as well as cleaning the line.

UW: Amalgam remains available as a restorative material option in the clinics. Clinic units are equipped with traps, and scrap containers are placed throughout the clinics.

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

UA: No responses noted

ATSU: No responses noted

UBC: The current program has been in place for four years. It is a central part of our curriculum and treatment will not begin on the clinical floor until such times as the appropriate caries management treatment has been implemented.

LLU: CAMBRA is incorporated into the preclinical curriculum and is in the early stages of being implemented into the clinical group practices. We are using the forms as published in the March, 2003 California Dental Association Journal.

UNLV: We are presently working on incorporating CAMBRA forms into an electronic format for diagnostic and comprehensive evaluation.

OHSU: CRA has been introduced recently throughout the school. DS 1 students will be exposed to the concepts and the forms in their Operative course, DS2 students will do Microbiologic tests on each other to understand their own caries risk, and the DS 3 and DS 4 students have begun utilizing the system in all of their initial exams and recall appointments. I am attaching the two page clinical form we use.
(This manuscript has been edited for spacial reasons by the Editor)

Record # _____

Compliance with Caries Risk Assessment for Adult Patients by Dental Students

Patient's Date of Birth/ _____ Dent-Cal: Yes / No

Patient's Language _____ Patient's Gender: M / F

1. Was the CPA done? Yes / No Date of Service _____ / _____ / _____

1a. Student (D3, D4, ID3, ID4, DH1, DH2) - circle which one

1b. Part of baseline or Periodic Oral Exam (POE)

1c. First CRA or follow-up CPA

2. Was there a language barrier? Yes / No

If Yes

2a. Was an interpreter used? Yes / No

2b. Did the student communicate in the patient's language? Yes / No

2c. Did the faculty communicate in the patient's language? Yes / No

3. How long did it take to complete the CPA and recommendations? _____ minutes

3a. How long did the complete baseline or POE take? _____ hr _____ min

4. Was the CPA form complete, or incomplete?

5. Were recommendations made? Yes / No

6. Was a diet history taken (diet form for sugar, acid and fluoride exposures)?

7. Was a saliva flow test done? Yes / No

8. What was the patient's caries risk? High, Moderate, Low

8a. If the patient was at high risk, was a bacterial culture done? Yes / No If not, what was the reason?

9. Was the patient's caries risk recorded in Axiom?

10. Was the patient's bacterial challenge recorded in Axiom?

11. Was the patient's caries status recorded in Axiom?

12. Was the CRA form/recommendations form signed by faculty? Yes / No

13. For follow-up CRA:

13a. Were some/ all the recommendations followed? Yes / No

13b. Which recommendations were followed?

(Compare with previous recommendations: Circle the recommendations that were made, e.g. R1, and circle Yes or No according to whether the patient complied with the recommendation, by asking the patient) For daily recommendations, circle Yes only if it was done daily.

Daily Oral Hygiene

R1 Yes / No brush twice daily (with fluoride toothpaste, all patients)

R2 Yes / No floss daily

R3 Yes / No interproximal brush

R4 Yes / No Stimudents

R5 Yes / No toothpick

R6 Yes / No Superfloss

R7 Yes / No other

Diet

R8 Yes / No limit snacking

R9 Yes / No limit sodas

R10 Yes / No other

Fluorides

R11 Yes / No fluoride-containing toothpaste 2X/day

R12 Yes / No fluoride rinse (0.05 % NaF, ACT or *Fluorigard*) 1 X or 2X/day

R13a Yes / No *Prevident* "brush-on" nightly, OR

R13b Yes / No gel (*Prevident*) in custom tray 10 min./night

R14 Yes / No fluoride lozenges (*Lozi-Fluor Fluor-a-day*) 1X/day

Sugar-free gum/mints

R15 Yes / No Chew after meals when you can't brush (xylitol preferred).

R16 Yes / No Use Xylitol mints 3-4 times daily.

Antibacterial rinse

R17 Yes / No Chlorhexidine gluconate, 0.12% (*Periogard*, *Peridex*, *Oral Rx*, by prescription).

R18 Yes / No Rinse with 10 ml at bedtime for 1 minute, 1X/day for one week.

R19 Yes / No Stop for three weeks.

R20 Yes / No Repeat rinsing for one week each month.

R21 Yes / No Use fluoride rinse (see above) every day during the weeks in between.

For dry mouth

R22 Yes / No baking soda tooth paste with fluoride

R23 Yes / No baking soda gum - *Dental Care Gum* (Arm & Hammer)

R24 Yes / No Chew frequently throughout the day -

R25 Yes / No rinse frequently with baking soda suspension during the day

Evaluator's Initials: # _____

Date of this evaluation _____ / _____

Comments:

UOP: No responses noted

UCLA: CRA protocols have been in development for the past two years by a small core of faculty active in the CAMBRA group. CRA forms have been added to the electronic record utilization and CRA is now part of preventive treatment planning for each patient. The next steps are to enlighten more faculty to ensure follow through after treatment planning, and to make CAMBRA principles the core of our restorative curriculum. The latter is planned as part of major school-wide curriculum reform effort presently getting underway.

UCSF: Preclinical Curriculum: At UCSF Caries Risk Assessment is an integral part of our new preclinical and clinical curriculum. The restorative curriculum is designed around the diagnosis, prevention and when possible chemical and minimally invasive conservative treatment of the carious process. We begin the freshman restorative course NOT by preparing teeth for restorations but by using the medical model approach for treating dental caries as an infectious disease that causes tooth decay. We proceed from chemical treatment of subclinical caries (Decalcification), to Sealants and Preventive Resin Restoration, to Conservative Preparations, to larger restorations and eventually crowns. CRA is taught to the freshmen class in the pre-clinical lab and involves saliva flow tests, Bacteriological culture and count, Stephan Curve pH Plotting, review of protective factors, fluoridation and remineralization. In the operative section, preparation designs are presented in clinically relevant context with emphasis on modification of designs should factors such as CRA be important. On competency exams, there is a line item in the preparation design criteria in which the student must alter the design of CRA is a factor.

Clinical curriculum: Students are introduced to CRA in the first year course. During the second year PCC 129 course, students practice the CRA on each other and then on their first clinical patient in the Spring of the 2nd year. During the 3rd and 4th year, all patients that are treated in the Undergraduate clinic have a CRA. Patients that are designated as being High Caries Risk should be bacterial tested and saliva flow measured. The school has developed a "Recommendations" sheet that is filled out and given to ALL patients. The sheet contains information about the caries process. (Enclosed) CRA is also done at every POE (recall). A new CRA Compliance form is attached as well. We are currently debating whether or not bacterial testing should be performed on every clinic patient. A preventive package of assessment and antibacterial products priced virtually at cost is available for clinic patients, but students do not promote it to their patients as frequently as we'd like to see.

USC: A taskforce has been developed to address caries risk assessment. Currently a protocol is being worked on. The implementation should occur within the next 6 months.

UW: No responses noted

- V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams? Have your calibration efforts improved inter-rater agreement between faculty? What outcome measures have you used to track the efficacy of your calibration? Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.**

UA: No responses noted

ATSU: No responses noted

UBC:

1. We have meetings before and after each and every clinical session
2. We have critical requirements which are presented with each exercise so that the student knows exactly what will be assessed and the instructors know exactly what to assess
3. Instructors work in pairs and if there is a difference of opinion during an assessment a third instructor (usually the course coordinator) is asked to make the tie breaking decision.
4. The pairings are changed every 6 weeks during the course.
Both instructors and students are very comfortable with these guidelines.
No studies have been conducted thus far to support the measures taken.

LLU: No responses noted

UNLV: This is done at the Team Leader level. Each Team calibrates its faculty on daily grading and semester student evaluations. Competencies are always graded by two faculty to eliminate bias and over-grading. Have your calibration efforts improved inter-rater agreement between faculty? YES. What outcome measures have you used to track the efficacy of your calibration? We are in the process of working on a tracking mechanism.

OHSU: This is an issue that has only recently been introduced. We began with a session at our summer faculty meeting, and showed examples of cases and had the faculty anonymously grade them. We did the statistics and then reported back to the group. The disparity was significant. We are now having the faculty anonymously evaluate the "case of the week" so that we can keep this idea up front in their minds. The pre-clinical faculty meets prior to the lab sessions and goes over examples of work (usually photos and models from previous years. We encourage the faculty to photograph student's work at will. We are very lucky to have a simulation clinic that seems to be very effective. ADEC simulators with Frasaco heads and dentoforms.

UOP: No responses noted

UCLA: Calibration becomes important for practical and clinical competency exams. All faculty receive detailed criteria for the grading of these exams, and the criteria are periodically reviewed and discussed at Restorative faculty meetings.

UCSF: Calibration is the #1 issue that faculty have voted on as needing improvement. New Interim chair (Brear) has made this her #1 priority. It started 1 year ago when there were 3 faculty retreats involving all clinical and pre-clinical faculty, department chairs, researchers and specialists (endodontic, pedodontic, periodontic, fixed and removable prosthodontic, and public health). The first retreat involved defining parameters used for applying conservative principles in our operative preparation designs. The second meeting involved using the data and input from the first meeting and presenting comprehensive operative designs that were slightly modified and then ratified by the faculty. Grading forms defining grading parameters and “clinically acceptable” standards were presented, reorganized and approved by both the preclinical and clinical faculty. The new forms will be used for both test cases (preclinical) and competency exams (clinical). New Web CT site for faculty only (“e- lounge”). All faculty must enroll. Web CT contains all lectures on the “new prep” designs that are being taught. There is also a required OSCE type exam consisting of 20 stations with tooth preparation problems that the faculty person must identify. The WebCT approach has helped to address the problem of part-time faculty attendance at in-person calibration sessions The same OSCE model is used with students, as well.

New Technologies:

1. Ideal designs were cut on typodont teeth and matched to the curriculum Over 20 additional teeth were prepared illustrating the most common errors found in the operative procedures. Both “ideal” models and the “error” models are being presented to the students for review before test cases and are being used to calibrate the instructors in an OCSE format. The new design criteria and designs have been condensed and have been placed on e-lounge. All lectures are on student Web CT also. All instructors are required to attend a mandatory calibration meeting where they have to:
 - a) review a printed version of the new design protocols and armamentarium.
 - b) review and examine all of the 3D models
 - c) Visit Web CT e-lounge site
 - d) Review grading sheets. The grading sheets have well defined parameters for each grade. Each grade is given in relation to all the steps performed in a test case or competency exam. Dr. Huang is working on duplicating all the example models for each student
2. Web CT for students and faculty: Web CT also has a newly published “Faculty Manual” on line.
3. Use of “3D Interactive Atlas of the Human Mandible and TMJ” in dental morphology class (Editors: Brown and Herbranson, Stanford/NASA National Biocomputation Center; Through NIH; Web Site: <http://www.toothatlas.com>)
4. Preclinical lab is now computer center with monitors at each desk.

Have your calibration efforts improved inter-rater agreement between faculty? Yes and fostered more exchange of information. What outcome measures have you used to track the efficacy of your calibration? Haven’t done this yet.

- USC:**
1. Faculty are given specific criteria to grade against, on going continuing education meetings are used as a venue to standardize faculty. A faculty calibration meeting is conducted once a year, and faculty take exams based on the day. An Inadequate grade results in the faculty losing the right to conduct clinical competency examinations. Calibration is ongoing.
 2. There are web based resources which the faculty must study and refresh their skills from time to time.
 3. Calibration is very difficult an assessment of inter-rater agreement has not been made. the grades given are varied.
 4. Efficacy of calibration has not been tracked we just have data on
 - a. Average % the faculty awards students
 - b. The average passing percentage the faculty will award.
 - c. The percentage of students passing with a specific faculty member.
- UW:** New technologies: Palm OS PDAs are checked out by each clinical faculty person at the start of each clinic session. The Clinic Director can compile each individual's grades and compare to those of other faculty to identify "outliers" – those who are unusually easy or hard as compared to the norm.

Regional CODE Agenda

To be established by the respective Region and Regional Director. Please also report on responses to the Regional Agenda from all participants.

Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations?
(Reference: ADA news, July 11, 2005; Vol 36, No.13)

All Region I schools responded "YES".

Suggestions for CODE.

What can the organization do to improve its effectiveness?

- Have a chat room where we could present concepts/problems for others to offer their comments.
- Publish a QUARTERLY which presents a review of articles pertinent to CODE members.
- Change the name so it will appeal to more than "Operative" instructors.

What is suggested to improve the Web site?

<http://netserv.unmc.edu/code/codeFrame.html>

- A Chat room and Blogs for more open communication.

Other comments?

None reported

CODE Region I Attendees Form

NAME	UNIVERSITY	PHONE #	FAX #	E-MAIL ADDRESS
J. Martin Anderson	UW	253-852-5155		jma@u.washington.edu
Tar Chee Aw	UW	206-543-5948	206-543-7783	tcaw@u.washintgon.edu
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Karen Gardner	UBC	604-822-3566	604-526-7998	drkg@interhange.ubc.ca
David Graham	UCSF	925-820-3000		david.graham@ucsf.edu
Larry Haisch, National Director	UNMC	402-472-1290	402-472-5290	lhaisch@unmc.edu
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Morrie Reisbick	ASD	520-275-5785		mreisbick@atsu.edu
Doug Roberts	LLU	909-558-4640	909-558-0235	droberts@llu.edu
Roy Tozzi	UNLV	702-774-2673	702-774-2501	raymond.tozzi@ccmail.nevada.edu
Victoria Wallace	Ultradent, Inc	888-261-9951		wwictoris@ultradent.com

CODE REGIONAL MEETING REPORT FORM

REGION: II (Midwest)

LOCATION AND DATE OF MEETING: Marquette University School of Dentistry
 Milwaukee, WI

September 18 - 20, 2005

CHAIRPERSON:

Name: Dr. Anthony J. Ziebert

Phone #: (414) 288-3704

Address: P O Box 1881

Fax #: (414) 288-5752

School of Dentistry

E-mail: anthony.ziebert@marquette.edu

Milwaukee, WI 53201-1881

List of Attendees: Please complete the CODE Regional Attendees Form (enclosed at end of Agenda)

Suggested Agenda Items for Next Year:

1. Implants
2. Post and Core - casts and prefabricated

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: Dr. Deborah Cobb

Phone #: (319) 335-7214

Address: University of Iowa

Fax #: (319) 335-7267

Iowa City, IA 52242

E-mail : deborah.cobb@uiowa.edu

Date: September 17 - 19, 2006

Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;

40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

**2005 NATIONAL CODE AGENDA
REGION II
SUMMARY RESPONSES TO NATIONAL AGENDA**

NO SUMMARY RESPONSES TO NATIONAL AGENDA SUBMITTED

2005 NATIONAL CODE AGENDA

REGION II RESPONSES

(Evidence cited where applicable)

Region II School Abbreviations

COLO	University of Colorado	MINN	University of Minnesota
CRE	Creighton University	UMKC	University of Missouri - KC
IOWA	University of Iowa	UNMC	University of Nebraska
MAN	University of Manitoba	SASK	University of Saskatchewan
MARQ	Marquette University	SUI	Southern Illinois University

ONLY RESPONDING SCHOOLS ARE LISTED

I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?

COLO: There are a series of courses on “professional decision-making;” however, nothing is structured.

CRE: During the 2nd semester of the freshman year, all students must develop a research project and present in the form of a table clinic. Students are formed into groups of 7-8, and with the help of a faculty mentor, they:

1. develop an idea
2. perform literature searches
3. structure the study
4. complete the study
5. run statistics
6. come to some conclusion

Also, a required course entitled ‘Research and Literature Evaluation’ is offered in the 1st semester of the junior year.

IOWA: A lot of what we do is based on clinical experience. References and guidelines are based on “current information.”

MAN: No responses noted.

MARQ: The freshman curriculum has a significant number of lectures on research, research design, and interpretation of results. Some lecture courses in Restorative Dentistry are taught with current literature. Students are given several articles prior to class and then are expected to discuss them during the class. The clinical implication of the research is emphasized. In addition, clinical students are expected to justify treatment decisions presented in Dental Rounds through references to the literature.

MINN: No responses noted.

UMKC: Introduced in lectures and supplemented with departmental and faculty wide Lunch-N-Learn's for the whole faculty throughout the year. Evidence also used from faculty research.

UNMC: Nothing formalized.

SASK: No responses noted.

SIU: No responses noted.

What is the methodology, obstacles, and successes?

All schools agreed that the obstacles were as follows:

1. Appropriate funding @ the libraries.
2. Faculty resistance to the best evidence and resistance to change.
3. Poor evidence and poor clinical trials.
4. Lack of curriculum time.

What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).

1. For evidence-based material, journals and web-sites are relied upon more so than textbooks, as journals and websites are more current.
2. Dental journals can easily be searched through the school's health science library, and if not available on site, the library can order them within 7 days. This is a very valuable asset.
3. Medline literature searches. Limiting searches on medline to EBM reviews. Searching by authors who are experts in the field. Reading *JADA*, *Operative Dentistry Journal*, *Dental Materials Journal*, *J Adhesive Dentistry*, *American Journal of Dentistry*, *Journal of Dental Research* and *Journal of Dentistry* etc.

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?

COLO: Usually, the strongest personality decides what is included.

CRE: We have no routine process of facing this phenomenon.

IOWA: There is a formal Instrument and Materials Committee which has tight control over new products/technology

MAN: No responses noted.

- MARQ:** A combination of the Instrument and Materials Committee and the Department Chair. Significant input is solicited from the clinical faculty, especially those who still practice a day per week.
- MINN:** No responses noted.
- UMKC:** Department chair decides since he has the final responsibility. Evidence is presented that is credible. Cost is always a consideration.
- UNMC:** While there is no formalized process, usually, the preclinical and clinical faculty in conjunction with department chair evaluate how a given material works in the students' hands.
- SASK:** No responses noted.
- SIU:** No responses noted.

How are the changes incorporated into the curriculum?

- COLO:** No responses noted.
- CRE:** Changes can occur through a number of different avenues:
1. The Instruments and Materials Committee can order dental materials for a faculty member for use in his/her course or clinic. This is a self-initiated change that usually is not challenged unless the Instruments and Materials Committee views it as being "on the fringe".
 2. Individual Departments may adopt a new product or technology, and in concert with the Clinical Director, Instruments and Materials Committee, and the Dean coordinate purchase as a capital investment. The new technique or product may be less influential throughout the school, and is simply adopted within the Department itself.
 3. The Curriculum Committee oversees and assesses existing courses against both inside and outside measurements. Inside measurements can be strategic plan objectives that expect a certain percent of students to pass on the first attempt. Outside measurements may consist of a percent pass rate for a National or Regional exam in a particular discipline. The Curriculum Committee reviews proposals for new courses; however, the committee does not focus its attention on dictating course content. At present, the Curriculum Committee is attempting a curriculum assessment and review, as it compares to commonly-practiced contemporary dentistry in the community.
- IOWA:** No responses noted.
- MAN:** No responses noted.
- MARQ:** No responses noted.
- MINN:** No responses noted.

- UMKC:**
- Introduced into the laboratory followed by introduction in the clinic.
 - Meetings with students and faculty explaining the new changes, rationale and evidence for the change.

UNMC: No responses noted.

SASK: No responses noted.

SIU: No responses noted.

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

COLO: No responses noted.

CRE: We have no formal process. It is really at the initiative of individual faculty members.

IOWA: No responses noted.

MAN: No responses noted.

MARQ: No responses noted.

MINN: No responses noted.

UMKC: We don't embrace the newest and latest and unproven. There have been too many company or market driven treatments that are here today and gone tomorrow. We tend to stick with treatments we know are time tested that we won't have to redo. We wait for the evidence before changing to the newest and latest, unless common sense is overwhelming. Students are taught the newest and latest as things to watch for on the horizon during the lectures. Our job is also to teach the basic principles so the students can restore a tooth with proven success.

UNMC: No responses noted.

SASK: No responses noted.

SIU: No responses noted.

II. Does your school teach cuspal replacement with composite in preclinic?

For all the schools, cuspal replacement with direct composite resin is NOT taught in the preclinical lab. Colorado, Nebraska, and Iowa teach cuspal replacement with indirect composite resin.

What is taught and what is the rational/evidence?

The literature seems to support the theory that composite resin is subjected to excessive wear and tensile stresses when it supports a majority share of the occlusal load. Gold, porcelain, or PFM are the materials of choice for cuspal replacement.

Are cuspal replacements with resin composite done in your clinics?

For all the schools, cuspal replacement with direct composite resin is NOT taught in the clinics on a routine basis. There are some exceptions for esthetics.

What circumstances and parameters or protocol may provide guidance in that determination?

COLO: No responses noted.

CRE: A thorough literature search would have to be done to determine the success or failure rate of composite vs. other materials in this particular clinical setting.

IOWA: No responses noted.

MAN: No responses noted.

MARQ: No responses noted.

MINN: No responses noted.

UMKC: Esthetics is the primary guidance or unsupported enamel that we would rather not remove at this time due to age of patient or finances involved in restoring to full coverage. When a tooth is broken down there are usually other problems such as previous deep restorations, caries and isolation problems. If there is no enamel at the margins to bond to we discourage the use of posterior composite in the posterior unless esthetics just force us into the treatment and full coverage is not affordable. Also, isolated non-functional cusp replacements (especially on the facial of visible maxillary teeth) taken out of occlusion on posterior teeth are a conservative treatment if the whole restoration does not have to be replaced. Some references that apply to the above question but not necessarily to our policy are listed below:

- van Dijken, J. W. *Direct resin composite inlays/onlays: an 11 year follow-up. Journal of Dentistry* 2000 28(5) 299-306.
- Hickel, R., Manhart, J. *Longevity of restorations in posterior teeth and reasons for failure. Journal of Adhesive Dentistry* 2001 3(1) 45-64.
- Wassell, R. W., Walls, A. W., McCabe, J. F. *Direct composite inlays versus conventional composite restorations: 5-year follow-up. Journal of Dentistry* 2000 28(6) 375-82.
- Scheibenbogen-Fuchsbrunner, A., Manhart, J., Kremers, L., Kunzelmann, K. H., Hickel, R. *Two-year clinical evaluation of direct and indirect composite restorations in posterior teeth. JPD* 1999 82(4) 391-7.

UNMC: No responses noted.

SASK: No responses noted.

SIU: No responses noted.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

All schools were in general agreement that a slot prep into the existing composite; creating mechanical retention; then restoration of the contact with the composite is the treatment of choice, in this clinical situation.

What is the evidence for this method?

The composite will mechanically lock into the existing composite. Micro-abrasion is recommended also. Evidence for composite repair in general is listed below:

- Trajtenberg CP. Powers JM. Effect of hydrofluoric acid on repair bond strength of a laboratory composite. Source *American Journal of Dentistry*. 17(3):173-6, 2004 Jun.
- [http://gateway.ut.ovid.com.ezproxy.mnl.umkc.edu/gw1/ovidweb.cgi?S=IDNJHKJOCFPLBK00D&Search+Link=%22Trajtenberg+CP%22.au.Trajtenberg CP. Powers JM. American Journal of Dentistry. 17\(2\):123-6, 2004 Apr.](http://gateway.ut.ovid.com.ezproxy.mnl.umkc.edu/gw1/ovidweb.cgi?S=IDNJHKJOCFPLBK00D&Search+Link=%22Trajtenberg+CP%22.au.Trajtenberg+CP.Powers+JM.American+Journal+of+Dentistry.17(2):123-6,2004+Apr.)
- Tezvergil, A. Lassial, LV. Valittu, PK. Composite-composite repair bond strength: effect of different adhesion primers. Source *Journal of Dentistry*. 31(8):521-5, 2003 Nov.
- Frankenberger R. Kramer N. Ebert J. Lohbauer U. Kappel S. ten Weges S. Petschelt A. Fatigue behavior of the resin-resin bond of partially replaced resin-based composite restorations. Source *American Journal of Dentistry*. 16(1):17-22, 2003 Feb.

What technique is taught to repair an open proximal contact in an old resin composite?

How old is "old?" The general consensus was to replace "old" composite resin restorations instead of repairing them. Most likely there are other shortcomings of the restoration (wear, roughness, margination, recurrent caries, discoloration) which will be improved upon if the restoration is replaced rather than simply repaired.

What is the evidence for this method?

Clinical experience.

Are bevels part of routine posterior resin composite preparations?

COLO: Teach butt joint margins for the entire preparation

CRE: Teach butt joint margins for the entire preparation

IOWA: Teach butt joint margins for the entire preparation

MAN: No responses noted.

MARQ: Teach butt joint margins for the entire preparation

MINN: No responses noted.

UMKC: Yes, if you can bond to the ends of the enamel rods rather than to the sides. Don't bevel dentin.

UNMC: We bevel the proximal walls only.

SASK: No responses noted.

SIU: No responses noted.

Where? What is the evidence for the bevels and the location?

There is evidence showing that a gingival bevel on enamel may increase bond strength at that location.

Gingival bevel if supragingival enough, should be bonded to the ends of the rods. Large occlusal preparations when the rods are at the cavosurface should be beveled. Narrow occlusal preps have the rods on the internal cavity walls. The important thing is to bond to the ends of the enamel rods wherever you can. Bond strengths are greater on beveled enamel vs. intact enamel. This could prove favorable on the gingival seat. If the occlusal cavosurface were beveled, masticatory forces could fracture the thin composite material, resulting in an open margin, plaque retention, and a compromised restoration.

- Vargas, M.A., Latta, M.A., Ibarra, G. and Armstrong, S.R. Microtensile Bond Strength of Composite to Different Enamel Rod Angulations. *Journal of Dental Research* 2001, 80:231 Abstract 1568.
- Carvalho, R. M., Santiago, S. L., Fernandes, C. A., Suh, B. I., Pashley, D. H. Effects of prism orientation on tensile strength of enamel. *J Adhesive Dent* 2(4) 251-7.

In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?

Most schools teach "lesion specific cavity design." In essence, preparation stops when sound dentin and enamel is reached. Also, when extending the preparation would unnecessarily weaken the tooth or compromise the retention of the restoration. This is a good area to place a composite resin if the gingival margin is not overly deep.

What is the evidence for this?

A favorable contact can be maintained, while only prepping the diseased tooth structure.

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

Most schools reported using "clinical judgment" to determine whether to replace or repair. Specifically, repairing amalgam technique is to condense fresh amalgam against a carbide-bur prepared surface. This is just as strong as the positive control. (*KE Diefenderfer, JW Reinhardt and SB Brown, Am J Dent 1997:10:9-14.*)

Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth? If so, describe and comment.

The failure with fiber posts has been between the fiber and the resin and the post stays loose in the tooth. It would be better if there were a complete failure so that leakage would not occur. With leakage there are more caries

What is the longevity of bonding agents for resin composites and amalgam?

The evidence is mounting to show that the resin-dentin interface (hybrid layer) is degrading in as short a time as 6 months. Some studies are claiming 3-5 years.

Based on the literature, how long can the bond be expected to last in vivo? Respond in context of bonding to various substrates.

Again, when referring to dentin, the bond may be effective anywhere from 6 months to 5 years. The evidence for longevity is still inconclusive. Chlorhexidine may show some promise in maintaining an intact hybrid layer over time.

III. What is your school's stance on amalgam usage?

There was general consensus that amalgam is the material of choice for posterior occlusal restoration, especially when field control is an issue or there are non-enamel margins.

What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school? (See ADA web-site: use topic search)

1. Scrap amalgam is placed into sealed containers.
2. Amalgam from traps is placed into "contact amalgam" containers.
3. Mercury scavenger systems in place at all schools.
4. Pre-capsulated alloys.
5. No bleach or chlorine-containing line cleaners.

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

COLO: This is a course which spans all four years. Caries risk assessment is done on all patients; students get non-surgical management credit and must submit a portfolio

CRE: Each patient undergoes a caries risk assessment exam that is recorded on a form and kept in the patient record.

IOWA: Preclinical lectures; 3rd year clinical application.

MAN: No responses noted.

MARQ: Theory introduced in the preclinical curriculum; theory reintroduced in clinical courses; however, poor follow-up with clinical patients.

MINN: No responses noted.

UMKC: In order to complete the diagnosis the student must choose a caries risk assessment before they are allowed to sign out for that appointment. Students must make provisions for providing prescriptions of Chlorhexidine and NaFl 5000 ppm toothpaste and for providing patient education which might include a diet analysis for their patients who are categorized as high risk patients for caries.

UNMC: Students take a cariology course.

SASK: No responses noted.

SIU: No responses noted.

V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?

COLO: No responses noted.

CRE: For preclinical labs, calibration is done by group grading and arbitration. Calibration for clinical exams is not as well-defined of a process. There is not a formal process for calibration for clinical grading.

IOWA: No responses noted.

MAN: No responses noted.

MARQ: A portion of semester PT/FT faculty meeting dedicated to calibration; lunch-time sessions a couple times per semester with examples showing passing and non-passing efforts.

MINN: No responses noted.

UMKC: In the laboratory the operative faculty calibrate before grading sessions using OSCE type manikin calibration. Before grading practical CRDT type exams we huddle and reinforce those things we are looking for and must have 2 out of 3 graders agree.

SASK: No responses noted.

SIU: No responses noted.

Have your calibration efforts improved inter-rater agreement between faculty?

In general, most school felt they improved inter-rater agreement.

What outcome measures have you used to track the efficacy of your calibration?

No responses noted.

Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.

COLO: No responses noted.

CRE: No responses noted.

IOWA: No responses noted.

MAN: No responses noted.

MARQ: No responses noted.

MINN: No responses noted.

UMKC: Only OSCE exams with quantifiable criteria that can be measured with periodontal probes, hatchets and explorers from reference areas on the tooth, e.g. marginal ridges, through the dentin, width of isthmus etc.

UNMC: No responses noted.

SASK: No responses noted.

SIU: No responses noted.

Regional CODE Agenda

To be established by the respective Region and Regional Director. Please also report on responses to the Regional Agenda from all participants.

Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations?
(Reference: ADA news, July 11, 2005; Vol 36, No. 13)

NO RESPONSES SUBMITTED

Suggestions for CODE.

What can the organization do to improve its effectiveness?

What is suggested to improve the Web site? <http://netserv.unmc.edu/code/codeFrame.html>

Other comments?

NO RESPONSES SUBMITTED

CODE Region II Attendees Form

NAME	UNIVERSITY	PHONE #	FAX #	E-MAIL ADDRESS
Craig Passon	Colorado	(303) 315-8507	(303) 315-0346	craig.passon@uchsc.edu
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Deborah Cobb	University of Iowa	(319) 335-7214	(319) 335-7267	deborah-cobb@uiowa.edu
John Purk	UMKC	(816) 235-2168	(816) 235-5524	purkj@umkc.edu
Larry Haisch	UNMC	(402) 472-1290	(402) 472-5290	lhaisch@unmc.edu
Bill Johnson	UNMC	(402) 472-9406	(402) 472-5290	wwjohnson@unmc.edu
Kalid Aziz	Marquette University	(414) 288-0772	(414) 288-5752	kalid.aziz@marquette.edu
Tim Creamer	Marquette University	(414) 288-7485	(414) 288-5752	timothy.creamer@marquette.edu
Rick Hagner	Marquette University	(414) 288-5254	(414) 288-5752	richard.hagner@marquette.edu
Hugh Murdoch	Marquette University	(414) 288-3682	(414) 288-5752	hugh.murdoch@marquette.edu
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Gary Stafford	Marquette University	(414) 288-5409	(414) 288-5752	gary.stafford@marquette.edu
Anthony Ziebert	Marquette University	(414) 288-3704	(414) 288-5752	anthony.ziebert@marquette.edu

CODE REGIONAL MEETING REPORT FORM

REGION: Ill South Midwest

LOCATION AND DATE OF MEETING:

University of Texas Health Science Center at San Antonio

October 20-12, 2005

CHAIRPERSON:

Name: Dr. J. D. Overton

Phone #: 210-567-3705

Address: UTHSCSA

Fax #: 210-567-6354

San Antonio, TX 78229

E-mail: overtonj@uthscsa.edu

List of Attendees: Please complete the CODE Regional Attendees Form (enclosed at end of Agenda)

Suggested Agenda Items for Next Year:

Revisit the topic of electric handpieces. Are more schools switching? What has been their experience?

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: Dr. Bill Tate

Phone #: 713-500-4264

Address: UTHSC at Houston,
Dental Branch

Fax #: 713-500-4108

6516 M.D. Anderson Blvd, Suite 493
Houston, TX 77030-3402

E-mail : william.h.tate@uth.tmc.edu

Date: TBA

Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;

40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

**2005 NATIONAL CODE AGENDA
REGION III
SUMMARY RESPONSES TO NATIONAL AGENDA**

NO SUMMARY RESPONSES TO NATIONAL AGENDA SUBMITTED

2005 NATIONAL CODE AGENDA

REGION III RESPONSES

(Evidence cited where applicable)

Region III School Abbreviations

BAY	Baylor University	OKU	University of Oklahoma
LSU	Louisiana State University	TENN	University of Tennessee
MISS	University of Mississippi	UTSA	University of Texas - San Antonio
	UTH		University of Texas - Houston

- I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?**
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).

BAY: The Operative course for our third year students uses evidence based clinical lectures to introduce and discuss current operative dentistry issues. Each lecture is accompanied with text (Summit et al) as well as peer-reviewed journal articles. Generally we use and acknowledge only peer-reviewed journal articles with sample sizes of at least 30 and that contain statistical analysis. Additionally, we strive to use studies that have been repeated and considered to be valid. The problems and issues with this mainly center on the fact that students prefer the non-peer reviewed clinical magazines which are so easily accessible, where the sample sizes are often one (1) and seldom contain statistics. Additionally students look to peers/mentors within the profession that offer anecdotal ‘evidence’. Regarding sources, any peer reviewed source may be used that is generally accepted, has a decent sample size and offers statistical analysis. In some instances “case reports or clinical discussions” may be used. Our goal is to move students from the throw-away journals to mainstream evidence based dentistry

LSU: No responses noted.

MISS: We use Vital Books (E-media on CD – ROM) as our primary source of material to supplement lectures, as other schools are also doing. We can reference multiple fixed and operative texts during the same lecture. Where some texts may be outdated in certain areas we site appropriate journal articles that support the methods or techniques that are taught. Also, a consensus from these CODE meetings are used to support the material taught in both didactic and clinical courses. Some results and conclusions from in house research projects are also sited and used to support what is taught both didactically and clinically.

- TENN:** During pre-clinical lectures, research is cited for the rationale of particular techniques and materials. Clinical: New material or technique is evaluated, if per review it has merit, submitted to Clinic committee for review. If approved, recommendation submitted to the Dean for approval prior to use on the clinic floor. Major obstacle is acceptance of new ideas and having faculty, staff and students on board. Education of faculty, staff, and students required for better understanding of the rationale for change. New materials and review of research for such is presented to department faculty during departmental meetings usually by our division of biomaterials. Citations are usually from a course's required text, journals, and from abstracts (IADR/AADR). Problem noted is that by the time the information is in print, the information may very well be outdated. IADR/AADR abstracts are usually recently done studies; however, the abstracts have not been scrutinized as well as journal articles or textbooks.
- UTSA:** The restorative dentistry curriculum has, for many years, been based on evidence where evidence exists. The faculty has worked to keep up with reported research findings in relation to restorative dentistry, and a significant amount of research has been performed by our faculty to try to determine best methods and materials. For methods, when there is significant evidence to support change, the faculty meets to decide how best to incorporate the information into the curriculum. Obstacles have included some resistance to make changes among some faculty members and the difficulty of educating part-time faculty members as to the changes and rationale, but, for the most part, the faculty has supported the incorporation of the evidence-supported techniques. Information sources include, primarily, research reports, more easily accessible through MedLine and other search systems. Since we have worked to base techniques that are in the textbook we use on current evidence, the textbook is used extensively. We also bring in expert researchers in the area of restorative dentistry to provide current information to faculty through lectures. But, the primary source of evidence has been research reports in refereed journals. So, valuable sources of evidence have been: 1) research reports, 2) textbook, 3) invited lecturers.
- UTH:** This is first introduced in preclinical lecture and laboratory projects. Informational resources include various texts (primarily *Sturdevant's Art & Science of Operative Dentistry* and *Fundamentals of Operative Dentistry A Contemporary Approach* by Summitt, Robbins, and Schwartz), various journal articles, and various web sites (numerous sites including many dental related manufacturer's sites). All are useful providing various levels of information.
- OKLA:** Evidence based Teaching: Generally, some evidence based teaching is done in our first year operative course by providing citations for studies whose results provide support for the use of certain techniques or materials. Often when the research on certain topics shows no overwhelming evidence to support one method or material, we will cite several studies that offer information on the topic. We will then offer our rational for choosing the method or material that we teach. Our students also receive information on how to review topics in the literature. A course titled Research Methods is given to the students in their freshman year. Our students also are required to read and summarize review articles from dental journals during their Dental Materials coursework. In regard to the didactic

material that we are providing for the students, we attempt to base the materials and techniques that we teach on sound evidence. Valid systematic literature reviews require a complete and thorough systematic literature search, a careful analysis and ranking all of the various studies based on their merits, and a comprehensive statistical meta-analysis of the combined data of all of the individual studies. We do not realistically have the time or expertise to perform this type of review for every detail involved in operative dentistry procedures. Instead we try to keep current on major review articles and correlate those findings with our clinical experiences. Individual studies, however interesting, should be looked upon with some apprehension in regard to the validation of a theory for inclusion into the basic curriculum of a pre-doctoral dental program. Informational Sources: We utilize the Summitt, Robbins, and Schwartz operative textbook, which we feel has been well researched. We encourage the students to observe the citations that support different ideas presented in the textbook. We also try to cite various journal articles that the students can investigate on their own to more thoroughly understand the reasons why we utilize a certain material or technique in our clinics. We try to mention other materials and techniques that are alternatives to our materials and techniques.

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?

How are the changes incorporated into the curriculum?

BAY: Generally we do not include the latest and greatest until it has been subjected to at least some level of scrutiny and investigation. If a new material or technology is being considered, it is brought before the section leader, department chair, and at times the Dean of Clinical Affairs for review and consideration. In the case of new materials to be added to our formulary, the matter is referred to our Formulary Committee composed of clinical faculty for review. This committee decides if the new material will be added to the materials carried in our dispensaries.

LSU: No responses noted.

MISS: Times they are a changin'. Due to increased patient longevity and tooth maintenance, our society is focused on appearance. Over half of services performed are elective. There is pressure brought on by media and marketing influences and there are increasing desires by patients' desires to eliminate metal from esthetics. Traditionally, most clinical decision-making has been based on clinicians' experience and expert opinion rather than on clinical review of the research. Dental faculty, in theory, act as a bridge across this gap. Most are required to engage in research or are at least exposed to recent research findings. The discipline of restorative dentistry is uniquely influenced by dental materials, new technologies (clinical and laboratory), clinical techniques and public awareness. It is a dynamic, popular field of exacting science blended with artistic flavor. Evidence-based dentistry has emerged as a catalyst for development of clinical practice guidelines and new avenues for health services research. This in time will translate research findings into clinical practice which we hope will improve oral health outcomes. Rapid advances in the biological sciences,

information technologies, and new diagnostic and treatment technologies are prompting researchers and healthcare administrators to promote a decision-making process based on the integration of new external evidence for effectiveness with clinical experience, expert opinion and personal judgment. We also rely on systematic searches on studies and databases, published or unpublished, that may answer clinically relevant questions. Both quantitative and qualitative analyses play a role in defining the strength of available evidence. Evidence-based dentistry (EBD) is an approach in healthcare that integrates assessments of clinically relevant evidence with the dentist's clinical expertise while taking into consideration the patient's treatment options and requirements. We recognize that treatment recommendations are determined for the patient by his or her dentist and the patients' particular preferences. A dentist's experience and other circumstances (practice based evidence?) should also be considered in treatment planning. EBD does not mandate a standard of care nor should it interfere with dentist/patient relationships. One has to look at reasons dentists start to use new and different practices and materials. Also, what other factors besides diagnosis and prognosis are used to make decisions on treatment options and how much time is spent in care. Factors to consider for successful implementation of an EBD approach will include: preparation of dental faculty for teaching and using the approach with undergraduate and graduate students, motivating practicing clinicians to acquire the skills and interest to read and critically review the scientific literature, convincing practitioners to base their practice on procedures where there is proven evidence of effectiveness, and asking clinicians to document and evaluate the outcomes of their clinical care.

TENN: New materials are tested in our dental biomaterials department. Occasionally, "safe" new materials are tried on the clinic floor for faculty and student feedback. If the new product/material lives up to its claims, test results and appropriate literature review, and reasons for use of the new material is submitted to the clinic committee for discussion. New materials are approved by the Dean upon the recommendation of the Clinic Committee. Requests for the incorporation of new materials/techniques may come from students or faculty, though the major of requests come from Division Directors and/or Department Chairs. Approved changes are implemented by department/division faculty. Major changes incorporated into the curriculum must be brought before the curriculum committee. There is a review of the proposed changes. The rationale for the change is evaluated and a recommendation is made for the Dean's approval prior to being incorporated officially into the curriculum.

UTSA: The faculty of restorative dentistry decides when a change of a material or technique is needed, again based for the most part on evidence. For materials changes, change requests are sent to the School's materials committee for approval. Changes must be supported by good reasons. Most requests have been approved; some have required resubmission with additional support.

UTH: Various preclinical and clinical faculty explore, discuss, and decide as a group. In general, changes to the curriculum are first implemented within the preclinical courses.

OKLA: Each discipline within the college of dentistry determines what materials and methods will be used during patient treatment in their clinics. In the operative department, we meet to discuss the techniques and materials taught in our courses. If a faculty member would like to modify a technique or introduce the use of a new material, they are required to provide a rationale for the change to the rest of the department for review. If the department agrees to adopt the material or technique, it is incorporated into our preclinical course and the materials are stocked in our clinic dispensary.

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

BAY: Discussion is of the latest and greatest is frequently included, with emphasis on what is and is not known about the product or technology.

LSU: No responses noted.

MISS: When consideration regarding what is the newest and latest dentistry, one has to look at reasons dentists start to use new and different practices and materials. Also, what other factors besides diagnosis and prognosis are used to make decisions on treatment options. Recognition of barriers to EBD such as amount of evidence available, quality of evidence, dissemination of the evidence and clinical practice based on authority rather than evidence must all be taken into account. A dentist's experience is considered to a great extent when considering teaching material which may be the newest and latest, but unproven. Clinical decision-making has been based on clinician's experience. There may exist inherent operator skills and translational methodology, which, although may be lacking specific research, has merit on the basis of clinically proven outcomes. One should not discount practice-based evidence as opposed to evidence-based dentistry even though the former may not have available scientific evidence. Oftentimes, anecdotal clinical findings will prompt investigation via the scientific and research community. Admired results are dependent on the selection of the proper restorative system (both clinical and laboratory). Forging ahead with clinical confidence should not be discounted. Overview of all clinical steps necessary while performing these tasks and documentation will in turn raise questions and hopefully thought processes to investigate further to obtain even better protocols in treatment and material modalities. By extrapolating on what is new, albeit unproven, while maintaining a balance with what is fundamentally sound, will stimulate the investigation and ultimately produce newer science in the field of dentistry.

- TENN:** “Tried and proven” techniques are provided through lectures. Students are introduced **to the newest and latest through lectures and labs, but are advised that though these** techniques show promise, further scrutiny is needed before full acceptance. We tend to be very cautious with “unproven” products/materials or techniques. Usually new products/materials are evaluated by faculty and/or biomaterials faculty prior to requests for use either in preclinical courses or on the clinic. Many of the newest and latest are an “improvement” to a known product or material. What is lacking is a history of longevity in clinical results. There must be a balance between what we know about a material and the expected benefits from any “improvements”.
- UTSA:** For the most part, that which is supported by evidence is included and the “newest and latest” is not included in the teaching programs. For example, based on current evidence, the so-called fourth-generation bonding systems still perform best, so the single-bottle systems have not been added. Another example, as evidence is emerging of the similarity in clinical performance of resin composite and dental amalgam, the teaching of amalgam has been reduced and the teaching of resin composite increased so that students receive about the same amount of time using each material in the preclinical course in operative dentistry.
- UTH:** This balance is carefully (often times intrinsically) monitored. It is similar to maintaining a proper the balance between enamel demineralization and remineralization. Hopefully, more remineralization is occurring.
- OKLA:** We try to teach what we feel is in the patients’ best interests. Just because something is “new” does not mean that we need to include it in our curriculum. If we feel we need to make a change, the department will discuss it and try to review the merits of the change in light of the patients’ health, and our students’ education. Our general philosophy is to not incorporate a change that has not been somewhat clinically proven over time and through studies. This is not to say that we have not made exceptions to this at times.

**II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rational/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

- BAY:** Composite cuspal replacement is not taught as part of the pre-clinical curriculum at Baylor except for Ti-Core build-ups to be used as foundations for cast restorations in the Pre-clinical Fixed Prosthodontics course. Cusp capping with amalgam and pin amalgam build-ups are taught pre-clinically in Operative as an option for restoration of missing cusps, at least as interim restorations or as foundations for cast restorations. Clinically, composite replacement and or coverage may be done on a limited basis at the discretion of the clinical instructor overseeing patient treatment. Essentially the replacement or coverage of a cusp would be considered a palliative treatment for which only a limited patient population would qualify (patient occlusion, size and location of the restoration in

question and other extenuating circumstances considered). Cuspal replacement composite foundations or build-ups for cast restorations are done routinely, however. Primarily Baylor subscribes to the 'pneumonia' model of comprehensive care, where patients are treated aggressively to a therapeutic endpoint (medical treatment model). The evidence for this philosophy has been described by Fennis et al. (Int. Journal of Prosthodontics 1994), which describes the complications often seen with cuspal replacement with composite. Fractures of bonded cuspal replacement restorations are generally more severe than those seen with alloy restorations. Segura and Riggins (Journal of Oral Rehabilitation 1999) also describe how bonded composite restorations replacing cusps do not increase the shear strength of the restored teeth and show greater wear rates when compared to similar alloy restorations. It is worthy of note that McPherson et al. (Journal of Dentistry 1994) describes observations in which the bonded composite restoration in conjunction with a threaded pin showed greater retention than pin retained amalgam restorations.

LSU: No responses noted.

MISS: We lecture on cuspal replacements in the pre clinical esthetics course and also in the amalgam course: complex restorations and the secondary retentive features are discussed for use with amalgam or composite foundations. The indications and contraindications for composite and amalgam build - ups are discussed (ability to isolate, remaining enamel and dentin in prep). At the present time no cuspal replacements exercises are done in the pre clinic lab with composite, however cuspal replacements with amalgam are done pre-clinically as a pin amalgam exercise. Cuspal replacements with hybrid composite are routinely done in our clinics more often as foundations for crowns however some free standing with one cuspal or part of a cuspal replaced with composite. Foundations with dual cured composite core build up material are also used. Parameters or protocol: Large class II composites depend on primary retention from micromechanical bonding to enamel and dentin therefore there must be sufficient tooth structure remaining to gain the necessary retention. If not secondary retentive features must be utilized such as grooves, coves, slots, locks or less frequently pins. Ability to isolate properly also determines if a bonded restoration is chosen or an amalgam foundation instead.

Rationale/ evidence: *Sturdevant , 4th edition*

TENN: No, The University of Tennessee does not teach cuspal replacement with composite. Cuspal replacement with amalgam is recommended in cases where restoring a tooth with a cast restoration is not possible due to financial or other reasons, as a control restoration, or as a foundation. Proven long term track record of amalgam cuspal replacement. In lieu of composites, patients are also given the following options: gold or ceramic onlays (Cerec).

Van Nieuwenhuysen JP, D'Hoore WD, Carvalho J, Qvist V. Long-term evaluation of extensive restorations in permanent teeth. J Dent 2003;31:395-405. (amalgams-12.8 years, composites-7.8 years)

Smales RJ, Hawthorne WS. Long-term survival of extensive amalgams and posterior crowns. J Dent 1997;25:225-227. (amalgam – 14.6 years)

(Cuspal replacements with resin composites) not as definitive restorations. Cusp replacement is allowed for crown buildups prior to cast restoration. Regarding circumstances and parameters or protocol that may provide guidance in cuspal replacement: ADA Statement on Posterior Resin-Based Composites, ADA Council on Scientific Affairs; ADA Council on Dental Benefit Programs, JADA, Vol. 129, November 1998, 1627-8. Supports the use of resin-based composites for small to moderate Class I and Class II restorations. Not to be used on teeth with heavy occlusal stress. We feel an update of the ADA statement is needed.

UTSA: Cusp replacement with resin composite is not taught in the pre-clinic at this time. We teach conservative indications for placing resin composite in posterior teeth. Since there are few if any clinical studies on the longevity of cuspal covered resin composites, we are reluctant to support this restorative option. Considerations are given if the multi-surface restoration will serve as a core build-up for a full coverage cast restoration. We assume only under special circumstances, with the guidance and expressed approval of the attending faculty member would cusp replacement with resin composite be done in the clinic. Clinical evidence on using the inter-cusp distance as a predictor of performance is lacking. Most longevity studies did not identify performance by the number of surfaces. Here are several studies that did:

§ Opdam NJ, Loomans BA, Roeters FJ, Bronkhorst EM. Five-year clinical performance of posterior resin composite restorations placed by dental students. *J Dent.* 2004 Jul;32(5):379-83.

- 5 yr survival of 783 posterior resin composites placed in 382 patients by dental students
- Longevity per # of surfaces: (reported as % failure at 5 years)
 - 1 = 7%
 - 2 = 14%
 - 3 = 27%
 - ≥4 = 18%
- Survival rate was 87% at 5 yrs, with annual failure rate of 2.8%
- Bottom Line:
 - Main reasons for failure were secondary caries, fx of restoration, endo tx, defective margins, lack of proximal contact
 - Acceptable mean annual failure rate achieved with all kinds of patients treated by operators with limited clinical experience.

§ Burke FJ, Wilson NH, Cheung SW, Mjor IA. Influence of patient factors on age of restorations at failure and reasons for their placement and replacement. *J Dent.* 2001 Jul;29(5):317-24.

- Survey of data collected on 9031 restorations (Am, PRC, GIC, compomer) placed by 73 dentists in UK
 - 2690 composites placed
- Longevity per # of surfaces: (Not identified by surface)
 - 1 = Mean longevity of Class I composite was 3.3 yrs
 - 2, 3, > 4 = Mean longevity of Class II composite was 4.6 yrs
- Bottom Line:
 - Longevity of resin composites in load bearing areas shorter than amalgam
 - Amalgams performed better overall
 - Secondary caries is most common reason for replacement

§ Pink FE, Minden NJ, Simmonds S. Decisions of practitioners regarding placement of amalgam and composite restorations in general practice settings. *Oper Dent.* 1994 Jul-Aug;19(4):127-32.

- Survey of reasons for placement of amalgam and resin composites in general practice
 - 51 providers returned data on 1877 amalgams and 1606 resin composites (all Classes)
- Longevity per # of surfaces: (reported by classes)
 - 1 = 5.9 yrs
 - 2, 3, 4 = 6.7 yrs
 - Median longevity for amalgam was 10 yrs
 - Median longevity for composite was 5 yrs
- Bottom Line:
 - Reaffirmed previous studies that approx 50% of amalgam and composite restoration are placed due to primary caries, and approx 50% of replacements are due to secondary caries

UTH: Yes, we have preclinical projects involving cuspal replacement with composite. Yes, cuspal replacements with resin composite are performed within our clinics. Many involve buildup procedures prior to full-coverage crown placement, taking advantage of the improved physical properties of today's composites and improving adhesive bonding systems. Preparations are primarily based within the rules and guidelines of fundamental amalgam preparations. Variation(s) away from fundamental guidelines are caries directed alterations (as appropriate for the resin composite restorative material). Overall considerations include the following (primarily based upon guidelines detailed in the text *Fundamentals of Operative Dentistry*):

- esthetics - the esthetic demands of the patient should be weighed against the strengths and weaknesses of posterior composites and bonding systems in general (if this is to be the final restoration)
- the gingival cavosurface margin(s) should be located on intact enamel (if possible)
- centric occlusal stops should be located primarily on sound tooth structure (if possible)
- there should be no signs of excessive wear from clenching and/or grinding (bruxism)
- the surgical site must be able to be dental dam isolated

OKLA: No. We teach that the resin composite material will not resist wear or fracture as well as other restorations available for these situations (amalgam, gold onlay, gold crown, or metal/ceramic restorations). We would very rarely replace a cusp with a resin composite restoration. It would need to be an area in which esthetics was critical, and due to extenuating circumstances other esthetic restorative materials could not be used.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

BAY: Depending upon the size and location of a new composite restoration, the repair of a freshly placed composite may be practical. As described by Gordon et al. (Journal American Dental Association 2003) there are inherent risks associated with the complete removal of composite to correct minor contour or contact issues. These complications range from unnecessary removal of tooth structure to the possibility of initiating pulpal inflammation. On a newly placed large anterior composite restoration lacking proximal contact, a portion of the restoration is removed, the surface of the remaining composite is roughened with a suitably shaped diamond instrument, cleansed with etchant for 15 seconds, then washed and dried. Bonding agent is applied and cured; composite restorative material is placed and cured followed by the usual finishing techniques. If the restoration is small, all of the previously placed composite material is usually removed and the tooth is restored using the usual etching and bonding techniques. On a posterior composite restoration lacking proximal contact, unless the restoration is small, a slot preparation is cut in the proximal surface lacking contact. The remaining composite is roughened with a suitably shaped diamond and cleansed with etchant for 15 seconds, then washed and dried. Bonding agent is applied and cured; composite restorative material is placed and cured followed by the usual finishing techniques. If the restoration is small, it is up to the discretion of the supervising faculty member as to whether or not all of the previously placed composite material is removed and the tooth restored using the usual etching and bonding techniques. Additionally, Franken and Berger (Journal of Oral Rehabilitation 2003) have demonstrated that repaired composites exhibit good resistance to marginal breakdown.

LSU: No responses noted.

MISS: The majority of our faculty teach the technique to prepare a box (slot) within a box with a 56 bur or diamond to roughen area of contact to be added, width of repair prep is enough to achieve proper contour and contact with adjacent tooth, acceptable to leave repair area entirely in composite, dovetailing into existing composite optional. Bonding procedure: matrix application, etch (clean) with phosphoric acid 37% for 20 seconds, apply PBNT adhesive and light cure, place and cure new composite. Evidence: Repair strengths of 65% of cohesive strength of intact composite (Lewis et al., 1998; Saul et al. 1999), roughening with green silicon carbide burs as well as sandblasting necessary to achieve good resin-resin bonds (Swift and Boyer 1992, Swift and Boyer 1994). An in vitro study comparing preparation modes for class II composite repair revealed less microleakage with a minimally invasive box only prep without undercuts with roughening using green silicon carbide bur compared to undercuts and dovetailing: Effect of preparation mode on Class II resin composite repair. Frankenberger, et al. Journal of Oral Rehabilitation, 2003, 30; 559-564). Use of dentin bonding agent to repair resin composite achieved higher diametral tensile bond strengths than with the enamel bonding agent or no bonding agent: (AD Puckett et al., Strength of Posterior Composite Repairs Using Different Composite/ Bonding Agent Combinations, Operative Dentistry, 1991, 16, 136-140)

- TENN:** Replacement. What is the evidence for this method? None, school policy. We feel students need to know how to place posterior composites with closed contacts upon initial placement.
- UTSA:** We recommend immediate repair if a proximal contact is missed, where light passes through the contact or shim stock passes through freely. A proximal box is prepared within the material and the contact established, using a sectional matrix and wedge, and sculpting the contact prior to curing. Frankenberger et al in the Journal of Oral Rehabilitation describe the operative technique in 2003. The preparation is placed entirely within the outline of the existing restoration. The experiment was done in vitro and the composites were aged for a year prior to repair.
- UTH:**
- Total or partial removal of the contact area and replacement is an option.
 - If adding proximal contact to an uncontaminated surface, a sectional matrix is placed. The teeth are firmly wedged (separated) and material is placed and thoroughly light cured.
- OKLA:** We find that it can be very difficult to attempt to bond new resin composite in the narrow space between the adjacent tooth and the deficient resin composite restoration. Avoiding voids and establishing a smooth surface and good contour/contact is very difficult. In an anterior tooth, if access is available and the air-inhibited layer is not contaminated, we will add more composite to the restoration using a mylar matrix band for contour. If access is poor, often the proximal contact area will be prepared to provide better access and incorporate retentive features such as converging opposing walls and retentive grooves. That is followed by a phosphoric acid etch, application of bonding resin, and insertion of additional resin composite using a mylar matrix. Most posterior teeth will require preparation in the composite including retentive features, etching(cleaning) with conditioner, and dentin bonding agent prior to repairing the contact area by inserting the resin composite. The resin composite is reinserted using a bitine ring and sectional matrix band for posterior teeth and a wedge and mylar strip for anterior teeth. Sometimes the entire proximal restoration may need to be replaced.

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

- BAY:** As stated previously, Baylor subscribes to the 'pneumonia' model of comprehensive care, where patients are treated aggressively to a therapeutic endpoint (medical treatment model). In general, regarding an old resin composite restoration with an open proximal contact, we teach the students to remove the existing defective restoration and replace it in its entirety. Occasionally, existing restorations may be repaired based on case circumstances in a very limited patient population at the discretion of the clinical faculty. In an old composite restoration, water saturation of the material has been reached and free radical activity has ended. "Absorption of water causes softening of the matrix,

microcrack formation, resin degradation and debonding of the filler-matrix interfaces” according to Tezvergil et al. (*J. of Dentistry* 31:8 Nov. 2003 pp. 521-525) and for this reason would be replaced. There are always exceptions to the rule, and it is up to the discretion of the attending faculty member to determine if it is prudent to leave a portion of the defective old restoration and repair it. Factors to be considered include whether removal of the restoration would compromise remaining tooth structure or pulpal vitality, or whether a patient is able to sit through a long appointment based on health history. Repair of existing composites will frequently result in something less than a definitive restoration. Even if the patient consents to such treatment, there are issues related to ‘guarantee’ and maintenance of the repaired restoration. In many cases where no guarantee is offered, it is implied.

LSU: No responses noted.

MISS: The consensus of our faculty teaches a similar method as the newly placed composite however if the old composite is too defective, replacement is the treatment of choice. If repair is chosen, the method used is similar to the method used with new composite except probably a more aggressive preparation to roughen and expose more surface area of composite. Evidence: Same as above references for new composite.

TENN: Replacement. Flexure strengths of repaired specimens were lower than the cohesive flexure strengths of the materials being repaired. (*Shen C, Mondragon E, Gordan VV, Mjor IA, The effect of mechanical undercuts on the strength of composite repair, J Am Dent Assoc. 2004 Oct;135(10):1406-12*)
Repairing RBC restorations has not been recognized as an acceptable procedure despite many laboratory studies showing that it can achieve favorable clinical results. (Repair of open proximal contact was not one of the listed types of repairs in this survey.) (*Gordan VV, Mjor IA, Blum IR, Wilson N. Teaching students the repair of resin-based composite restorations: A survey of North American dental schools. J Am Dent Assoc. 2003 Mar;134(3):317-23.*)

UTSA: What technique is taught to repair an open proximal contact in an old resin composite restoration? There’s not much guidance or consistency in describing this technique. We recommend a minimally invasive proximal box be prepared and a restoration placed within the outline of the existing preparation. That is assuming that there is no demineralized dentin or evidence of leakage. Esthetic failure of the restoration may require more extension or actual replacement. What is the evidence for this method? Techniques include roughening of the surface with diamond burs or abrasives, acid etching and bonding with a fourth generation or later bonding agent, application of a silane coupling agent, microabrasion with aluminum oxide, use of an adhesive composite primer such as Add and Bond, and others. The literature supports a variety of methods although the bond strength of repaired composite does not normally approach the cohesive strength of the material. Combinations of techniques such as air abrasion and use of an adhesive composite primer showed the highest repair strength in one study. The bond appears to be substrate dependant.

UTH: Total removal and replacement is often the best option for an aged composite. However, when adding composite to a contaminated or aged composite surface we follow the procedure detailed below (from Fundamentals of Operative Dentistry).

1. When adding proximal contact, firmly wedge (separate) the teeth lacking proximal contact
2. Mechanically roughen the surface (diamond bur or finishing strip) to expose fresh composite, place a sectional matrix, and firmly re-wedge
3. Acid etch (H3PO4) the surface to clean the glass filler particles
4. Apply a layer of bonding agent and allow it to soak into the composite surface and light cure
5. Add fresh composite, thoroughly light cure - finish and polish

OKLA: A repair in this situation might be indicated in the case of a fairly large resin composite restoration that is in good condition other than the open contact. A repair similar to that mentioned above may be attempted. The proximal contact area will be prepared with retentive features such as converging opposing walls and retentive grooves. That is followed by a phosphoric acid etch and application of bonding resin. The resin composite is reinserted using a bitine ring and sectional matrix band for posterior teeth or wedge and mylar band for anterior teeth. With an older resin composite we would usually be more inclined to replace the entire restoration. This is based solely on evidence from clinical observations and experiences.

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

BAY: Pre-clinically, the students create posterior resin composite preparations without bevels. They are told that clinically they may or may not place bevels on the facial, lingual, and gingival box walls depending on the case and at the discretion of the attending clinical faculty member. Gingival bevels are placed in the proximal boxes if the gingival floor is no closer than 1.5mm to the CEJ, and again at the discretion of the attending faculty. Occlusal bevels are never placed on posterior composite preparations. When used, these bevels are about .5 mm in length. As described by Opdam et al. (*Journal of Prosthetic Dentistry* 1998) and Nebot et al. (*Actual Odontostomatol* 1989), bevels ensure a good peripheral seal and minimize marginal microleakage.

LSU: No responses noted.

MISS: We do not teach bevels for routine posterior composite preps. However, according to some faculty if bevels are placed it would be on the facial or lingual proximal cavosurface margins if the proximal box is already wide and it is determined that the additional retention with increased surface area of exposed enamel rods would be beneficial. Gingival cavosurface bevels are not routinely placed nor are occlusal bevels.

Evidence against: *Sturdevant 4th edition*

Evidence for beveling:

1. Beveled class II preps with various bonding agents exhibited less microleakage than non beveled class II proximal cavosurface margins. (abstract #0503) March 2004 IADR/AADR- Beveled and Non beveled Enamel Margin Microleakage Utilizing various Bonding Systems, Knapp and Fruits.
2. Internal bevel at the aproximal cervical margin significantly reduced microleakage compared to the conventional butt joint cervical margin. *Operative Dentistry*, 1997, Sept/Oct. vol.22 ,217-221, Holan, Eidelman, and Wright.
3. Little or no leakage in beveled restorations with high degree of leakage occurring in butt-joint restorations. *Eriksen and Buonocore (1976) Journal of Oral Rehabilitation Vol. 3 ,315-322.*
4. "Conservative bevels on facial and lingual cavosurface margins of the proximal box to aid in finishing and polishing. Beveling gingival margin requires clinical judgment, whether to bevel or not depends on the decision to remove the thin enamel closer to CEJ that can decrease effectiveness of acid etching". *Fundamentals of Operative Dentistry. Schwartz, Summitt , Robbins*

TENN: Yes. Everywhere there is enamel.

Literature support for beveling the enamel on the gingival and vertical proximal walls. (See below for list of citations):

For occlusal bevels:

Moore DH, Vann WF Jr. the effect of a cavosurface bevel on microleakage in posterior composite restorations. J Prosthet Dent 1988;59:21-4

Against occlusal bevels:

Dias KR, Dias, AR, Lamosa AC, Rezende LB, Sampaio Filho H. Evaluation of the bevel effects on the resin restoration microleakage. Abstract 3006: 2005 IADR/AADR/CADR 83rd General Session & Exhibition

Isenberg BP, Leinfelder KF. Efficacy of beveling posterior composite resin preparations. J Esthet Dent. 1990 May-Jun;2(3):70-3

Summitt, JB, Robbins, JW, Schwartz, RS, Fundamentals of Operative Dentistry. 2nd ed. Carol Stream: Quintessence Publishing, 2001:281

Wilson NH, Wilson MA, Wastell DF, Smith GA. Performance of occlusion in butt-joint and bevel-edged preparations: five-year results. Dent Mater. 1991 Apr;7(2):92-8

UTSA: Bevels **are a** part of routine posterior resin composite preparations. We recommend that they be placed on the facial and lingual cavosurface margins of the proximal box preparation with a GMT and if there is adequate access. Conservative bevels (0.5mm) are placed at a 45-degree angle to the surface. Gingival bevels can be placed if there is sufficient enamel above the cemento-enamel junction, otherwise an inverse or internal bevel is recommended. We do not recommend bevels on the occlusal surfaces. What is the evidence for the bevels and the location? Bevels on these margins (facial and lingual) have been shown to significantly reduce marginal leakage (*Hilton et al 1999, Opdam et al, 1998, Opdam et al, 1998*). Bevels placed on the occlusal surfaces are not indicated because the orientation of the enamel rods already allows the restorative material to bond to the end-cut enamel. Thus, surface area of resin composite exposed to occlusal forces is minimized, and a lesser amount of thinner material is exposed to possible marginal fracture and wear.

UTH: Using the following guidelines, bevels may be added to posterior resin composite reparations (based upon the text *Fundamentals of Operative Dentistry*). When sufficient dentin-supported enamel remains for an adequate bevel, composite adaptation and seal (decreased microleakage) may be enhanced:

- gingival margins may be beveled only if they are positioned well above the CEJ and an adequate band of sound enamel remains.
- when a cavosurface (margin) approaches to within $\approx 1.0 - 1.5$ mm to the CEJ, no bevel is placed.
- facial and lingual vertical cavosurfaces (margins) may also be beveled; smoothed and finished to remove any chipped and/or fragile/fractured enamel(gingival margin trimmer).

OKLA: Our evidence is simply based on clinical observations and experiences over time. We teach our students to place bevels in the lingual and facial proximal walls. Bevels can be placed in the gingival wall if adequate enamel is available in that wall. No bevels are placed on the occlusal cavosurface margins. There is quite a bit of evidence that the cut enamel rods created by bevels allow a more effective seal for the interface between the tooth and resin. (See list of citations below)

Aker DA, Aker JR, Sorensen SE. Effects of methods of tooth enamel preparation on the retentive strengths of acid etch composite resins. J Am Dent Assoc 1979; 99(2):185-189.

Qvist V, Strom C. 11 year assessment of Class III resin restorations completed with two restorative procedures. Acta Odontol. Scand 1993;51:253-262.

Opdam NJ, Roeters JJ, Kuijs R, Burgersdijk RC. Necessity of bevels for box only class II composite restorations. J Prosthetic Dent 1998;80(3):274-279. Nozaka K, Suruga Y, Amari E. Microleakage of composite resins in cavities of upper primary molars. International Journal of Pediatric Dentistry 1999; 9(3):185-194.

Han L, Okamoto A, Iwaku M. the effects of various clinical factors on the marginal enamel microcracks produced around composite restoration. Dental Materials Journal 1992; 11(1):26-37.

Tan DE, Tjan AH. Margin designs and fracture resistance of Class IV resin composite. American Journal of Dentistry 1992; 5(1):15-1

Baratieri LN. Canabarro S. Lopes GC. Ritter AV. Effect of resin viscosity and enamel beveling on the clinical performance of Class V composite restorations: three-year results. Operative Dentistry 2003 28(5):482-7.

Bevels are not placed in margins located on the occlusal surface.

Isenberg BP, Leinfelder KF. Efficacy of beveling posterior composite resin preparations. Journal of Esthetic Dentistry 1990; 2(3):70-73.

Hilton TJ. Direct posterior esthetic restorations. In: Summitt JB, Robbins JW, Schwartz RS(eds). Fundamentals of Operative Dentistry, Chicago: Quintessence 2001:279-281.

Internal gingival enamel bevels are sometimes used if removal of the enamel would result in a loss of gingival wall enamel.

Holan G, Eidelman E, Wright GZ. The effect of internal bevel on marginal leakage at the proximal surface of Class 2 composite restorations. Operative Dentistry 1997; 22(4):217-221.

**In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?
What is the evidence for this?**

- BAY:** Pre-clinically, the students are taught that when placing a proximal box, the facial and lingual wall should always break contact with the adjacent tooth to allow for proper carving and burnishing in the case of amalgam restorations, and for proper placement in the case of composite restorations. This also makes evaluation of the proximal margins of the restoration easier. When the inexperienced student restores a Class II preparation, visibility of the facial and lingual box wall allows the faculty and student to assess the quality of the amalgam condensation or composite restoration placement. Voids and underfilled margins are easily detected when box walls break contact with the adjacent tooth or teeth. The student then knows if the restoration technique he/she used was successful and if not what modifications are needed.
- Students are also taught that clinically there may be times when a facial and/or lingual box wall may not need to break contact with the adjacent tooth. A proximal box wall may be left in contact with the adjacent tooth when all decay and decalcification has been removed and extending the wall further would jeopardize the integrity of the remaining tooth structure or compromise esthetics on a patient at low risk for decay.
- LSU:** No responses noted
- MISS:** It is acceptable to do this when the caries/ defect / previous restoration can be removed without extending beyond the contact area and thus leaving the contact on sound tooth structure which may simplify matrix application, composite insertion and contouring. If the matrix band cannot be applied easily the contact must be opened more. Usually this is for restoration with composite where bonding to enamel is predictable. Not as often done with amalgam. What is the evidence for this? *Sturdevant , 4th edition*
- TENN:** UT does not teach leaving the facial or lingual wall of a proximal box in full contact with an adjacent tooth as routine practice. However, in the occasional case where excessive sound tooth structure will have to be removed to break contact, an exception may be made, i.e. as in rotated teeth. What is the evidence for this?
- Summitt, JB, Robbins, JW, Schwartz, RS, *Fundamentals of Operative Dentistry. 2nd Ed. Carol Stream: Quintessence Publishing, 2001:315*
 - Roberson, TW, Heymann, HO, Swift, JS. *Sturdevant's Art & Science of Operative Dentistry. 4th ed. St. Louis, Mosby, Inc, 2002:701*
 - Osborne, JW, Summitt, JB: *Extension for prevention: is it relevant today? Am J Dent 11(4):189,1998*
- UTSA:** In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth? There is no evidence to show that extending beyond the contact area increases restoration longevity, nor is there evidence that leaving it in contact shortens the restoration lifespan. Conservation of tooth structure is paramount. What is the evidence for this? None.

- UTH:** This decision is primarily based upon the clinical situation and the experiences of the supervising practitioner. Considerations include but are not limited to the clinical situation after the complete removal of damaged, diseased, or decalcified tissue, isolation (bonding and/or composite contamination concerns), tooth morphology, tooth positioning in relation to adjacent (contact) surfaces, access to cavosurface margins (in terms of the ability to properly place and bond the composite, thereby sealing this surface), esthetics, and personal restorative experiences and philosophy.
- OKLA:** For posterior resin composite restorations: It is preferable to extend the facial and lingual walls of the preparation to minimally break contact with the adjacent tooth to allow finishing of the margin, examination of the margin for voids, and cleansing of the margin by the patient. (*Hilton TJ. Direct posterior esthetic restorations. In: Summitt JB, Robbins JW, Schwartz RS(eds). Fundamentals of Operative Dentistry, Chicago: Quintessence 2001:279-281.*)
- For amalgam restorations: It is preferable to extend the facial and lingual walls of the preparation to minimally break contact with the adjacent tooth to allow finishing of the margin, examination of the margin for voids, and cleansing of the margin by the patient. Some exceptions are made: 1) when a significant amount of sound enamel would be removed while breaking the contact; 2) when the amalgam margin will be seen, and esthetics will be compromised. (*Summitt JB, Osbourne JW, Amalgam Restorations In: Summitt JB, Robbins JW, Schwartz RS(eds). Fundamentals of Operative Dentistry, Chicago: Quintessence 2001:315.*)

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

- BAY:** With respect to composite, responses given previously are related to this question regarding replacement vs. repair. Regarding defective amalgam restorations, in selected cases the repair of a large alloy restoration may be appropriate. Caution is advised when repairing amalgam restorations because the repair will rely upon mechanical retention created and the presence of recurrent caries can not be fully appreciated radiographically. The evidence is anecdotal.
- LSU:** No responses noted
- MISS:** We tend to do more repairs today than in the past, unless the restoration has significant recurrent decay/ defective margins. For large complex amalgams the decision to repair isolated marginal defects is more predictable than to replace the whole restoration.
- Evidence for repair : Composite:
1. *Influence of Different Repair Procedures on Bond Strength of Adhesive Filling Materials to Etched Enamel In Vitro, C Hannig, et al., Operative Dentistry, 2003, 28-6, 800-807*
 2. *The Effect of Air Abrasion with Two New Bonding Agents on composite Repair, N Oztas, et al., Operative Dentistry, 2003, 28-2, 149-154*
 3. *Shear Bond Strength of Repaired Composite Resins Using a Hybrid Composite Resin, C W Sau, et al., Operative Dentistry, 1999, 24, 156-161*

4. *Microleakage at the Composite-repair Interface: Effect of Different Surface Treatment Methods*, AN Cavalcanti, et al., *Operative Dentistry*, 2005, 30-1, 113-117
5. *Bond strength of repaired anterior composite resins: an in vitro study*¹, S.A. Shahdad², J. - G. Kennedy³, *Journal of Dentistry* 26 (1998) 685-694
6. *The effect of mechanical undercuts on the strength of composite repair*, Chiayi Shen, Ph.D. et al, *JADA*, Vol. 135, October 2004
7. *Effect of combinations of surface treatments and bonding agents on the bond strength of repaired composites*, Tamar Brosh, PhD, et al., *Journal of Prosthetic Dentistry* 1997; 77:122-26
8. *Intraoral Repair of Cosmetic Restorations*, Gerald Denehy, DDS, MS, et al., *Dental Clinics of North America*, Volume 42, Number 4, October 1998
9. *Repair of class I resin-composite restoration*, Theodore P. Croll, DDS, *Journal of Dentistry for Children*, January-February 1997
10. *Effect of preparation mode on Class II resin composite repair*, R. Frankenberger, et al. *Journal of Oral Rehabilitation*, 2003, 30; 559-564

Evidence for repair : Amalgam:

11. *Interfacial bond strength of amalgam bonded to amalgam and resin composite bonded to amalgam*, Terry J. Fruits, et al., *Quintessence International*, 1998;29:327-334
12. *Effects of Surface Treatments on Amalgam Repair*, J P Jessup, et al., *Operative Dentistry*, 1998, 23, 15-20

- TENN:** A repair of an adequate existing restoration may be the most conservative and simplest treatment. The advantages of repairing an existing restoration include lower cost, minimizing the lost of additional sound tooth structure, less trauma to the pulp, and less discomfort. (At UT, repairs of restorations are done on a limited basis.) Gordon VV, Mijor IA, Blum IR, Wilson N. *Teaching students the repair of resin-based composite restorations: A survey of North American dental schools. J Am Dent Assoc.* 2003 Mar;134(3):317-23.
- UTSA:** Total removal of existing restorations advances the cycle of restoration and re-restoration and increases the insult to the pulp that occurs with multiple preparations. Total replacement should be undertaken when there is demineralized tooth structure under the restoration and/or at the DEJ, the tooth has symptoms suggestive of a leaking restoration, or extent of damage to the restoration precludes repair.
- UTH:** A defective restoration regardless of restorative material should be replaced rather than repaired. A restoration that is simply old or aged may or may not be defective. Anusavice K. *Quality evaluation of dental restorations: criteria for placement and replacement.* Chicago: Quintessence, 1989.
- OKLA:** Certainly there is some rational for repair versus replacement of defective restorations. It will probably conserve tooth structure compared to removing and replacing the restoration, especially in the case of resin composite restorations. Repairs will also cause less trauma to the pulpal tissues. We have not accumulated a great deal of evidence from the literature that a repair is better. There has been some research supporting sealing existing amalgam restorations. Cassin AM, Pearson GJ, Picton DC. *Fissure sealants as a means of prolonging longevity of amalgam restorations—and in-vitro feasibility study. Clinical Materials* 7(3):207-7, 1991

**Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?
If so, describe and comment.**

BAY: There has not been an appreciably higher incidence of failure of bonded composite cores when compared to other core restorations on anterior teeth at Baylor. The observations at Baylor are similar to those described by Gokhan et al. (*Journal of Prosthetic Dentistry* 2005). Askoy found that bonded composite cores and dowel post and cores were better retained when a bonded composite cement was used. Similarly, Castellon and Burgess (2004) found a non-statistical difference when Prime and Bond NT dual-cured was used with chemical or dual-cured materials. Considering the composition of the core material, our experience has been similar to that of Goto (*JPD* 2005); fiber-reinforced resin dowels and bonded composite cores under fatigue loading provided significantly stronger crown retention than cast gold post and cores and titanium alloy dowels with composite cores under fatigue loading.

LSU: No responses noted

MISS: We have not seen a failure problem with bonded resin composite cores as long as the ferrule effect of having at least 2 mm of crown margins on sound tooth structure is maintained. If crown margins are too close to the resin build up, 1 mm or less, may be destined for failure.

TENN: Yes. Bond failure, usually associated with technique. Students do not use materials properly or forget steps.

UTSA: The success or failure of any core material is dentin dependent. The incorporation of a ferrule is paramount to clinical success. Our experience with resin composite cores is limited. We have not seen more failures with either core material in teeth that have adequate dentin and a good ferrule.

UTH: No failure problem when the correct bonding system is used. We have seen bond failures when self-cured composite core material is used with an incompatible bonding agent.

OKLA: Our Fixed Partial Denture department has the following philosophy in regard to resin composite cores: We believe that there is not enough evidence-based dentistry to justify the use of composite resin with or without prefabricated cores. We do see a great amount of failures (recurrent caries) with crowns supported by these cores. Some of our faculty members advocate their use, but this is based on empirical information.

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

BAY: When properly placed on appropriate candidates, bonded amalgam and bonded composite restorations are acceptable definitive restorations. The data in the literature varies as to the exact life expectancy of bonded restorations as many variables must be considered as confounders. Generally, the observations at Baylor are similar to those described by Opdam et al. (*Journal of Dentistry* 2004), in that an annual failure rate for posterior composites was 6.3% with a 50% survival rate over 8 years. Kinkle described in 2001 (*Journal of Adhesive Dentistry*) that annual rates for alloy were between 0-7% and for composite 0-9%.

LSU: No responses noted

MISS: Although there are no complete clinical longitudinal studies on the long-term performance of restorative materials, in-vitro studies and existing clinical studies suggest that composites have a 4 year life (<20 %failure) and amalgam will last approximately 10 years (< 10% failure). Although bonded amalgam restorations have gained popularity, *in vitro* and *in vivo* studies suggest that bonding of amalgam is controversial and may not significantly increase the life of the restoration and does not significantly decrease sensitivity or microleakage. Reference: Chadwick B., Dummer P., Sunstan F., et. al. How long do fillings last?, *Evidence-Based Dentistry* (2002) 3, 96-99

TENN: Composites: Bond to enamel very good long term, over twenty years.
Roberson, TW, Heymann, HO, Swift, JS. *Sturdevant's Art & Science of Operative Dentistry*. 4th ed. St. Louis, Mosby, Inc, 2002:181

Many studies have shown short term dentin bond strengths to be high, but many show a decrease over time. Decreases shown at one year, two years, and at three years.

- Kato G, Nakabayashi N. The durability of adhesion to phosphoric acid etched, wet dentin substrates. *Dent Mater*. 1998 Sep;14(5):347-52
- Hashimoto M, Ohno H, Sano H, Kaga M, Oguchi H, *In vitro* degradation of resin-dentin bonds analyzed by microtensile bond test, scanning and transmission electron microscopy. *Biomaterials*. 2003 Sep;24(21):3795-803
- Hashimoto M, Ohno H, Sano H, Kaga M, Oguchi H, Degradation patterns of different adhesives and bonding procedures. *J Biomed Mater Res B Appl Biomater*. 2003 Jul 15;66(1):324-30
- Hashimoto M, Ohno H, Sano H, Kaga M, Oguchi H, *In vivo* degradation of resin-dentin bonds in humans over 1 to 3 years. *J Dent Res*. 2000 Jun;79(6):1385-91
- Meiers JC, Young D. Two-year composite/dentin bond stability. *Am J Dent*. 2001 Jun;14(3):141-4

Amalgam: Studies have shown success of bonded amalgams from 2-3 years, 5 years, with one study showing no difference vs. pin retained amalgams at 6 years.

- Setcos JC, Staninec M, Wilson NH. A two-year randomized, controlled clinical evaluation of bonded amalgam restorations. *J Adhes Dent*. 1999 Winter;1(4):323-31
- Belcher MA, Stewart GP. Two-year clinical evaluation of an amalgam adhesive. *J Am Dent Assoc*. 1997 Mar;128(3):309-14
- Mach Z, Regent J, Staninec M, Mrklas L, Setcos JC. The integrity of bonded amalgam restorations: a clinical evaluation after five years. *J Am Dent Assoc*. 2002 Apr;133(4):460-7
- Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. The performance of bonded vs. pin-retained complex amalgam restorations: a five-year clinical evaluation. *J Am Dent Assoc*. 2001 Dec; 132(7):923-31
- Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. Six-year clinical evaluation of bonded and pin-retained complex amalgam restorations. *Oper Dent*. 2004 May-Jun;29(3):261-8

Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.

Bonded amalgam- over six years

Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. Six-year clinical evaluation of bonded and pin-retained complex amalgam restorations. *Oper Dent*. 2004 May-Jun;29(3):261-8

Composites:

- Survival rate at 16 years: Herculite 62%, P50 65%
Demarco FF, Rodolpho PAR, Cenci MS, Donassollo TA. Clinical evaluation of posterior composite restorations: 16 years follow-up. Abstract 0167: 2005 IADR/AADR/CADR 83rd General Session & Exhibition
- 74.2% longevity over 10 years
Gaengler P, Hoyer I, Montag R. Clinical evaluation of posterior composite restorations: the 10 year report. *J Adhes Dent*. 2001 Summer;3(2):185-94
- 40-50% failure rate at 10 years
Raskin A, Michotte-Theall B, Vreven J, Wilson NH. Clinical evaluation of a posterior composite 10-year report. *J Dent*. 1999 Jan;27(1):13-9
- 87% survival rate at 5 years for composites placed by dental students (2.8% annual failure rate)
Opdam NJ, Loomans BA, Roeters FJ, Bronkhorst EM. Five-year clinical performance of posterior resin composite restorations placed by dental students. *J Dent*. 2004 Jul;32(5):379-83.
- 7-year recall - 70 of 120(original) evaluated, 4 failed
Turkun LS, Aktener BO, Ates M. clinical evaluation of different posterior resin composite materials: a 7-year report. *Quintessence Int*. 2003 Jun;34(6):418-26

UTSA: Systematic reviews of the longevity of direct restorations are the best analytical approaches. For Class 1 and 2 resin composite restoration longevity, we would cite the findings of the Downer *et al*/systematic review of routine posterior restorations that found the majority of MST in the six to ten year range, and the El-Mowafy *et al* meta-analysis that found a 84% survival rate after five years.

Downer MC, Azli NA, Bedi R, Moles DR, Setchell DJ. How long do routine dental restorations last? A systematic review. *Br Dent J*. 1999 Oct 23;187(8):432-9,
el-Mowafy OM, Lewis DW, Benmergui C, Levinton C. Meta-analysis on long-term clinical performance of posterior composite restorations. *J Dent*. 1994 Feb;22(1):33-43.

UTH: Separating the longevity of individual components of an *in vivo* adhesive restorative system into exclusive categories is somewhat difficult. Restorative failure may result from failure of the bonding agent, failure within the composite (restorative material), improper placement technique, improper curing of one or more components of the system (or the use of a defective light-curing unit), traumatic finishing and polishing procedures, the result of patient habits or behavior, or result from a combination of any of these or other factors. Individual components do not function in a mutually exclusive environment. However, in one study, median annual (overall) failure rates for three types of restorations were 2.2% for direct composite, 3.3 % for amalgam, and 7.7% for glass ionomer cement*.

Burgess JO, Walker R, Davidson JM. Posterior resin-based composite: review of the literature. *Pediatr Dent*. 2002;24:465-479.

Hickel R, Manhart J. Longevity of restorations in posterior teeth and reasons for failure. *J Adhesive Dent*. 2001; 3:45-64.

*Hickel R, Manhart J, Garcia-Godoy F. Clinical results and new developments of direct posterior restorations. *Am J Dent*. 2000; 13:41D-54D.

Swift E.J. Dentin/enamel adhesives: review of the literature. *Pediatr Dent*. 2002; 24:456-461.
Van Meerbeek B, Perdigao J, Lambrechts P, Vanherle G. The clinical performance of adhesives. *J Dent*. 1998; 26:1-20.

OKLA: We have no definitive answer for this question. Certainly some clinical studies are indicating some long-term success with bonded amalgams (Summitt et al), but this may or may not be attributed significantly to the longevity of the bond. We have not found any evidence that can identify the specific longevity of the bond. (Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. Six-year clinical evaluation of bonded and pin-retained complex amalgam restorations. *Oper Dent* 29(3):261-8, 2004.)

III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?

BAY: At Baylor, we believe that amalgam restorations are viable restorations in properly selected cases and advocate its usage. We follow the ADA's recommended Best Management Practices (BMP) for amalgam waste at Baylor College of Dentistry. Specifically, scrap amalgam, contact amalgam (amalgam that has been in contact with the patient and collected in chair side traps), amalgam sludge collected in evacuation bottles in the SIM lab, and empty amalgam capsules are placed in covered plastic containers labeled as amalgam for recycling. These containers are then picked up by the recycling company with which the school has contracted and the amalgam is recycled.

LSU: No responses noted

MISS: We support and teach amalgam as a safe and effective treatment for tooth restoration. Lectures on the environmental safety precautions with amalgam and the amalgam controversy are given in the freshman year in the amalgam course (Caries I). We require a certain number of amalgam procedures to be completed in the 3rd and 4th years. Class II amalgams have been required on the Mississippi State Board in the past and we assume it will be on the CITA exam this year. Therefore students have competencies to complete for class I and II amalgam preps and restorations. All the (BMP) for amalgam waste adopted by the ADA have been implemented in our clinics. These guidelines are written in the clinic operating manual given to all students and faculty. We have filters that collect amalgam waste in the dental units which are removed on a weekly basis and placed in jars which are collected for disposal by the risk management dept.

TENN: It is still considered a useful restorative material. When used properly, it is a safe, cost effective restoration, that is durable and long lasting. Since amalgam restorations are part of the SRTA examination, it will continue to be part of our curriculum. Separate containers are available on the clinic floor for the disposal of leftover amalgam and for empty amalgam capsules. Operatories are equipped with chair side traps. Vacuum pumps have centrifugal filters for the trapping of amalgam sludge and water.

- UTSA:** We are teaching both amalgam and composite at this time. We currently are implementing all of the ADA BMPs for amalgam waste. Pecapsulated alloys are available in a variety of sizes to minimize waste. Faculty and students are informed through training videos on how to capture and recycle amalgam, non-contact, (scrap) amalgam are placed in labeled wide-mouthed, airtight containers. Extracted teeth are disinfected with glutaraldehyde and packaged similarly. Both are sold back to a recycler. Chair-side traps, in combination with separation units capture virtually all of the mercury waste discharged from the dental clinic i.e. (amalgam sludge, waste water or contact amalgam caught on the chair side trap). The wastewater is then processed by a unique amalgam recovery system which includes holding tanks, separators, and absorbent columns. The recovered waste is weighed and transported to Mercury Waste solutions. Each quarter the concentration of mercury is tested in the Dental School's effluent waste stream by the San Antonio Water System. So far we have never exceeded our permit level of .05mg/l.
- UTH:** Amalgam restorations are taught and utilized in our school. Procedures for handling and disposal of amalgam waste basically follow the BMP (ADA) guidelines mentioned above. Further, our school sends amalgam waste to a facility which recovers the mercury through a distillation process.
- OKLA:** We use amalgam restorative material in most moderate to large posterior restorations. We feel that amalgam is the most cost efficient restorative material available to the public. We are not aware of any reasons not to use this material. Our dental units have amalgam traps located at the chair. We collect and separate empty amalgam capsules and waste amalgam. We store these in closed containers. We have a recycler handle these materials for disposal.

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

- BAY:** Baylor has incorporated caries risk assessment principles into the pre-clinical and clinical curriculum. In the Fall of the second year, students are first introduced to caries risk assessment during the course "Introduction to Clinical Practice". In the spring of the second year, students are introduced to epidemiology and applied preventive dentistry. In the third year, students continue the study of applied preventive dentistry and assess their clinical patients for caries risk and implement appropriate preventive treatment. In the fourth year, students continue using ODRA (Oral Disease Risk Assessment) and appropriate preventive treatment, re-evaluation and follow-up procedures on their clinical patients.
- LSU:** No responses noted

- MISS:** We have incorporated all aspects of the caries risk assessment into the didactic portion and the clinical component of our curriculum. Caries risk is introduced in the methods I course during the first year and followed up in the diagnosis/admissions clinics. For each patient there is a caries risk assessment form for the student to fill out which is then reviewed by admissions faculty. All further caries risk and prevention procedures are followed up in the prevention/periodic clinic.
- TENN:** Preclinical – Caries assessment principles are presented in didactic courses.
Clinical – Guidelines are currently being implemented in oral diagnosis, actual clinical treatment procedures are under development, and a tri-state referral list (sliding scale payment) has been developed.
- UTSA:** The Department of Community Dentistry supported by the core clinical faculty teaches caries risk assessment to second and **third year dental students. They have a one page Oral Health Evaluation form for use** in the third year clinic which includes an accumulative caries risk assessment and preventive plan guide. The Department of Restorative Dentistry also incorporates caries risk assessment into the second and third year curriculum.
- UTH:** Caries risk assessment principles are covered in various preclinical courses. An “Oral Risk Assessment” patient form (below) is utilized clinically. Relevant references include the following:
- 1) *Management Alternatives for the Carious Lesion. Oper Dent supplement 6, 2001;*
 - 2) *The Academy of Operative Dentistry Recommendations for Clinical Practice. 26(4):321-422, 2001;*
 - 3) *Featherstone et al.. J Calif Dent Assoc 31:1-9, 2003;*
 - 4) *Anusavice KJ. Present and future approaches for the control of caries. J Dent Ed. 69(5):538-54, 2005.*
- OKLA:** We teach caries risk assessment principles in the preclinical curriculum. We do not at this time have a systematic caries risk assessment instrument in our patient charts. We do require the students to consider the factors affecting caries risk for each patient during the clinical treatment planning stage of their patient treatment.

**V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?
 Have your calibration efforts improved inter-rater agreement between faculty?
 What outcome measures have you used to track the efficacy of your calibration?
 Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.**

- BAY:** When at all possible, new faculty members in Operative Dentistry are scheduled in the pre-clinical lab in order to see first hand what instrumentation and techniques are taught at Baylor. This is not always possible, especially for part-time faculty members. Our faculty have access to the textbooks, pre-clinical and clinical manuals, and lecture materials used in our pre-clinical and clinical courses. With respect to daily work, the course director reviews the use of the QA (Quality Assessment) form with new faculty members and the salient points of preparation

design, restoration placement and finishing procedures that we teach at Baylor. Experienced faculty mentor new faculty as needed. When grading lab practical exams, the course director works closely with new pre-clinical faculty for the first few exams so that the new faculty member can see what emphasis is placed on various aspects of the preparation design or restoration qualities. All pre-clinical faculty have the opportunity to review all lab practicals and informally calibrate among themselves. For clinical progress exams, we use full time faculty members or faculty who are at least 50% FTE and have pre-clinical lab teaching experience. These clinical progress exams are graded independently by two, paired faculty members. When a new faculty member is added to the clinical progress exam team, the clinical course director reviews the grading criteria with the new faculty grader. The experienced member of the grading pair mentors the new faculty grader as needed during the course of the actual exam. At least every three months, the Operative Faculty meet to discuss any changes in clinical protocol and any problems that may have arisen. Some problems/concerns are addressed informally or in faculty memos as the need arises. Once a year, the third year restorative faculty meet with the fourth year faculty for a calibration seminar. Any changes to the QA form are discussed along with the evaluation parameters. Our calibration efforts appear to have improved inter-rater agreement between faculty members but that evidence is anecdotal. There are no formal outcome measures in place to track the efficacy of our calibration. Generally we look for faculty evaluations of student work to fall within a half-grade level of one another. In the last few years, Baylor has looked at an automated laser preparation evaluation tool in development. This was in an effort to remove the subjectivity from the grading process, at least at the pre-clinical level. The machine would be programmed to evaluate student preparations based on an "ideal" preparation previously scanned into the system. Early trials were fraught with many pitfalls and shortcomings in the system. To date, the independent company developing the system has not satisfactorily corrected these problems.

LSU: No responses noted

MISS: Operative faculty are calibrated and standardized prior and during practical examinations for the assigned practicals. Faculties are given, and review with course coordinators, criteria used for evaluation prior to a practical examination. During the practical two operative faculty independently evaluate a students practical based on the written criteria previously reviewed. If the two faculties evaluations are significantly varied, usually a greater than 10 point range, a third faculty member evaluates the practical in question and reviews their evaluation with the original two evaluators. The final grade is determined by the group based on the third evaluation and one of the original evaluations. All failing practicals is usually reviewed by three evaluators. Calibration for clinical competencies occurs primarily during the senior clinical comprehensive examination. All operative faculties receive written criteria are similar to state board criteria at an annual departmental meeting with all full and part-time faculties prior to the senior clinical examination. Criteria are reviewed by the faculty before the examination. During the examination, two faculty grade each procedure and if they are ten points or more apart, a third faculty must arbitrate the two grades. A failing or passing grade has to be agreed upon by at least two of the three faculty evaluating the

procedure. Also, all students take clinical competency examinations in class I, class II, class III, and Class V situations. Two clinical faculty evaluate each competency examination and have to agree on the final grade within a ten point range. Daily clinical grades are only evaluated by one faculty member based upon the same criteria used for clinical competencies. Evaluators are usually within the ten point range when evaluating a student. All evaluations are done anonymously when possible to prevent any bias among faculty/student. Intra-rater agreement between faculty does not present large problem possible due to the smaller size of the faculty, (4 full and 8 part-time) and general agreement on criteria used. No technology is used to help with calibration other than digital or 35mm photography of preparations and restoration during the senior clinical examination. These are used to review with faculty at the annual departmental meeting.

TENN: Evaluating/grading practical exams: Several faculty members grade practical exams. Grading criteria are reviewed with faculty and discussion of grading procedure is done before grading. Extremes of the grading curve are reviewed by multiple graders. Occasional spot checks are also done. Daily clinic work: Daily clinic work is done as a overall clinical experience. The actual "work" is just part of the "daily grade". Clinical competency exams: Clinical exams for competency are graded by two instructors and are a pass/fail exam. An attempt is made to follow SRTA's guidelines, especially for operative, faculty are encouraged to sit in on SRTA calibration meetings to become familiar with SRTA's grading procedure. Have your calibration efforts improved inter-rater agreement between faculty? Inter-rater agreement between faculties tends to improve the longer and the more frequently the faculty work together. What outcome measures have you used to track the efficacy of your calibration? Since we try to calibrate our grading of clinical exams with SRTA, how well our students do on SRTA is one way to track our efficacy. DentSim is showing improved calibration in its grading of students.

UTSA: In the preclinical course, daily exercises and practice for skill-assessments are evaluated as satisfactory or unsatisfactory using criteria-referenced evaluation sheets. Many of the faculty who are staffing the pre-clinical laboratories are part-timers or volunteers. Calibration is therefore limited to having the faculty attend the lecture which highlights preparation design and restoration criteria that are considered important. Each lecture is followed by a briefing session for the faculty during which they are informed of the aspects of the exercises that need to be emphasized or reinforced. Following the briefing session, faculty members go to the four student laboratories. Each of the laboratories is directed by a veteran full-timer who is available to answer any questions. Pre-clinical skill-assessments are graded events. Two full-time faculty members grade the projects independently of each other and then come to a consensus on grades. All potential failures are reviewed by a third grader. Calibration of the graders for pre-clinical skill-assessments occurs while the students are taking the examination. Slides of previous examination attempts are projected which demonstrate the criteria being evaluated, and a discussion is conducted to determine how each criterion should be handled. Clinical daily work is evaluated as pass/fail using criteria referenced evaluation sheets. (The same sheets that are used during the graded skill-assessments) Each of the criteria on the sheet is referenced to a written

description of how it will be evaluated. This grading sheet was developed as the result of a group effort between the Restorative and General Dentistry Departments, in an effort to improve calibration. Clinical skill-assessments are evaluated by two faculty members using the same forms as described above. Beginning this year, we are requiring digital photographs of each skill-assessment performed by the student, along with information regarding who the faculty graders were. We intend to use these photographs to help calibrate graders further. Have your calibration efforts improved inter-rater agreement between faculty? We have just implemented the changes described above for this academic year in an effort to improve our inter-rater agreement and to increase realistic feedback to students. We do not have data to determine whether or not the change will improve inter-rater agreement or student performance. What outcome measures have you used to track the efficacy of your calibration? We are not currently formally tracking the efficacy of our calibration besides having the course director review the final scores delivered by the various graders and to determine trends. Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item. The major improvement in our calibration efforts that utilizes a technology-based approach is the incorporation of digital photography to document the clinical evaluation taking place by faculty on junior skill-assessments. We hope to use this information to evaluate the consistency of evaluation and to further calibrate our faculty.

UTH: The only calibration occurring with clinical faculty involves our Senior Mock Board Examination. Calibration here is performed using clinical slides and a discussion of specific grading criteria. Preclinical calibration has resulted from the faculty longevity (as a preclinical group) and the continued discussion of those involved within the courses.

OKLA: Our calibration efforts have not changed since the 1999 CODE meeting. Our grading is not perfectly standardized, but we feel that it is a fair system. Our grading system for all preparations and insertions are based on a list of objective criteria. There are specific criteria for all the various types of "ideal" preparations and insertions completed on a typodont tooth and a natural tooth. These criteria are supplied to the students and all department members so that both are aware of the grading criteria. The students have several preclinical lab projects that involve evaluating their own and their classmates' preparations and insertions utilizing these criteria. New faculty members are initially calibrated by allowing them to evaluate several preparations and insertions on typodont teeth that were completed by students in past years and have been previously evaluated by the faculty. The new faculty members can then compare their evaluation to those done previously by more experienced departmental faculty to establish an initial concept of the department's grading system. During each semester, all members of the department individually evaluate each student's practical examinations. After the results of the evaluations are collated, the entire department meets to discuss any grades that fall beyond a certain acceptable level of variation (More than one letter grade variation is not acceptable). This allows the faculty to discuss the deficiencies observed in the preparation and calibrate how much it should affect the assigned grade. This also provides us with the percentage of grades for each

practical exam that fall outside of the accepted parameters for our calibration. We have no new high tech methods for faculty calibration. We have used this system for the past 30 years in our department. The results of this technique have yielded evaluations that are fairly reliable between our faculty members. The four faculty members evaluating the students' work have a combined eighty years of experience teaching in our department. Generally, the grades assigned and the reasons for assigning the grades are very reliable from one instructor to another. No statistical analysis has been performed.

Regional CODE Agenda

To be established by the respective Region and Regional Director. Please also report on responses to the Regional Agenda from all participants.

Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations?

(Reference: ADA news, July 11, 2005; Vol 36, No.13)

UTH: As the situation clarifies itself, a discussion may be appropriate.

Suggestions for CODE.

What can the organization do to improve its effectiveness?

University of Mississippi has requested that "repeat agenda items" from previous years that have already been discussed thoroughly should not be included again. Caries risk assessment was an example of reworking an issue they felt had been well covered in previous meetings.

What is suggested to improve the Web site? <http://netserv.unmc.edu/code/codeFrame.html>

Other comments?

TENN: Would like to revisit the topic of electric handpieces. Are more schools switching? What has been their experience(s)?

MISS: The repeat agenda items from previous years that have already been discusses thoroughly should not be included again, such as caries risk assessment.

CODE Region III Attendees Form

NAME	UNIVERSITY	PHONE #	FAX #	E-MAIL ADDRESS
Jim Summit	UTSA	210-567-6354	210-567-6354	summit@uthscsa.edu
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Joe Connor	UTSA	210-567-3690	210-567-6354	connorj@uthscsa.edu
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Brent Hudson	BAY	214-828-8281	214-874-4544	bhutson@bcd.tamhsc.edu

CODE REGIONAL MEETING REPORT FORM

REGION: IV (Great Lakes)

LOCATION AND DATE OF MEETING: SUNY-Buffalo

Buffalo, NY

October 13 - 14, 2005

CHAIRPERSON:

Name: Dr. Gary Wieczkowski

Phone #: (716) 829-2862

Address: 235 Squire Hall,
Dept of Rest Dent

Fax #: (716) 829-2442

School of Dental Medicine

E-mail: gwhiz@buffalo.edu

Buffalo, NY 12414-3008

List of Attendees: Please complete the CODE Regional Attendees Form (enclosed at end of Agenda)

Suggested Agenda Items for Next Year:

1. How do we teach in our clinics?
2. Discuss carbide bur use vs diamond points in operative dentistry at various schools.
3. Discuss matrixing – full-band vs sectional. When and why do schools use them.
4. What type of lab support does your school have?
5. Does your school teach cast gold restorations? Do students do the lab work?
6. What is your school's policy on replacing existing amalgam and composite resin restorations which will be receiving full coverage?

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: Dr. Bob Rashid

Phone #: (614) 292-3071

Address: Ohio State University

Fax #: (614) 292-9422

School of Dentistry

E-mail : rashid.1@osu.edu

Columbus, OH

Date: October 12 - 13, 2006

Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;

40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

**2005 NATIONAL CODE AGENDA
REGION IV
SUMMARY RESPONSES TO NATIONAL AGENDA**

NO SUMMARY RESPONSES TO NATIONAL AGENDA SUBMITTED

2005 NATIONAL CODE AGENDA

REGION IV RESPONSES

(Evidence cited where applicable)

Region IV School Abbreviations

CWRU	Case Western Reserve University	OSU	Ohio State University
UDM	University of Detroit Mercy	PITT	University of Pittsburgh
ILL	University of Illinois - Chicago	SUNY	State University of NY - Buffalo
IUPUI	Indiana University	WVU	West Virginia University
MICH	University of Michigan	UWO	University of Western Ontario

I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?

CWRU: Case has just undergone a total restructuring of the “Restorative Department.” Two of the larger departments – Restorative Dept and General Dentistry Dept - were merged into the largest department. A national search for a chair ensued. We have just finished our first year as the Dept of Comprehensive Care under the chairmanship of Dr. Avishai Sadan. The faculty and administration are in the process of totally revamping the entire curriculum to be more problem based. (Although the structure will be a hybrid of problem based, team learning, and some lecture (traditional).

So we are only now beginning the discussion on EBD: what it “really” is, whether or not, or to what extent it is being applied / taught.

The chair, A.S., has instituted the following to help faculty stay current:

1. Bi-monthly meetings for the entire dept. during which time faculty either do case presentations or work to “calibrate” faculty to be consistent in their teaching, use of materials, etc. In fact, the last four sessions were related to EBD and application to pre-clinic and clinic.
2. Internationally/ nationally known guest lecturers have been invited to present CE lectures and “hands on” demonstrations / workshops. i.e. in September Dr. Eric van Doren from Belgium spoke about anterior implant restorations, this Saturday Dr. Didier Dietchi will give a workshop on posterior esthetic dentistry.
3. The entire dept has been invited to attend national / international seminars and other innovative ideas
4. Obstacles – there is not that much evidence if one considers the best evidence- randomized controlled clinical studies, systematic reviews and meta-analyses reviews

Not all faculty embrace EBD, when some of the techniques/methods have been successful for many years.

- UDM:** Faculty utilize an evidence-based approach and incorporate references to evidence when preparing lectures and course documents. Faculty regularly attend in-service training during which the latest evidence-based treatment recommendations and techniques are presented. Students are introduced to evidence-based concepts and approach during their first year of dental school, including minimally invasive dentistry and caries risk assessment and management. These concepts are reinforced throughout the four years of dental school. Current literature reading assignments are also incorporated into simulation courses.
- ILL:** No responses noted.
- IUPUI:** Evidence-based teaching is incorporated in problem-based learning and through lecture, reading.
- MICH:** No responses noted.
- OSU:** No responses noted.
- PITT:** No responses noted.
- SUNY:** No responses noted.
- WVU:** In lecture and CE courses.
- UWO:** At the University of Western Ontario we are attempting to base all our teaching on “evidence-based” information; however, there is not really a lot of true evidence-based material out there. Each discipline attempts to reference their teaching to valid research. But as you know this can be difficult to do as one can come up with justification for almost any approach – depending on your selected references

What is the methodology, obstacles, and successes?

- CWRU:** There is not that much evidence if one considers the best evidence- randomized controlled clinical studies, systematic reviews and meta-analyses reviews. Not all faculty embrace EBD, when some of the techniques / methods have been successful for many years. Students are instructed in EBD in their first year Critical Thinking Course. This course includes discussion of statistics, research design, how to search the literature, etc. The dept is some of the bi-monthly meetings to discuss current literature, as well as emerging trends
- UDM:** Methodology - Students are introduced to techniques for conducting searches in courses taught by other departments in the school. The main obstacle is the amount of time it takes to thoroughly research topics and reference sources. The main success is that the level of awareness regarding the value of an evidence-based approach has been elevated for both faculty and students.

ILL: No responses noted.

IUPUI: Problem-based learning, lecture and reading. Obstacles in PBL include that the cases are so full of basic science issues that there isn't a lot of room for operative.

MICH: No responses noted.

OSU: Currently, EB Dentistry is taught within the first year formally, as a course that also integrates statistics. This is a classroom course and is taught prior to the clinic. While other courses base content on evidence in the literature, we do not challenge the students with 'discovering' evidence for what we teach. In the first year, internet and library (mostly library – Medline searches) is emphasized. The topics are not restricted to just restorative dentistry. Clinically, we have a minimal capability to teach EBD; however, with only one computer available for each care clinic (two for the D3 and two for the D4 students), access and time are minimal and the capability is not utilized. Some elective courses tie evidence with the use of newer materials. These courses are offered as electives in the junior and senior year. Finally, the D3 students have a case presentation and the D4 students compete in an "Clinic Excellence Day" where they are encouraged to tie evidence into treatment rendered for their patient presentation.

PITT: Currently, in collaboration with Dental Public Health department, new initiatives to institute methods of practicing evidence based care are being developed.

- Introducing material into the didactic curriculum, via modifying existing courses, to help students understand EBD and how to apply it clinically.
- Faculty development meetings to help faculty understand concepts of EBD, and its clinical relevance. Including how to perform literature searches and interpret data.
- Initiating clinical 'Evidence Based Subscriptions': a protocol for students to perform EBD on actual patients. (Literature searches/reviews to help decide appropriate clinical treatment)
- Making above mentioned EBD applications a part of the clinical requirements for graduation ('X' number of patients/term)
- Major obstacles include finding space and time in an already overcrowded curriculum. Also finding time for clinical faculty to implement EBD in a 'productivity' environment. Another would be the difficulty in training clinical faculty to appreciate and utilize EBD.
- Informational sources are mainly web-based search applications (*Pub-Med; Medline; PittCAT; etc...*)
- Dental Public Health has been instrumental in helping Restorative faculty in evaluating sources of evidence to help insure clinically applicable research.

SUNY: One lecture on EBD is given to third year students. Cochrane Collaboration and Cochrane Library are discussed. Definition given for evidence based dentistry—the “conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients.” (*Sackett, et al., 1996*) I’m attending the EBD workshop in Chicago in early November. I’m hoping to use this workshop to introduce more EB material into my third year course in the future. We use evidenced based teaching in our preclinic course and in our lecture courses, and we tell the students that “Studies show . . .”. Obstacles include pressure from manufacturers, the lay press, students’ desire to do ‘what’s new’, and part-time faculty. We use published studies that we think meet the criteria, and textbooks.

WVU: No responses noted.

UWO: Incorporated in lecture presentations. Obstacle is time to remain current on meta analysis articles, etc.

What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).

CWRU: No responses noted

UDM: Sources - Textbooks, journals (mainly), and web sites are all utilized. Cochran Library and Journal of Evidence-Based Dental Practice are good sources.

ILL: No responses noted

IUPUI: Please identify and evaluate source(s) and value of source(s).
Text – high value The Art and Science of Operative Dentistry
Lecture – high value
Web – medium value (From PBL)

MICH: No responses noted

OSU: No responses noted

PITT: No responses noted

SUNY: No responses noted

WVU: Journal of Evidence Based Dentistry, web abstracts, web sites such as DIS (USAF), ADA and AGD.

UWO: Most of the faculty use Medline or the Cochrane Group sites when looking for “evidence-based” material. So far, I personally, have not found a whole lot of what I would call “evidence-based” dentistry in either the literature or on websites

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)? How are the changes incorporated into the curriculum?

CWRU: The dept chair, with consultation with the faculty, course directors and leading experts, generally makes the final decision which dental materials will be used in the clinics. All material used in the clinics is also taught in the pre-clinics. The course directors are asked to explain their rationale for inclusion of new instruments, and encouraged to eliminate those not usually employed in the clinic. A similar approach is used to decide which techniques will be taught. Because our students purchase their own instruments, changes in instruments, burs, etc. is less complicated for us, than for those institutions which lease/ supply students with instruments.

UDM: The department evaluates new materials and treatment options to determine whether they should be adopted. For materials, the School of Dentistry also has a multidisciplinary Formulary Committee, which makes final decisions after input from departments. Any changes in the curriculum must be approved by the school's Curriculum Committee. Significant changes in techniques or materials are first introduced to the DS1 and DS2 students in the simulation lab. The changes are then phased into the clinic as that class progresses to patient care.

ILL: No responses noted

IUPUI: Refer to previous question. Major changes (new courses, dropped courses, etc through the Curriculum committee, departments represented).

MICH: No responses noted

OSU: There is a structure that is 'usually' followed for materials change in the clinics. The section of Restorative and Prosthetic Dentistry is responsible for teaching pre-clinically (D1-D2). The section of Primary Care is responsible for clinical teaching (D3-D4). There is some overlap; D1 students start in the clinic the first quarter and D3 students still have pre-clinic courses. However, the pre-clinic essentially starts the process with the choice of what is used in the course. Policy is that 'what is taught pre-clinically will be used clinically.' This is followed with materials and equipment (burs, etc.). There is generally discussion amongst the two sections when change is desired. Faculty generally go first to their section chair with requests for change. Many times, samples of proposed changed materials are placed into the faculty practice for faculty to form opinions. There is also a college-wide committee responsible for the approval of materials used in the clinic. This was done to eliminate the use of materials brought in from trade shows or practices that were not in the normal arsenal of the student. This committee provides the final sounding board for what we use.

Inevitably, some materials may make their way into the clinic by other routes. There is a staff member who orders for the student issue and clinics. She will notice the new material (with a new order request) and alert faculty about the change.

- PITT:** New products are constantly being brought to our attention manufacturers' reps. bringing material to the SDM. Traditionally, sample material was given to key faculty members (Course directors/Department Chairs) for their evaluation and recommendation. Due to the overwhelming amount of material presented and the fact that faculty could barely get through the day without interruption, new protocols were developed. Currently, a Committee on Materials and Instrumentation coordinates how and when manufacturers can contact the SDM for product demonstration The products are still given to appropriate faculty for testing/trial, including utilizing part time practitioners who can use materials in a private practice setting. Materials are also given to our Instrument Management center, for testing. (multiple autoclaving, etc...) Feedback from the aforementioned sources is coupled with any and all available research for a given material. Change to the curriculum is slow, as research on new products is limited and manufacturer sponsored
- SUNY:** Very haphazardly, often with little or no input from the full time clinical and pre-clinical faculty. Back when Operative Dentistry was its own discipline here at the SDM, we looked for good science behind a new material, and it was then given to the full timers to try in their private practice. If their feedback was positive, we would then weigh the pros/cons of introducing the new material. Currently, that no longer occurs.
- WVU:** Instrument and material committee. Review clinical and lab research data, review CRA and other independent lab reviews.
- UWO:** We tend to teach and use what provides acceptable clinical results. In other words we are not on the "leading edge" when it comes to changes. We inform students of the other options they may be faced with but encourage them to be fooled into changing proven methods for new ones until they are absolutely sure there is going to be an improvement long term.
Any change in teaching methods or course content has to be approved by Curriculum Review Committee. Addition, deletion, or changes to clinical dental materials has to be agreed upon by the Clinical Chairs Committee. If I wish to change the brand of composite resin I have to consult with other users of that product to make sure there is agreement.
A very difficult area is that of composite resin. There has been so much change/repackaging of resins that I am afraid dentists and their patients have become the testing ground for many new products. Gone are the days you could see 3-5 year follow-up clinical results before you decided on a material. Even poor materials can be successful for 6 – 12 months!

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

- CWRU:** The dept chair, with consultation with the faculty, course directors and leading experts, generally makes the final decision which dental materials will be used in the clinics. All material used in the clinics is also taught in the pre-clinics. The course directors are asked to explain their rationale for inclusion of new instruments, and encouraged to eliminate those not usually employed in the clinic. A similar approach is used to decide which techniques will be taught. Because our students purchase their own instruments, changes in instruments, burs, etc. is less complicated for us, than for those institutions which lease/ supply students with instruments.
- UDM:** Mostly, what is fundamentally sound and supported is what is taught. However, new ideas/techniques are presented to students through their reading of assigned current literature and through elective courses or Lunch-N-Learns.
- ILL:** No responses noted.
- IUPUI:** Most that is taught (above 80%) is well-founded in the literature. A team Operative Dental Materials Faculty (Informal).
- MICH:** No responses noted
- OSU:** We generally change foundation courses slowly. We have just revised the first-year operative sequence to provide more practice with resin materials, especially in the posterior. Other techniques are taught in electives, usually. Most of those provide some of the later techniques to students in the senior year. Also, our system of clinics has more part-time faculty teaching the D4 students. This provides them with more insights regarding what happens in private practice. The D3 students have a core of faculty who have taught them pre-clinically. This was done to continue the standards of preparation and restoration as previously taught and apply them to the variety of preparations in 'live' patients.
- PITT:** We have tried to maintain teaching fundamentally sound procedures, trying to insure our students have a grasp of the basics. New methods are introduced at different times during elective classes, etc...allowing students a 'taste' of 'what's out there' We will explain and demonstrate new procedures, but we try to stress that some of these procedures, although ADA approved, have not had the long-term evaluations or research of the more established techniques.
- SUNY:** This remains a constant struggle for us. We continue to have a large disconnect between what is taught in pre-clinic and what occurs on our clinic floors. We remind students that they're not here long enough to see their clinical failures return. We supervise the failures!
We would like to teach what is sound and supported to the second and third year students, and then let the fourth years branch out some (especially the second

semester fourth year students. In reality, however, even first semester third year students are using the newest and latest materials. In short, we do not maintain a balance!

WVU: Our seniors are exposed to the newest and latest through a restorative seminar that presents these materials and techniques. We then compare and contrast with existing materials and technology. We also invite and include various clinician's experience.

UWO: We really don't have a balance – it is totally on the side of what fundamentally sound. In lectures I discuss the “new” product and techniques that are available with students. Again it is emphasized that the faculty are teaching what will have the best chance of producing good results. Students are told that there are often several ways to obtain desired results but they should not be fooled into using unproven materials and techniques. It is also emphasized that we only have enough time to cover one or two ways of doing clinical procedures. Others will have to be learned through reputable CE courses after graduation.

**II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rational/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

CWRU: **NO.** The question was raised: “Should it be taught?” – there was disagreement among the faculty about the need to teach the technique. Some felt that instruction on complex amalgam restorations should suffice – that teaching concepts would cover the issue. Others wanted to define which cusps: supporting vs guiding. Others felt that if we replace cusps in clinic – it should be taught in pre-clinic. The pre-clinical faculty is divided over whether it should be taught or not, but with a policy of placing more emphasis on concepts that it will not be taught as a separate technique.

Is cuspal replacement with composite taught in the clinics? YES and NO. There has not been a formal policy on cuspal replacement, hence decisions to replace cusps with composite material is at the discretion of the preceptor. During the most recent departmental meeting, no one disagreed with using composites as build-up or interim restorations, the controversy was whether we should teach it / provide to patients it as a definitive restoration. Also some felt it was acceptable for replacement of non-supporting cusps.

A future goal of the dept is to have a system (in-house) that would be able to provide indirect composites at a reasonable cost to patients, so we would not have to rely on direct composites for complex restorations.

- UDM:** No. Not taught in the preclinic. Composite cores are occasionally placed in the clinic in situations when it necessary to prepare the tooth for a crown during the same visit as core placement given certain parameters regarding size and ability to adequately isolate the tooth.
- ILL:** No responses noted
- IUPUI:** Cuspal replacement with composite would not be ideal. It might be done if patient could not afford gold, resin-bonded ceramic, or crown and did not want to use amalgam.
- MICH:** No responses noted
- OSU:** No. We continue to use amalgam for cuspal replacement. This is what is taught pre-clinically. Clinically, when this arises, the teeth are later covered with full-coverage restorations. Esthetic, non-functional cusp replacement on otherwise healthy teeth is an exception, where the clinical faculty may choose to replace with composite resin. However, resins are not used as core materials in our clinics.
- PITT:** The University of Pittsburgh SDM uses Sturdevant's Art and Science of Operative Dentistry (fourth edition) as its teaching text. It is usually the reference of choice for our clinical recommendations.
Cuspal replacement with direct composite resin is not taught in pre-clinic, that is, a pre-clinic project is not done. Cuspal replacement is only recommended if the restoration will serve as a core build-up or if the patient's financial situation leaves no other option. Typically it is recommended both pre-clinically and clinically that if a cusp needs replaced, either an onlay or full coverage crown is the treatment of choice. If an indirect restoration is not practical, amalgam is recommended. Compromises are made for esthetic situations, or financial limitations. There is an open debate between instructors as to the viability of onlays vs. full crowns. There is evidence of successful restorations with either treatment choice and it is left up to the individual instructor, student, and patient to decide.
- SUNY:** We do not teach cuspal replacement with composite in preclinic. Because of the difficulty in handling composite and wear characteristics of composite. Occasionally we will replace a cusp where esthetics is a concern and patient cannot afford a crown.
- WVU:** We teach only indirects for improved strength. Cuspal replacements with resin composite are done only as cores. The circumstances that provide guidance in our choices are:
1. Esthetics primary reason for material selection
 2. All margins on enamel
 3. Composite not in hard, centric occlusion
 4. Small in size
 5. Anterior to oblique ridge in 1st molar

UWO: There is no teaching of cuspal replacement with composite resin in the preclinical. We stress the use of composite resin in small to medium preparations where esthetics is important. We still teach amalgam. We stress that the most suitable material should be the first consideration in selecting restorative materials. Yes, sometimes we replace cusps with composite resin in our clinics when esthetic considerations far outweigh functional ones.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

CWRU: Presently students re-prepare a portion, etch and place an adhesive prior to adding the new composite material.

UDM: In general, open proximal contacts in newly placed resin composites are not repaired, instead the restoration is replaced. However, in cases of large restorations, a repair of the contact may be attempted by creating a mechanical undercut in the finished composite surface, followed by adhesive and composite placement.

ILL: No responses noted

IUPUI: Remove part of the resin and re-wedge and establish contact. This is based on anecdotal experience.

MICH: No responses noted

OSU: We still do not place many posterior resins clinically. We don't have an official policy; it depends on the instructor involved. There is likely to be a repair in a newly placed restoration, rather than a complete replacement.

PITT: Open proximal contact in new restorations (same appointment) A composite resin is recommended-mini prep, appropriate adhesive protocol, add new material, etc...

SUNY: We may have the student replace the entire composite as a learning experience, depending upon the time already involved and the patient circumstance. Although not taught, we may have the student cut a new proximal box into the deficient contact. We are not aware of any evidence for this method.

WVU: We teach Palodent matrix, etch, adhesive, then composite. Our procedure is to best determine the presence of contact before one begins the finishing procedure so as to avoid contamination.

UWO: We have students re-wedge, remove enough composite resin in the contact area to allow the placement of a matrix band and use of a "contact instrument" (Trimax Instrument). This involves essentially removing the proximal box area far enough below the contact area to allow for the establishment of a smooth well contoured final result. The evidence is that it works!

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

- CWRU:** Presently students re-prepare a portion, etch and place an adhesive prior to adding the new composite material.
- UDM:** Open proximal contacts on old resin composite restorations are corrected by replacing the restoration.
- ILL:** No responses noted
- IUPUI:** Remove part of the resin and re-wedge and establish contact if the remainder of composite is sound. If not, replace with new resin or amalgam. Our evidence is anecdotal experience.
- MICH:** No responses noted
- OSU:** Generally, problems with old restorations are reasons for replacement in our clinics. This is true when the restorations were not initially placed by our students and faculty.
- PITT:** Open proximal contact in older restorations (previous appointments): it depends on the age of the restoration, but generally a repair is recommended - always inspecting the remaining material, margins, radiographs, etc... If questionable, replacement is recommended.
- SUNY:** We do not repair old composites, especially if they were not placed in our clinics.
- WVU:** We usually replace.
- UWO:** With old resin composites we would generally remove all the old resin. Sometimes when repairs can be made totally within the existing resin (without exposing dentin) a small preparation within the restoration is done and fresh resin composite added.

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

- CWRU:** Interesting. Bevels on the facial and lingual are taught in the pre-clinic esthetics course, but not routinely used in the clinic. The rationale for not using bevels in the clinic is primarily conservation of natural tooth structure in a patient with minimum decay and few restorations. However, if better esthetics would be achieved with bevels, especially if the prep already extended into a clean area, then – bevels might be incorporated into preparation.

- UDM:** Bevels are not routinely placed on posterior resin composite preparations. There is a fair amount of evidence, both pro and con regarding bevel placement for resin composites, in general. However, it is generally agreed that bevels should be avoided in areas of occlusal loading. Access is difficult or placement of proximal bevels, particularly when the preparation is conservative. In considering conservation of tooth tissue vs placement of a bevel, conservation is given higher importance at the proximal margins.
- ILL:** No responses noted
- IUPUI:** Yes, only in interproximal box areas and gingival margins that are still enamel. This is based on anecdotal extrapolation of previous research.
- MICH:** No responses noted
- OSU:** Bevels may be placed in proximally accessible areas, but are not placed occlusally on posterior resin restorations.
- PITT:** Bevels: Routinely not recommended in normal size (small) posterior preparations. As preparation gets larger (wider occlusal isthmus and proximal box), typically bevels are recommended. Enamel rod configuration seems indicate that beveling here will lead to a better marginal seal/ less microleakage. Although this will increase surface area and wear rate.
- SUNY:** We do not teach bevels in any area of a posterior composite preparation. We use a microfil composite for posterior teeth, and microfills show wear at margins, so we do not bevel occlusal margins. Because of contour concerns and the difficulty in getting resin to a beveled margin that has matrix on it, we do not teach interproximal bevels.
- WVU:** Yes. Placed proximal box margins. Many early studies show better marginal integrity with bevels.
- UWO:** We bevel all enamel margins that are not subjected to occlusal forces. bevel on occlusal of Class II resin composites. Clinical studies done here at the University of Western Ontario in the past show a breakdown of both beveled occlusal and non-beveled margins; however, the beveled margins broke down sooner and to a greater extent. Bevels placed in other locations seem to last for many more years.

**In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?
What is the evidence for this?**

- CWRU:** Many of the instructors had mixed feelings about this. Although in general they felt that the contact should be broken, and that was usually the case, they did suggest that on occasion they would not break contact for the following reasons: conservation of natural tooth structure in a patient with minimum decay and few restorations, esthetics, and rotated teeth.
- UDM:** While we do not have a readily available citation for this, we do not feel that an entire facial or lingual wall of any proximal box should be left in contact with the adjacent tooth.
- ILL:** No responses noted
- IUPUI:** Class III and Class II composites, based on anecdotal experience.
- MICH:** No responses noted
- OSU:** Though taught to eliminate proximal contact in Class II designs, esthetics and the attending instructor are able to change that. Esthetics, accessibility for evaluation, caries rate and remaining tooth structure (especially in rotated teeth) are reasons for leaving the contact.
- PITT:** The Proximal box is left in contact is esthetics is a concern. Currently, for composite preparations, students are taught to remove the defect, and ~1mm surrounding, preserving as much as possible. In the pre-clinic, we follow Sturdevant's 'beveled conventional' (anterior) and 'conventional' (posterior) preparation recommendations. We utilize a Columbia typodont with ideal (non-carious) teeth.
- SUNY:** Depending on the age of the patient, his/her caries prevalence, and the amount of tooth that needs to be removed to open the contact, we may leave a preparation in proximal contact. This is, however, the exception to the rule. Our evidence is based on a US Army study showing that after 26 years of age new caries does not appear to be a problem.
- WVU:** Yes, if the box would be too wide of too far or if esthetics may be a problem.
- UWO:** Generally we only do this in patients with good oral hygiene where there is need to do so for esthetic reasons (MB of max. 1st. bicuspid). This obviously makes it harder to ensure a smooth margin but with patient compliance it seems to work well. Outside of clinical observation that this seems to be an acceptable treatment we have no outside sources to quote for evidence this. Contacts are only left if the patient's oral hygiene is very good. With poor oral hygiene the contacts are always removed and restored in resin enough facial/lingual clearance for easier cleaning.

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

- CWRU:** The policy is to replace restorations that we have not placed, and those that were placed more than within the previous 6-12 months. The latter though is dependent upon patient hygiene, as well as the condition of the restoration. If it appears to the instructor that the restoration was inadequate to begin with – the school will replace it. The exceptions are usually in the geriatric clinic.
A recent JADA article reported the results of North American Schools (*Gordon et al. JADA 2003*) regarding repair. They noted that 71% of the responding schools were teaching repair of restorations. Most schools' rationale was preservation of tooth structure & reduction of harmful effects on pulp. They considered it a definitive measure/treatment. Expected longevity of ~ 4 years. Smales et al did a retrospective study of repaired versus replaced amalgam (*Operative Dent. 2004*) in Australia, 3 cities, private practice, retrospective (abstract). At 5 yr – No significant difference between the two (in line w/ dental school survey), but at the 10 year mark, the repaired had a higher failure rate.
- UDM:** Repair of large amalgam or composite restorations with a localized defect that are otherwise sound can be supported when the area of defect is readily accessible and when the repair will not compromise the integrity of the final restoration. The primary rationale for repair is minimizing trauma to the tooth by avoiding a total replacement of the restoration.
- ILL:** No responses noted
- IUPUI:** Our evidence is based on anecdotal experience.
- MICH:** No responses noted
- OSU:** Minimal marginal breakdown and faculty judgement are the rationale for repair. Students, when repairing are generally told to evaluate the damage after removing the surface defect and determine if there is need for replacement.
- PITT:** Repair vs. Replacement: factors
- Material type
 - Age of restoration
 - Symptoms/ evidence of decay
 - Patient's desires/financial situation
 - Size/condition of existing
 - Clinical experience of the instructor
- SUNY:** We are not sure of the evidence, but we do repair large amalgam restorations if they were placed in our clinics, if we are certain that the rest of the existing restoration is acceptable, and that the repair will not jeopardize the restoration. We do not repair composite restorations.
- WVU:** Controllable margin discrepancy. Clinical detection or radiographic evidence for a void or open margin.

UWO: With amalgam restorations, especially large ones, we tend to repair them if there are a number of good features already present (good contacts/proximal contour, etc.). Removing all the old restoration results in some removal of remaining tooth structure further compromising the integrity of the tooth. In other words we save what is good and replace what isn't.
With composite resin restorations we generally replace the restoration if it is defective. We will repair if the composite repair can be within the existing restoration using undercuts for retention. When the whole restoration is removed it is often difficult to determine the extent of the composite resin. In these cases we leave the deeper layer as long as there is no evidence of leakage. This remaining composite resin is treated as liner/base.

**Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?
If so, describe and comment.**

CWRU: We are teaching the use of composite as a core build-up. We have virtually eliminated cast post-cores, except for a few in the anterior. Instructors are to make sure there is sufficient ferrule / tooth structure to support the crown and posts are of sufficient length into the core material. No GI build-ups. We are even considering a parallel/tapered posts because the size of the posts is related to file size. This might minimize lateral perforations in the portion of the root

UDM: Our policy calls for cast post and cores for anterior teeth due to a relatively high failure rate of prefabricated posts with composite cores.

ILL: No responses noted

IUPUI: Yes. When there is not enough MECHANICAL retention to hold the core it often comes out with the provisional when it is removed.

MICH: No responses noted

OSU: We have had some problems in the past with pre-fabricated posts and use cast post and cores where remaining tooth structure is minimal, rather than rely on bonded resin for casting support. Remaining tooth structure determines what we tell the patient with respect to prognosis.

PITT: We have not noticed an increased failure rate with composite cores for anterior teeth. The majority of core build-ups (with or without posts) are composite resin. Core-Paste or light cured composite resin (EsthetX). Very little cast post and cores being done clinically.

SUNY: We place cast posts in al single rooted teeth.

WVU: Generally if one is short on the ferrule effect (less than 1.5 mm margin beyond resin core).

UWO: We do not use composite resin for a post and core material unless it supported by a pre-fabricated post system, or there is sufficient remaining tooth structure to provide the necessary strength. We have found typical posts and cores made of composite resin will fracture at the core interface.

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

CWRU: Difficult to say, few studies. One in vitro study on the long-term monitoring microleakage of cavity varnish and adhesive resin with amalgam (*Sepetcioglu F& Ataman BA JPD 1998*) found after 6 months that Panavia EX (w/amalgam) had significant less microleakage compared to copal varnish.

UDM: ???

ILL: No responses noted

IUPUI: The longevity of bonding agents for resin composites and amalgams is unknown (The reason we require mechanical retention). I don't believe that the expected longevity of a bond in vivo has ever been established.

MICH: No responses noted

OSU: We tell our patients that the composites will last 3-5 years and amalgam 7-10 years, on average. We do not use resin bonding for amalgams.

PITT: Longevity/durability of dental bonding will vary depending on substrate (dentin vs enamel). Also will vary depending on bonding system (total vs self etch). What is known is that the bonds do not last as long as earlier predicted, and the question of restoration longevity arises.

SUNY: We do not have any long-term data from our clinics, but we do replace composites more frequently than we do replace amalgams, although we do not place bonded amalgams. The Osborne/Summit study appears to give credibility to bonded amalgam restorations.

WVU: DB generation. Hydrolysis of blood.

UWO: Don't know, but some research indicates bond between amalgam and bond resin is short (6-12 months) - probably due to differences in thermal expansion-contraction.

**III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?**

- CWRU:** We are teaching it in pre-clinical courses. However, it is used less often in the clinics than it had been previously. This is in part due to patient demands. We have one faculty administrator in charge of all aspects of infection control. He has set up the school's management protocol to follow the ADA (see ADA web site)
- UDM:** No responses noted
- ILL:** No responses noted
- IUPUI:** Still one of the best materials to use in terms of cost, longevity, and characteristics. The Best Management Practices (BMP) for amalgam waste at our school are:
1. Various size amalgam capsules to minimize waste.
 2. In labs, collect waste in trays and then dispose in labeled ADA amalgam containers.
 3. Unsure about what is done with scrap collected in traps
- MICH:** No responses noted
- OSU:** We continue to teach amalgam as a major restorative material for Class I and II restorations. Amalgam waste is collected in commercially available sealed containers (with sulfur). These are collected by our maintenance personnel periodically and transported to the University's waste management group for appropriate disposal.
- PITT:** Amalgam is still the preferred material for direct posterior restorations. All non-contact scrap amalgam is collected and recycled through a vendor provided by the Environmental Health and Safety Dept. All units have solids collectors. These collector screens are also discarded through this vendor. Our vacuum system also has a collection tank. Waste from this tank is processed as chemical waste. Its handling is supervised by EHS.
- SUNY:** We feel that dental amalgam still has a place in a modern dental practice. I just lectured to the third year students two days ago on dental amalgam. I share with them in lecture the required textbook's (Roberson) position on dental amalgam - *"Even with the concern about the disposal of mercury, this textbook advocates the continued use of amalgam as a direct restorative material. Research has demonstrated both the safety of the material and the success of restorations made from amalgam. While the scope of the clinical uses of amalgam presented in this textbook will be narrower than in the past, amalgam still is recognized as an excellent material for restoring many defects in teeth."*
- It is taught in the pre-clinic during a six week summer session in which new second year students prepare and restore seven permanent teeth. One deciduous molar is prepared, but not restored. A practical exam is given at the end of the six weeks in which they prepare and restore a Class II. A Thanksgiving practical is given which can be either a composite or an amalgam, and then finally, in late January (just prior to going to clinic), another amalgam practical examination is given. It is still placed regularly on the clinic floor, although less frequently than in years past.

We recycle our amalgam waste. On the clinic floors students place amalgam waste in plastic containers (not stored under water or fixer). When full, the contents of these containers are emptied into a five gallon jug located in the basement. Two to three times a year a company comes to pick up and recycle approximately ten of the five gallon jugs of amalgam waste. In the pre-clinic, students place their amalgam waste in empty alginate containers located at the front of the lab. When full these containers are emptied into the five gallon jugs mentioned above

WVU: We collect and recycle dry scrap in closed containers at each unit. We collect, store, and recycle amalgam caps (closed) in screw cap jars. We recycle wet scrap (HVAC traps) monthly.

UWO: At the University of Western Ontario we teach amalgam procedures. The first year operative dentistry curriculum deals exclusively with amalgam. In the main adult treatment clinic approximately 70% of single tooth posterior restorations done in operative dentistry are done using amalgam. It is the material of choice. Posterior composite are restricted to smaller Class II and Class V situations. If good isolation is not possible composite resin is not used.
By contrast, the children's clinic does not place any amalgam in deciduous teeth. It is an "amalgam/mercury-free" environment. Our paedodontic faculty have decided compomer resins are the material of choice in deciduous teeth.
We collect all amalgam scraps and store them in containers supplied by the university. They collect, exchange the containers and dispose of their contents according to government regulations covering disposal of toxic waste.

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

CWRU: There was much excitement about introducing caries risk assessment after Dr. Featherstone's lectures at Case last spring, implementation of caries risk assessment is scheduled for 2006.

UDM: We have developed a comprehensive caries risk assessment and management protocol at UDM. This was a multidisciplinary project, with several departments participating in its development and implementation. We are in our third year for this protocol. The protocol, principles, and concepts are introduced during the first semester of the first year of dental school and continue through all four years.

ILL: No responses noted

IUPUI: All patients go through a formal caries risk assessment at the initial exam visit. Two forms are filled out. Form A establishes that a patient falls into a low risk category based upon collected data and no "special" caries prevention is warranted. High risk patients are determined by Form B and further diagnostic tests and treatment options are discussed with our prevention faculty.

- MICH:** No responses noted
- OSU:** We continue to teach as we did in 2000. A revision to the first-year operative curriculum incorporates more discussion of the time for intervention and also of prevention and medical intervention measures.
- PITT:** All students are enrolled in a cariology didactic course. They are also enrolled in an Oral Diagnosis course that addresses risk factors for oral disease including caries. Included in each clinical patient's record is a summary of oral health history and risk factors for oral disease.
- SUNY:** We do not have a formal caries risk assessment in our pre-clinical and clinical curriculum. We do teach occlusal sealants in both.
- WVU:** Taught preclinically in microbiology and preventive courses. Performed (questionnaire) on all patients, salivary analysis on selected patients.
- UWO:** At present we do not incorporate caries risk assessment into our curriculum. We are just starting a complete curriculum review. Part of the review will deal with both revision of what we teach, how we teach it, and what should be changed or added to the curriculum. Caries risk assessment will be part of this review.

**V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?
Have your calibration efforts improved inter-rater agreement between faculty?
What outcome measures have you used to track the efficacy of your calibration?
Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.**

- CWRU:** In the preclinics, the course directors use one of two methods of grading. Some have each instructor grade all criteria of a competency examination for their respective group. Others have each faculty member evaluate several criteria for the entire class. Students generally prefer the latter method, although it is not necessarily more valid, it does seem more fair. In the clinics, over the last few years there have been several modifications in the evaluation system. One year, one instructor evaluated all the typodont and most of the patient competency examinations, another year, a handful of faculty were calibrated to be primarily responsible for the aforementioned examinations. Today, there is no formal calibration of clinical faculty. However, the faculty's rotations through pre-clinical courses and the departmental bi-monthly meetings are an attempt to improve the consistency of the evaluations.
- UDM:** Practical exams: Course directors conduct calibration sessions immediately before grading begins. In most cases all bench instructors participate, each evaluating 2-3 criteria for the entire class.
Daily clinical work: Faculty in-service sessions are conducted at least once per year. Outliers are identified and the chairperson will personally talk with them to clarify points in question.

Competency Exams: The chairperson conducts calibration sessions immediately before the exam begins for mock NERB exam, which doubles as senior competency. For DS3 competencies, all exams are evaluated by two faculty, who have attended in-service standardization sessions. Every attempt is made to pair more experienced faculty with newer faculty. Unfortunately, we have not formally measured our efforts at standardization. However, anecdotally, we saw an increase in agreement during the first year of our standardization program.

ILL: No response noted

IUPUI: Faculty calibration is a fundamental issue that faculties continually struggle with. Calibration - Practical exams have been graded by the same 3 instructors for approximately 5 years. We do compare grades from year to year. Clinical calibration is a real problem. There has been a lot of talk, but no action. We utilize average practical exams and laboratory grades from year to year.

MICH: No responses noted

OSU: The creation of clear criteria for the students for each preparation has helped with faculty calibration. However, in any given course, it is a problem, still. Each course director has a different way of balancing the different faculty views. The section of Primary care has in-service training yearly on issues that frequently involve calibration. Our grading forms have evolved to eliminate very specific procedural step grading and incorporate overall (more subjective) grading of student performance with areas to list the amount of independence and quality of judgment shown by the student. We don't formally evaluate inter-rater agreement. However, for my D1 course, I list all grades duplicated by faculty evaluation and determine which evaluations differ by 1 or more points (on a 4-point scale with ½-point increments). There has been surprising consistency amongst the evaluators. However, this is after assigning faculty to groups that emphasize their evaluation strengths. Also, most faculty have been in the course for a number of years. One final method of calibrating faculty that is used, somewhat informally, is to rotate new faculty through the laboratory course. This teaches the faculty how we want the students to perform the procedures and grading in the course provides a reasonable start at calibration. Course and clinic directors are requested for grading competency exams frequently.

PITT: Regarding clinical competency exams, calibration meetings were held for all clinical restorative faculty. As the same criteria is used for daily grading, it was hoped that this calibration would carry over to the patient care clinic. To date no outcomes have been assessed.

SUNY: There is virtually no calibration on the clinic floor. Students often take their CPE (Clinical Productivity Exam) with a single faculty member. In pre-clinic, we have a faculty development day once a year to help calibrate faculty. The operative pre-clinic faculty has been together for many years. We feel this has helped us to calibrate.

WVU: Full time faculty teach in both preclinical and clinic and grading criteria (Ryge - Snyder) are similar in both. Difficult to calibrate part timers but we attempt by pairing a full time faculty member with a part time one to evaluate performance assessments. No real technology based calibrations. Grades given on performance assessments. Student receives daily feedback and a descriptive overall report 2 x semester.

UWO: The calibration of faculty has not been one of our strong points. In the preclinical labs this has been done by grading projects as a group. Instant feedback can be obtained from the course director regarding appropriate grades. This has worked reasonably well.

In the patient treatment clinics formal calibration has not been done. This is largely due to the fact that finances to hold “calibration retreats” has not been available. With our present curriculum review and the dedication of the dean of medicine and dentistry we will, hopefully, receive funds for such activities. Fortunately, 95% of our part-time instructors are graduates of our school and are familiar with what we teach and how we grade student’s work and need very little calibration.

Due to the lack of faculty calibration competency is determined, not by formal clinical exams, but by full-time faculty evaluating the overall clinical performance of the student. One of our main problems with part-time faculty providing proper grading is some believe students just starting their patient treatment in year D3 should be marked easier than those in year D4. My policy is there is only one standard - that of competency.

2005 REGIONAL CODE AGENDA

REGION IV RESPONSES

(To be established by the respective Region and Regional Director)

Region I School Abbreviations

CWRU	Case Western Reserve University	OSU	Ohio State University
UDM	University of Detroit Mercy	PITT	University of Pittsburgh
ILL	University of Illinois - Chicago	SUNY	State University of NY - Buffalo
IUPUI	Indiana University	WVU	West Virginia University
MICH	University of Michigan	UWO	University of Western Ontario

1. What clinical evaluation/ scoring method does your dept use in evaluating patient treatment results?

CWRU: There is no assessment of overall treatment at the completion of the entire Treatment of the patient (prior to placing the pts on recall). There is no daily grading per se, although every treatment must be approved and evaluated (with a signature) by an instructor. The preceptors also evaluate each of their students' progress quarterly, including a qualitative description as well as an overall letter grade.

UDM: No response

ILL: No response

IUPUI: 40 point scale used – most students receive 40 or very near 40.

MICH: No response

OSU: We have a single procedure grade of 0, 2, 3 or 4 for daily work by the student. This is in addition to grades of infection control, preparedness and professionalism. The 0-4 grade is subjective and any 0 grade requires a comment. Patient treatment is evaluated at the end of Phase II (disease control) and also at the end of treatment. There is no grade for this evaluation – it is done as an outcome measure to determine completeness of the record and to determine whether there are further treatment needs and patient satisfaction.

PITT: At present we have no scoring method used in evaluating patient treatment results. We have quality assurance forms used whenever treatment is required to be re-done or complications arise (post perforation, wrong tooth treated, poor aesthetics, etc.) Each patient receives an exit exam and prophylaxis to evaluate treatment also.

SUNY: No response

WVU: We have each assigned instructor fill out a card on each student's daily procedure and evaluate them against five standards: Unacceptable; Below Expectations; Meets Expectations; Above Expectations; and Outstanding. We apply these "glance and grade" criteria to five areas: Diagnosis and Clinical Judgment; Technical Skill-Tooth Preparation; Technical Skill-Restoration; Patient management; and Attitude and Professionalism. We also write comments on their performance and key this to the ADA code. For Performance Assessments, we use two instructors to evaluate the procedures against published Ryge-Snyder standards. Each student SHOULD complete 7 Performance assessments prior to completing Operative Clinical.

UWO: We evaluate all the technical steps done by the student – rubber dam application, tooth prep, liner/base, matrix band, final restoration, etc. Each is given a numerical score (1= poor, uncorrectable mistake; 2=poor but correctable; 3=acceptable; 4=very good/excellent). Students are also given similar scores for patient management, time management and infection control. In the Division of Restorative Dentistry we have recently considered changes to our scoring and a revision of the daily Clinic Scoring Card used by instructors. We looked at scoring the overall results in a number of areas of performance (as some schools do); however, most of our restorative dentistry instructors wanted to continue to evaluate each of the technical steps done by students.

2. Do you rely equally on grades given by part-time faculty and full-time faculty?

CWRU: Case has a fairly unique system in which most of the clinical preceptors are in a clinical practice and have a half-time+ (51%) appointment, in which they receive full benefits. Therefore, there are very few true part-time faculty. These preceptors are primarily responsible for overseeing most of the comprehensive care provided to patients. (Students treat the more complicated endo, ortho and perio conditions in the specialty clinics). There are part-time faculty who volunteer in pre-clinical courses. In general, their evaluations are equal to that provided by half-time and full-time faculty. course, the ultimate decision is that of the course director.

UDM: No response

ILL: No response

IUPUI: Equal weight given to full or part-time instructors

MICH: No response noted

OSU: Yes, part-time and full-time faculty grades are all treated equally. Clinic directors are the persons responsible for giving clinic quarter/year grades to the student and they use all faculty who have worked with the students as input in the process. Comments placed on grade sheets are also important (whether from full or part-time faculty).

- PITT:** For daily grading, full-time and part-time faculty grades are weighted equally. For practical exams, only full-time faculty and one or two specially calibrated part-timers may grade.
- SUNY:** No responses noted
- UWO:** We find the part-time instructors tend to be easy graders. Some are very reliable and others don't seem to want to give failing grades. As a result full-time faculty will ultimately be the ones to decide if a student is competent.
- WVU:** We use input from part and full-time faculty equally.

3. Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations? (*Reference: ADA news, July 11, 2005; Vol 36, No.13*)

Yes, all schools indicated an interest in knowing more about National Examinations.

Suggestions for CODE.

What can the organization do to improve its effectiveness?

1. Be proactive on increasing competency criteria and an effective measurement method. (WVU)
2. Be more vocal against the tendency to establish "mega" departments within Schools. All preferred smaller, more distinct divisions (i.e. operative dentistry no longer exists at some schools).
3. Promote CODE more with Deans of schools.
4. Spell out "Consortium of Operative Dentistry Educators' in correspondence rather than just using CODE. Many educators don't know what "CODE" stands for.
5. Take a more active role/some position, on teaching in the schools, especially in operative/restorative dentistry. Make our views known to Deans.
6. Put out an Executive Summary of CODE meeting reports – publish it in ADEA Journal for all to see.

What is suggested to improve the Web site?

<http://netserv.unmc.edu/code/codeFrame.html>

Some suggested it was difficult to find the CODE website. They suggested considering an easier to remember URL

Other comments?

No responses noted

CODE Region IV Attendees Form

NAME	UNIVER SITY	PHONE #	FAX #	E-MAIL ADDRESS
Bill Gray	UWO	(519) 661-2111 x86097	(519) 661-3416	william.gray@schulich.uwo.ca
Ilze Bekeny	CWRU	(216) 368-2846	(216) 368-3204	iab2@case.edu
T. Roma Jasinevicius	CWRU	(216) 368-2237	(216) 368-3204	trj2@case.edu
David Brown	SUNY	(716) 829-2862	(716) 829-2440	dhbrown@buffalo.edu
Ed Deschepper	IUPUI	(317) 274-5331	(317) 274-2419	edeschep@iupui.edu
Bob Joynt	SUNY	(716) 829-2862	(716) 829-2440	joint@buffalo.edu
Cornel H. Driessen	UWO	(519) 661-2111 x86101	(519) 661-3416	cornel.driessen@schulich.uwo.ca
Daniel Ratkus	PITT	(412) 648-7146	(412) 383-7796	dpr3@pitt.edu
Andrew Nigra	PITT	(412) 648-8655	(412) 383-7796	abn3@pitt.edu
Gary Wieczkowski	SUNY	(716) 829-2862	(716) 829-2440	gwhiz@buffalo.edu
Bob Rashid	OSU	(614) 292-3071	(612) 292-9422	rashid1@osu.edu
Ron House	WVU	(304) 293-1142	(304) 293-2859	rhouse@hsc.wvu.edu
Larry Abbott	UDM	(313) 494-6783	(313) 494-6781	abbottlj@udmercy.edu

CODE REGIONAL MEETING REPORT FORM

REGION: V - Northeast

LOCATION AND DATE OF MEETING:

Columbia University

October 20, 21, 2005

CHAIRPERSON:

Name: Dr. Richard Lichtenthal

Phone #: 212-305-9898

Address: Columbia University

Fax #: 212-305-8493

603 W 168th Street

E-mail: rml1@columbia.edu

New York, NY 10032

List of Attendees: Please complete the CODE Regional Attendees Form (enclosed at end of Agenda)

Suggested Agenda Items for Next Year:

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: Dr. Richard Lichtenthal

Phone #: 212-305-9898

Address: Columbia University

Fax #: 212-305-8493

603 W 168th Street

E-mail : rml1@columbia.edu

New York, NY 10032

Date: October 5 6, 2006

Please return all completed enclosures to Dr. Larry D. Haisch, National Director,
UNMC College of Dentistry;
40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

**2005 NATIONAL CODE AGENDA
REGION V
SUMMARY RESPONSES TO NATIONAL AGENDA**

- I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).**

Evidence based teaching is a part of the preclinical curriculum of most schools. Literature review, reference materials such as textbooks, journals, etc. are often cited in introductory classes. Web based materials are becoming increasingly popular. References are a part of the presentation and discussion process throughout. Schools not presently emphasizing evidence based clinical practice are planning to, or are in the process of, implementation.

**With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?
How are the changes incorporated into the curriculum?**

It appears that most schools operate in a similar manner. Faculty make recommendations, discussions at faculty meeting ensue, and the Chair decides based on the evidence, cost effectiveness and success. Changes are then incorporated into the curriculum via seminars, demonstrations and lectures.

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

Schools vary in approach from relegating “newest and latest” to lecture material only, to utilization with “honors” groups to active research involvement. The standard curriculum generally only contains sound, proven techniques and materials with a substantial history of evidence.

- II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rationale/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

Majority of schools do not teach cuspal replacement with direct composite in preclinic and rarely in clinic. Economics and patient desire play a role in clinical decisions. Indirect composite onlays are occasionally utilized. Amalgam or full coverage is the alternate treatment of choice.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

Where it is taught and utilized the technique is to place a slot preparation in the proximal area and restore with standard bonding technique. Generally this is utilized in larger restorations, with small restorations being replaced instead.

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

Otherwise intact old restorations are repaired in the same way as new restorations. Some schools do not repair anything – rather- remove and replace. Composite to renewed composite surface has been seen as a successful technique.

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

Bevels are not routinely placed on proximal cavosurface margins of posterior composites with the exception of enamel margins of Class V posterior composites.

In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?

What is the evidence for this?

In small, minimal proximal preparations it is permissible to leave the B and L proximal walls in contact with the adjacent tooth. The gingival margin must not be in contact.

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

Most schools base their replace or repair philosophy on the size and condition of the bulk of the restoration. Large restorations would be repaired where possible while smaller restorations might be replaced. Some schools teach only replacement. Not a significant body of evidence to support either philosophy

Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?

If so, describe and comment.

Most school do not use composite cores, rather amalgam and/or cast post and core. Some schools report seeing failure as a result of occlusion, preparation or inherent characteristics of the composite material.

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

No concrete answer. Provider, technique, substrate quality all play a role in longevity. These things vary too much to predict. Not much evidence in literature.

- III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?**

All schools continue to use amalgam for medium to extensive restorations. BMP varies little, according to local environmental regulations.

- IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?**

All schools incorporate caries risk assessment into the curriculum in preclinic and all do now, or will, incorporate it into clinical practice, with varying degrees of success.

- V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?
Have your calibration efforts improved inter-rater agreement between faculty?
What outcome measures have you used to track the efficacy of your calibration?
Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.**

All schools are involved in calibration of faculty in their ability to grade students fairly and equitably. Graders of preclinical exercises are easier to calibrate than faculty in clinical examinations. Success is greater when full time faculty are involved (regular, continuously working together). Evaluation, over time by Chair or program director, is the usual means of picking up discrepancies.

2005 NATIONAL CODE AGENDA

REGION V RESPONSES

(Evidence cited where applicable)

Region V School Abbreviations

BU	Boston University	MTRL	University of Montreal
CLMB	Columbia University	UMNJ	University of New Jersey
CONN	University of Connecticut	NYU	New York University
DAL	Dalhousie University	PENN	University of Pennsylvania
HARV	Harvard University	SUNY	State University of NY - Stony Brook
HOW	Howard University	TEMP	Temple University
LAV	University of Laval	TORO	University of Toronto
UMD	University of Maryland	TUFT	Tufts University
MCG	McGill University	USN	United States Naval Dental School

- I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?**
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).

BU: Evidence Based Dentistry is taught in preclinic and rarely mentioned in clinic. It is being introduced in a new treatment planning program. It is taught in small groups critiquing abstracts . The goal is to be able to analyze literature.
Successes: Students approve of the course.
Obstacle: very few people understand the concept.
Utilize : *c.a.s.p. @ oxford* and *J.A.M.A 'How to use an overview'*.

CLMB: Evidence based teaching principles permeate all of the preclinical courses in the curriculum. In Operative Dentistry, as in other courses it is a part of the presentation process. Textbooks and Journal articles are the basic source of teaching materials, technique and materials. These, research reports and manufacturers reports are all used as evidence. Basic concepts in evidence based teaching, learning and practice is discussed in Introduction to Dentistry and Informatics. Literature review and critique seminars, case presentations requiring evidence references and defense of treatment and material selections clinically.
Sources : Textbooks, Journals, Websites, research and faculty experience are all utilized.
Obstacles: Time, enthusiasm and apathy.

- CONN:** Evidence based teaching and practice is not specifically highlighted; it is part of the presentation process. Literature references are used to rationalize some methods, materials and equipment presented in lecture. Likewise data from literature and from manufacturers is used, in part, as justification for clinical methods, materials and equipment. There are also other factors such as patient desire and cost.
- DAL:** We attempt to use evidence based dentistry in all aspects of Operative Dentistry. Students are encouraged not to accept a theory without having thoroughly researched the topic. Student resources include textbooks as well as dental journals. Textbooks seem to be the most readily available source but are a weaker source of evidence based information. Literature searches are still the best resource but are not as frequently used. There is no course, per se, that addresses evidence based dentistry.
- HARV:** No responses noted
- HOW:** No formal program at the predoctoral level at present. However, the faculty is charged by the administration with implementing evidence based teaching into lecture and clinical format. Evidence based teaching is utilized in some courses in Operative Dentistry and in some instances in clinical practice. Methodology includes review of assigned "hallmark" articles, web site referral and text applications which supplement and support justifications for clinical choices. Establishing consistency in utilization by students and faculty has been one of the obstacles. The successes have been individualized with students saying that exposure to this type of information helps them to solidify treatment choices.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Students have formal course material in SAPL (Skills in Assessing Professional Literature). It is woven throughout the curriculum starting the first week in year 1 with library/text searching and it is covered, reviewed and assessed in every course.
- PENN:** Evidence based teaching is taught at the University of Pennsylvania in the form of literature searches and reviews in small group seminar format. This is first taught in the D1 first semester with the Basic Science Courses. There is not a formal literature search/review course in the restorative dentistry department. However, lecture material is based on literature reviews and these materials are given to the students for references. Also, articles are required for the students to review for some preclinical operative lectures in the D1 year. In the D3 and D4 year, in the format of group seminars, literature is reviewed as cases and treatment modalities are discussed.

- SUNY:** We are currently evaluating the formal inclusion of Evidence Based teaching principles into our curriculum. All of our clinical practices and materials have an evidence based foundation. The incorporation of evidence based evaluation of clinical practices is important. A significant objective in our curriculum is to train our students to “critically think” as clinicians.
- TEMP:** Faculty calibration exercises for all faculty in which faculty must receive an 80% score. If less they will get remediation from the appropriate course or clinic director. For competency examinations, identified faculty who teach pre-clinically are calibrated, have years of experience in the clinic are paired together. Students sign up for the exam only on the days that they are in clinic.
- TORO:** It is departmental policy that discipline teaching at all levels in the undergraduate program is to be based on best available evidence and/or science. Regular in service meetings allow for transmission of evidence based clinical practice concepts to teaching faculty. Senior students in the Comprehensive Care Program (CCP) patient based learning module are required to submit an evidence based project which is a component of their overall CCP grade.
- TUFT:** Evidence based teaching and clinical practice in restorative dentistry are introduced using lectures, texts, journals and websites. Junior dental students are given lectures on critical thinking to evaluate and appraise dental literature. The most common obstacles encountered are student apathy and faculty bias. These are listed sources:
Ovid: Medline Web Search - Excellent,
Pub Med: Websearch - Excellent,
Cochrane Collaboration Website - Excellent,
Journal of Evidence Dental Practice-Excellent.
- USN:** No responses noted

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?
How are the changes incorporated into the curriculum?

- BU:** Faculty offer the concepts to the administration and if it is justified it is made a part of the clinical protocol. (CEREC). The decision is the Dean's – Can we afford it?, and can we get a grant?
- CLMB:** Suggestions for change in technique and materials can come from anywhere: faculty, students, alumni and even patients. Arguments are made, evidence is presented, discussions at faculty meetings, course directors, with the Chair making the final decision based on evidence, experience, and cost. Changes in technique and material can be easily introduced into the clinical curriculum (protocols) via lectures, seminars and demonstrations. Introduction into the preclinic takes a little longer – syllabus changes, presentation/lecture/powerpoint/video changes. Usually mid year for the following year.

- CONN:** Mechanisms for incorporating change vary. The Chair of Operative may request changes in materials. Other Operative faculty can recommend a change which the Operative Chair may make a request for. The process of making a change in materials in the clinic has been very slow for the last few years; this seems to be related to too few support personnel who are over-burdened.
- DAL:** Changes are instituted at the division head level and are usually introduced with several factors in mind: cost, ease of student use shelf life, manufacturer support and evidence of clinical effectiveness. At Dalhousie we are fortunate to have published experts in the fields of material science and adhesion dentistry. These individuals act as professional consultants when new products are introduced to the school. We have very strong inter-professional interaction with, and opinions from, clinicians in the community, who are greatly valued in this process. Curriculum changes must go through a series of committees prior to integration into the program. The general path for new curriculum is from department head to division head to curriculum committee. Changes are incorporated from the most introductory courses through to advanced operative courses. In preclinical courses the new product use is discussed in order to familiarize the students with the new product or technology. Clinical dental assistants are thoroughly educated in new products and technology as to aid in the seamless incorporation into students clinical experience.
- HARV:** No responses noted
- HOW:** Faculty makes a referral to the Chair or the Chair is contacted directly to review the product/technology. This information is presented to the faculty. At faculty meetings the possibility of incorporation of this new system or product is discussed. The Chair ultimately decides based upon need and cost justification. New procedures and materials are introduced to students through lunch and learning sessions, seminars, lectures and clinical use on an individualized basis.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** The departments (as a whole) determine the materials utilized in the preclinical and clinical program relating to their discipline. This is done in concert with the Department of Biomaterials.. Introduction of new materials starts in the preclinical course. Students will receive new lectures, handouts or computer presentations on the materials being introduced. Faculty receive written, hands-on or lecture style updates on new materials and techniques.

- PENN:** A change in material preclinically is generally discussed among the department chairperson, individual course directors and the director of dental materials. Changes in the clinical materials are discussed among the department chairperson, director of dental materials and a committee of clinical group leaders, course directors and pertinent staff. Currently, there is a disconnect between preclinical and clinical materials. This is being addressed and corrected on the preclinical level to match materials offered in the clinic. Material changes are incorporated into the preclinical curriculum via lecture. For D3 and D4 student, changes are discussed in clinic group/seminar format.
- SUNY:** The Director of Operative Dentistry has the responsibility of deciding on the materials/products/technique/technology in operative dentistry. The Director of Operative Dentistry has the responsibility to establish appropriate changes to the operative curriculum. This occurs with input from the Chairman, Department of General Dentistry and the Course Directors involved at each year level course.
- TEMP:**
- Active participation of major dental companies in the lunch and learn seminars.
 - Attendance at scientific dental meetings
 - Dissemination of information from other faculty
 - Introduction from Materials and Instrument committee.
 - Literature Search and clinical questionnaire
 - Recommendation to Chairman
- TORO:** Definitions and methodology of evidence based dentistry are taught in our community dentistry undergraduate program. The hierarchy of evidence is utilized, with cognizance of the level of evidence:
Textbooks – respected, current, well referenced
Journals – acknowledged leaders in the discipline
Special Journals – e.g. Evidence Based Dentistry
Web based – Cochrane collaboration
Changes are introduced into the curriculum at the appropriate level in the program, but when they are applicable to all four years, the objective is for simultaneous introduction. Preclinical and clinical manuals are modified accordingly and part time faculty are introduced to the newly adopted product/technology at educational in-service meetings.
- TUFT:** A dental materials committee made up of 10-12 members of different specialties. These include representatives from: oral surgery, perio, endo, restorative, ortho and radiology. These faculty members meet every 6 months to evaluate dental literature for new and useful products and technology. New materials are brought into the clinic using lectures and demonstrations, i.e. laser, CEREC, by faculty who use them in private practice. The positives and negatives are exposed to students.
- USN:** No responses noted

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

- BU:** By letting students know and understand what “risk” means. i.e. an all ceramic bridge - the material is good but the thick connections required are harmful to the periodontal tissues. We have the equipment but its use is too risky.
- CLMB:** When new technology/material/technique becomes available we try it. Faculty supervised usage in small doses (areas of concentration groups, special study groups, faculty practice, post doctoral programs) until a track record is established in house and in the profession. These things are presented to students with the reality - i.e. no long term evidence of service, efficacy or safety and therefore are not incorporated into the curriculum as a standard but rather a subject for trial and discussion.
- CONN:** Information is presented just as stated in the question. If we do not know, we tell the students that we do not know. That is, if there is no, little or inadequate information to support or back up a product, say, in terms of durability or longevity, there is no reason not to state that up front. Interestingly, experience tells that “balance” is individual, bias specific. When someone has an agenda to push, it can be a different balance compared to someone without an agenda, or a differing agenda.
- DAL:** The presentation of concepts that are fundamentally sound and proven make up the bulk of what is taught to students. We attempt to provide students with the basic principles upon which they can make informed decisions in the future on new technologies. Students are encouraged not to have tunnel vision when it comes to dentistry and clinical operative techniques. However, we encourage that any new and upcoming technique or theory be evidence based prior to its institution into a clinical setting.
- HARV:** No responses noted
- HOW:** Generally, departmental philosophy is maintained.. Nothing is employed that is unproven. The “newest and latest” may be introduced in lecture or as a point of information at chairside, with the appropriate disclaimer.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** All clinically taught techniques are expected to be substantiated by the literature. Newer unproven techniques may be presented in seminars or used in “honors” courses.

- PENN:** At the School of Dental Medicine, we are conservative and somewhat slow to change the curriculum unless it is proven and backed with research.
- SUNY:** Our philosophy at Stonybrook is for Year I and II students to illustrate competency with fundamental concepts and procedures in operative dentistry. As our students advance to Year III, and especially our Year IV General Practice Program, more advanced and/or newest concepts are introduced and practiced. Although many concepts and/or practices may be discussed by faculty, actual procedures/materials utilized on patients must have an evidence based foundation.
- TEMP:** Our policy is to introduce materials and new procedures which faculty feel are sound but at the same time special and latest – unproven practices can be approved by the clinic director/chairman because they will have to deal with any problems that may arise.
- TORO:** Our default philosophy is to teach only what is sound, makes scientific sense, and/or is supported by the best available evidence. Available curricular hours do not permit extensive discussion of the burgeoning number of “newest and latest” products and techniques. An effort is made to present information and critical discussion (with possible concerns) concerning innovative products /technologies which have generated significant interest in the dental community. (e.g. Kavo caries monitor). This is done in a lecture format incorporating published evidence and, whenever possible, departmental research findings/ assessments.
- TUFT:** No responses noted
- USN:** No responses noted

**II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rational/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

- BU:** The school does not teach cuspal replacement in preclinic. This is guided by studies done by the Biomaterials department. It is done occasionally in the clinic by a few faculty members.
- CLMB:** Cuspal replacement with direct composite is not taught as a standard of treatment and not recommended. It is not taught preclinically – cuspal replacement with a direct material is done in amalgam or - indirect /onlay/ crown. It is utilized only as a temporary measure for esthetics where and when indicated. Posterior occlusal forces, particularly supporting or working cusps are not kind to direct composite. We continue to use the published guidelines – greater than 1/3 the Buccolingual width – no direct composite.

- CONN:** No, cuspal replacement is not taught in preclinic. We do have an amalgam exercise for this purpose. Yes, cuspal replacements are done in the clinic. Students are told that it is a contra-indication to use composite resin to replace supporting cusps. Additionally, large posterior composite are contra-indicated, that occlusion on posterior composites should be light or non-existent and that the indication for use decreases the more posterior the tooth is located. Usage is determined on an individual basis.
- DAL:** Generally speaking, cuspal replacement with composite resin is not advocated at the preclinical or clinical level. For cuspal replacement a pinned amalgam is recommended. However the first choice of treatment in cuspal replacement is a cast restoration. Composite resin use is not recommended as a restorative option if the bulk of the occlusal contacts will be found on the restoration, wide preparations (>1/3 intercuspal width) or if the patient has a history of bruxism.
- HARV:** No responses noted
- HOW:** Students are not taught cuspal replacement with composite in the preclinic. Students are taught amalgam cuspal replacement as a direct restoration. Patient status, extent of tooth loss and recommended final restoration. Ability to isolate and occlusal function are but a few things considered in making treatment decisions.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Yes, we teach cuspal replacement with composite in preclinic. Students are expected to complete composite or porcelain onlays where indicated. In clinics criteria for replacement of a cusp are established. Indications: restorations opposing natural dentition, amalgam or gold. Teeth with substantial remaining tooth where full crown preparations would destroy excessive good tooth structure. Contraindications: insufficient tooth structure, poor oral hygiene, more than two cusps missing, rubber dam cannot be used at the time of placement.
- PENN:** At the present, direct composite procedures for cuspal replacement is not advocated. Indirect (composite onlay) is discussed in lecture preclinically, but not carried out as an exercise. Clinically, it is not policy to use direct composite for cuspal replacement. Some direct composite onlays and inlays are being done in the clinic, on a group to group basis. Standardization of techniques among clinical groups is a foremost concern and is to be addressed in the very near future.
- SUNY:** We do not teach cuspal replacement with direct composite restorations. Our guidelines for placement of direct posterior composites are: Must not be greater

than 1/3 the B-L width of the tooth; Proper isolation with a rubber dam must be achieved; Preference is that gingival margins are in enamel. Rationale: Wear studies of posterior direct composite; Isolation is critical to any composite restoration; Bond strength and marginal seal of enamel vs. dentin.

TEMP: Our school does not teach direct composite cuspal replacement and they are not done in the clinic. Occasionally we will do an indirect composite onlay. Evidence: *Am. J. Dent. 1999, Feb 12(10):19-25*

TORO: Our preclinical teaching conforms to our guidelines for use in the clinics ie. Composite resin is contra-indicated for: large restorations with high occlusal function, greater than 50% intercuspal width and parafunctional activity. Rationale: see *Hilton, T.J., page 272 in fundamentals of Operative Dentistry, Summitt, Robbins and Schwartz, 2001* and *ADA Council on Scientific Affairs, Posterior Resin based composites, 1998*. Cuspal replacements with composite are rarely done. Replacement of a fractured buccal cusp in the esthetic zone as an interim solution is an infrequent exception.

TUFT: The school does not teach cuspal replacement with composite in preclinic or clinical settings. Indirect composite or ceramic would be preferred. Cuspal replacement is taught using pins or bonding with amalgam. In cases where excessive tooth structure is missing; endodontics , post and core followed by full coverage.
Evidence: *Sen, D. Nayir, E, Cetiner, F, Summitt, JB. Shear bond strength of amalgam reinforced with a bonding agent and/or dentin pins. JPD 87(4):446-50, 2002 Apr.*
Burgess JO, Alvarez, A, Summitt, JB, Fracture resistance of complex amalgam restorations. Operative Dentistry 22(3):128-32, 1997 May-Jun

USN: No responses noted

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

BU: We do not repair , we replace the replace the restoration. The Biomaterials department cautions against repair, evidence supporting repair does not seem to be strong enough.

CLMB: In a narrow BL newly placed composite resin the entire restoration is removed and replaced. If it is wide BL and the rest of the restoration is sound, a slot preparation is made in the proximal portion, within the original composite, etched, bonding resin and a new composite is placed into contact.

CONN: Generally, if oxygen inhibited layer is still on the surface additional restorative material can be added. If contaminated, the surface is cleaned with phosphoric acid etchant, bonding agent is applied and restorative material added. Evidence (*Chiba, JPD 61(6):669-75, 1989, Jun*) [in vitro and not conclusive.]

DAL: An open proximal contact in a newly placed composite resin is repaired by removal and replacement of the proximal resin. We attempt to teach ideal dentistry, not emergency care

- HARV:** No responses noted
- HOW:** If we can track a history of the resin composite, recently completed, the appropriate amount of resin will be removed with surface abrasion, and the etch/bonding procedure will be completed with appropriate measures taken to insure proper contact. If history is unclear the entire restoration will require removal and replacement.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** The technique taught to repair an open proximal contact in newly placed resin composite is a slot prep to add contact. The evidence for this is achieving clinical success.
- PENN:** No technique is taught to repair an open contact in a newly placed composite restoration. The student is taught to replace the restoration.
- SUNY:** Improper contacts with newly placed composites: we teach students to replace the entire restoration, once the air-inhibition layer is lost. Rationale: Inappropriate bond strength
- TEMP:** The size of the existing restoration will determine repair.
Small restoration – replace totally
Large restoration – box, etch, bond, restore
- TORO:** No responses noted
- TUFT:** Repair of newly placed resin composite includes re-prepping the box prep, etch, bond, and replacement of resin material. The school uses a microhybrid (i.e. TetricEvo Ceram) for composites. Posterior composites that may also be used are larger particle microhybrids (i.e. Heliomolar Hb). Repair of old placed composite includes removing the entire resin to ensure removal of secondary decay. For posterior composites, a layer of flowable composite is placed first prior to placement of heavy bodied “condensable” composite. For preventive resin restoration (PRR) a filled flowable resin is used.
Evidence: *Frankenberger R. Roth S Kramer N Pelka M Peltsscelt A. Fundamentals of Operative Dentistry, Effect of preparation mode on Class II composite repair. J Oral Rehab 30(6):559-64 2003 Jun.*
Frankenberger R. Kramer N Ebert J Lohbauer U Kappel S ten weges S Petschelt A. Fatigue behavior of the resin resin bond of partially replaced resin based composite restorations. American J. of Dent. 16(1):17-22, 2003 Feb.

USN: No responses noted

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

BU: Remove and replace. No repair as in above.

CLMB: If the remainder of the restoration is sound then it is treated like a newly placed resin. The evidence for repair of existing composites indicates that the bond strength of composite to composite is good.

CONN: Roughen the surface, etchant, bonding agent, restorative material. There seems to be a consensus in the literature: there are numerous in vitro articles reporting this to give better bond strength than other methods.

DAL: In an old composite resin an open contact is repaired by complete removal of the composite resin and replacement with either resin or amalgam, depending on the clinical situation.

HARV: No responses noted

HOW: We do not repair obviously defective restorations. We remove existing restorations and replace them. If the restoration is visibly intact with marginal overhang , but otherwise asymptomatic and unremarkable radiographically, recontouring may be indicated. If this is fruitless, the entire restoration must be removed and redone.

LAV: No responses noted

UMD: No responses noted

MCG: No responses noted

MTRL: No responses noted

UMNJ: No responses noted

NYU: This depends on the condition of the restoration – not age. The evidence for this is achieving clinical success.

PENN: No technique is taught to repair an open proximal in an old composite resin. The student is taught to replace the restoration.

SUNY: We teach students to replace the entire restoration. Rationale; As above

TEMP: Restore the majority of the restoration, exposing enamel cavosurface , etch, bond, restore. Airbrasion may be of use. Evidence: *Operative Dentistry* 1993 Sept, Oct.

TORO: If the proximal component is conservative then re-prepare the entire proximal box. If the proximal is wide then prepare a conservative slot in the contact area and restore. Both situations require a box preparation with additional mechanical retention (grooves/undercut). Evidence: for repair bond strengths (*Mjor, I 2003, Blum, IR et al 2003*), plus multiple other papers demonstrating good bond strengths to existing composite. Clinical experience has been good.

TUFT: No responses noted

USN: No responses noted

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

BU: Operative Dentistry teaches that any two walls meeting at an acute angle is a natural bevel. As long as enamel rods are exposed there is ample material for bonding. The gingival margin is difficult to bevel.

CLMB: We do not routinely utilize bevels on posterior composite restorations. The decision to bevel the proximal cavosurface (flare) is sometimes made clinically to improve the seal.

CONN: Students are taught that the use of bevels depends upon the situation. In the case of a conservative "adhesive preparation" the object is to minimize the extent of the cavity preparation outline by only removing caries and terminating the margins on sound enamel in order to limit the extent of the resin material used. This leads to a confined preparation in which a short gingival margin bevel can be placed if there is a substantial amount of enamel (occluso-cervically) remaining at this area. (*Holan (OpDent 22(5):217, 1997)* found in vitro that marginal leakage was less with a bevel vs. a butt joint; (also see *Dietschi, Quintessence Int. 26:1127, 95*). It is likely that 1mm. or less of enamel vertical height at the gingival will not etch well due to the presence of prism-less enamel and therefore not provide an advantage over a butt joint (*Martin, Aust.DJ 29:308, 1984; Ferrari, Am DJ 12:77, 1999*). If the proximal margins are out of contact with the adjacent tooth they too are beveled. Other articles showed decreased leakage with marginal enamel beveling. *J.D.Mater. 11(1):26 1992; J. Oral Rehab. 4(4):305, 1977; Am.JD 12(3):123, 1999*.

DAL: Bevels are advocated on posterior resin preparations at the gingival margin if there is a sufficient amount of enamel remaining. The placement of a bevel in an area that does not receive any occlusal forces is acceptable as the resin over a cavosurface bevel is thin and may fracture easily under occlusal forces.

HARV: No responses noted

HOW: No. Bevels are not part of our routine posterior composite resin restorations.

LAV: No responses noted

- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** No, we do not place bevels.
- PENN:** Bevels are not taught to be placed on Class II posterior composite preparations. Clinically, unfortunately, this is determined by preference of each group leader/faculty. Again, standardization amongst all groups is something UPSDM understands is an area that needs to be addressed.
- SUNY:** We do not teach bevels in posterior composite restorations. Rationale: Contra-indicated in areas of occlusal load; no significant bond strength and/or marginal seal is noted.
- TEMP:** No – not routinely
- TORO:** We do not teach bevels for any aspect of the cavosurface margins in Class I or II preparations. We teach bevels for Class V preparations (excluding gingival margins) and where additional retention is required for non carious cervical lesions. Evidence: *page 395, Fundamentals of Operative Dentistry, 2001*
- TUFT:** Bevels are placed at the gingival margins along with a flared proximal box. This enhances adaptation and seal. This is to prevent marginal gap formation due to polymerization shrinkage.
Evidence: *Summit, J Robbins JW Schwartz R Fundamentals of Operative Dentistry A contemporary approach Quintessence pp281, 2001*
- USN:** No responses noted

**In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?
What is the evidence for this?**

- BU:** If a patients home care is excellent and caries risk is low.. If the margin is in enamel and can be restored so that it will not leak. If breaking contact will sacrifice a lot of sound structure.
- CLMB:** In conservative, minimal preparations it is always permissible for the proximal, B and L cavosurface margins . The gingival margin will always be prepared below the contact. (*Sturdevant*) The interproximal gingival area is susceptible to recurrent caries if the gingival contact is not broken.

- CONN:** Students are taught minimal preparation design (adhesive preparation). That is, remove caries and terminate margins on sound tooth without regard to the presence or absence of proximal contacts. Location for periodic oversight and subjection to impact as well as patient caries risk are among factors considered for selection of this modality. These preparations are generally limited to the mesial of the first molars and the premolars.. Each case is considered individually. Composite restorations do better if they are small and closer to the front of the mouth. (*Wilspen, J.Dent.Mat. 7:92, 1991 ; Johnson, Quintessence Int. 23(10):705, 1992*).
- DAL:** The contact of a facial or lingual wall of a proximal box is always opened. Contacts are fully opened to facilitate proper finishing of the tooth/restoration margin as well as to facilitate patient cleaning of the restoration margin.
- HARV:** No responses noted
- HOW:** We teach our students to break contact and gingivally and proximally. Traditional literature indicates this for finishing purposes.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Always for composite except that the localization of caries is generally below the contact thereby requiring the contact to be broken .
- PENN:** Predclinically, it is taught that the facial and lingual wall are left in full contact with the adjacent tooth during preparation design for minimal dentistry Class II caries that would be restored with a composite slot preparation. The tooth would be prewedged for caries removal and a small slot preparation would be completed. However in keeping with NERB requirements, contact is broken on all other proximal box designs.
- SUNY:** Yes. We teach minimal reduction of tooth structure, removal of caries only without leaving unsupported enamel. Rationale: Extension for prevention is no longer supported; improved esthetics in the anterior region; creation of proximal contact is technically easier to create.
- TEMP:** Yes. Conservative Dentistry for a very small lesion confined to the location of the caries.

- TORO:** We advocate conservative box preparations wherever possible, which can result in facial/lingual walls remaining in contact. Exceptions: 1) minimal removal of remaining proximal tooth structure required to break contact 2) high caries risk patients. Position of the gingival margin appears to be more critical. Gingival margins always extended into the gingival embrasure because of increased incidence of recurrent caries when gingival contact is not broken. Evidence: *McComb, D. Systematic review of conservative caries management strategies. J. Dent. Educ. 65:1154, 2001.*
- TUFT:** In preparation design, it is acceptable to leave the facial and lingual proximal box intact as long as a matrix band can be placed. Most of the time we teach to break contact at least so there is a light leak between the tooth being worked on and the adjacent tooth. In extenuating circumstances we do not. The key is to remove caries while maintaining access for restoration placement and finishing.
- USN:** No responses noted

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

- BU:** Repair is not done at Boston University
- CLMB:** In a large composite or amalgam, if the defect is accessible, the remainder of the restoration is acceptable and there is no radiographic evidence of caries a properly effected repair is advisable to reduce the risk of further damage to the tooth structure or to the vitality of the tooth. It is both clinically effective and economic.
- CONN:** If a restoration is large, a repair might be done rather than a replacement if the contour and margins of the remaining restoration are suitable. This way there is less instrumentation of the tooth; replacement usually results in the loss of additional tooth structure and trauma to the pulp. Repair often allows for shorter or fewer appointments than replacement; this can be important for medically compromised patients who cannot sit for lengthy appointments.
- DAL:** Repairing margins in composite and amalgam restorations is almost never advocated. (especially older restorations) as marginal leakage commonly leads to recurrent decay that does not always appear clinically or radiographically. Recurrent decay can only be fully ascertained with complete restoration removal. The addition of resin to resin or amalgam to amalgam does not result in a unified restoration but two separate entities in between which a fault exists. This fault can be a source of microleakage and ultimately recurrent decay.
- HARV:** No responses noted
- HOW:** We are currently reviewing our practice philosophy regarding this subject.
- LAV:** No responses noted
- UMD:** No responses noted

- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** It depends on the extent and location of the defect and the size of the defective restoration (e.g. a small restoration with defects will be replaced. A large restoration will be repaired).
- PENN:** At the UPSDM, there is no rationale for repair of a defective amalgam or composite restoration. It is the philosophy of the school to replace the restoration.
- SUNY:** Very little. We teach replacement of all defective restorations as ideal care. Appropriate compromises are made only as we “weigh” patients needs and financial limitations. These are very limited cases and made with appropriate documentation and informed consent.
- TEMP:** Size of the restoration and the relative risk to pulp encroachment. If there is recurrent decay you must remove all decay until the margins of the remaining restoration are clear.
- TORO:** Rationale: Reduced trauma, tooth structure conservation, decreased treatment time, cost effectiveness, observed clinical effectiveness.
- TUFT:** The rationale to support removal vs. repair is based on size and depth of the restoration.”the cure should not be worse than the disease”.
- USN:** No responses noted

**Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?
If so, describe and comment.**

- BU:** Yes. Cores can absorb moisture and then they break down.
- CLMB:** Occasionally, usually where the post and core are the sole support for a crown in total function and there is no prepared tooth beyond the core with little or no ferrule effect on remaining tooth structure.
Tan, Aquilino, Gratton Varying Ferrule heights and configurations, J. Pros. Dent 93:331-336, 2005
- CONN:** It is policy to use amalgam or cast post and core for most posterior teeth. Resin fiber posts are used in anterior teeth and premolars where an all ceramic crown is to be used, but this is probably a small percentage of crowns done. There is no database to support determination of failure of restorations.

- DAL:** Generally the use of bonded resin cores is not advocated because of the following reasons : resins are a water sorptive material, dimensionally unstable and the skill level of students compromise the restorations longevity and strength. At present Dalhousie is advocating the use of cast post/core for anterior teeth.
- HARV:** No responses noted
- HOW:** We do not routinely do bonded resin composite cores. It is difficult to identify whether failure is due to the material or the preparation design
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Crowns that lack an adequate ferrule around the tooth on sound tooth structure have a tendency to fail.
- PENN:** Other than failure of the preparation design and a lack of remaining tooth structure as causative factors for failures, we experienced a failure problem that was associated with resin posts and cores placed with bonding agents incompatible with self cure core material. Again, standardization is our concern amongst clinical groups as well as material familiarity.
- SUNY:** All post and core cases are handled at SUNY Stonybrook by the Fixed Prosthodontic faculty. Cast post and core is the recommended clinical technique.
- TEMP:** Not reported.
- TORO:** Only on rare occurrences, It is usually bite clearance related.
- TUFT:** We do not use bonded resin cores.
- USN:** No responses noted

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

- BU:** Basically Unknown
 Amalgam Bond is weak – no real advantage
 Enamel / Composite - Very strong
 Dentin / Composite - still unknown

- CLMB:** We do not recommend bonding amalgam restorations. The longevity of bonding agents for resin composites (the bond) is dependent on the adherence to surface preparation, bondability of the tooth structure involved, proper technique and occlusal stresses. We recommend a three step adhesive bond technique for all bonded resins.
- CONN:** Unknown. Summit text references: Anterior composite : 3.3 to 16 years; Posterior composite: failure rates of 1% to 3.4% per year for study times of 4 to 17 years; Amalgam: failure rates of 0.7% to 6.3% per year for study times of 5 to 18 years. But, this data is meaningless without considering the nature of the applications for each material.
- DAL:** No responses noted
- HARV:** No responses noted
- HOW:** No responses noted
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Long term bonding to dentin and enamel is expected to last “indefinitely” though its surface characteristics may no longer be esthetically acceptable.
- PENN:** Longevity of bonding agents for resin composites and amalgam : do we really know?
- SUNY:** There is currently no one answer to the question of in vivo bond longevity. The answer depends on many variables, which include: type of bonding system, restorative material and areas of teeth to be restored. In vivo degradation of bonding is very much dependent on the bonding system. Correlation of in vitro bonding studies to in vivo results is not always appropriate. In vitro models of aging specimens give us some indication of which bonding systems (1,2 or 3 step) show better longevity. Retention of Class V non-carious lesions may not be a true model about bond failures. Most long term longevity studies show that amalgam restorations have a greater life span than composite restorations. Unfortunately, these studies do not solely measure longevity of bonding agents. The final issue is the type of restoration used. Differences occur in anterior vs. posterior, direct vs. indirect. Does it include cuspal replacement? At Stonybrook we utilize the three step etch and rinse adhesive for all composite restorations. We do not universally bond all amalgams.
- TEMP:** Not aware of any evidenced longevity studies for resins or amalgam.

- TORO:** See: *De Munck, J et al. A critical review of the durability of adhesion to tooth tissue. Methods and results. J. Dent. Res 84(2) 118-132, 2005 09 15.*
 “The immediate bonding effectiveness of contemporary adhesives is quite favorable, regardless of the approach used. In the long term the bonding effectiveness of some adhesives drops dramatically, whereas the bond strengths of other adhesives are more stable”. “A comparison of contemporary adhesives revealed that the three step etch and rinse adhesives remain the gold standard in terms of durability” This review provides estimates of longevity for different classes of adhesives. There is insufficient data to comment on bond strengths to amalgam.
- TUFT:** Amalgambond shows good bond and seal.
Galvan RR Jr. West LA Liewehr FR Pashley DH Coronal microleakage of five materials used to create an intracoronal seal in endodontically treated teeth J Endo. 28(2);59-61, 2002 Feb.
 There are no studies on the longevity of dental bonding. There are studies that state that composites last up to 17 years and amalgams up to 23 years. Bonding to freshly prepared dentin is ideal. Bonding to secondary, tertiary and sclerotic dentin will result in less retention.
HawthorneWS, Smales RJ Factors influencing long term restoration survival in three private dental practices in Adelaide. Australian Dental Journal 42 (1) :59-63 Feb 1997
- USN:** No responses noted

**III. What is your school's stance on amalgam usage?
 What “Best Management Practices (BMP) for amalgam waste” have been implemented at your school?**

- BU:** Relatively few patients have minimal lesions. We use a lot of it, very often. We have scrap containers at each unit with water line traps and separators (Massachusetts law).
- CLMB:** At present, amalgam is the material of choice for large multi-surface posterior restorations. Amalgam waste is scavenged at the unit by traps and filters, excess unused amalgam is kept in a dry container at chairside. Both waste products are removed weekly by clinic personnel and disposed of by a professional environmental personnell.
- CONN:** Amalgam is used for posterior restorations and for direct posterior core buildups. The school's statement is that amalgam is an acceptable restorative material. Faculty are encouraged to review the ADA report on amalgam which includes: “Dental amalgam (silver filling) is considered a safe, affordable and durable material that has been used to restore the teeth of more than 100 million Americans. It contains a mixture of metals such as silver, copper and tin, in addition to mercury, which chemically binds these components into a hard, stable and safe substance. Dental amalgam has been studied and reviewed extensively and has established a record of safety and effectiveness”.
 Amalgam waste canisters are in clinics where students can dump left over amalgam. Suction traps are periodically emptied and the amalgam from here

goes into a scrap container. The health center environmental department picks up the scrap and disposes of it in the legal manner.

Additionally, Connecticut requires a mercury recovery filter on the waste lines. So, there is a filter on the main waste line from the dental clinics.

- DAL:** Amalgam is a safe restorative option that is widely used and taught in preclinical and clinical operative instruction. ADA guidelines have not been implemented at Dalhousie. Local governing bodies have their own practices for waste management; the newest of which includes mandatory mercury traps and filters for all suction units.
- HARV:** No responses noted
- HOW:** We teach amalgam restorations for Class I,II,V and some Class VI defects. We have faculty responsible for the implementation and review of amalgam waste management. This individual directs how amalgam waste is disposed of on the clinic floor and sees that the collection and discarding process is maintained according to administrative guidelines.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** We would like to phase it out. Amalgam scraps and teeth with amalgam are collected and disposed of with a certified waste hauler.
- PENN:** Amalgam usage is predominantly the material of choice at UPSDM. Best management practices for amalgam include amalgam scrap waste containers and their appropriate disposal.
- SUNY:** We teach amalgam restorations in the preclinical courses. We perform amalgam restorations in the clinic. Amalgam waste management is handled as per New York State, ADA and OSHA guidelines. It is practiced and taught as per SOP outlined in the clinic handbook.
- TEMP:** We use amalgam. We have implemented BMP for waste. Traps at the units. Facilities management and environmental health and safety manage removal.
- TORO:** Having examined the evidence, the department has no concerns about the issue of safety in patients. It is the material of choice for extensive/complex posterior restorations, particularly involving cusp replacement, high caries risk patients, financially challenged patients and post/core buildups on teeth with inadequate remaining coronal dentin.
Scrap amalgam and amalgam capsules are kept dry in separate containers and

disposed of by a licensed contractor for hazardous waste. Our clinical units have not been equipped with amalgam separators since our effluent particle levels are significantly below the recently implemented municipal bylaw limits.

TUFT: Tufts is a pro-amalgam use dental school. Amalgam waste management is implemented at Tufts. Vacuum pump filters collect excess amalgam sludge and water. Excess amalgam is collected in plastic containers. Waste disposal company returns monthly to remove waste materials.

USN: No responses noted

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

BU: CRA is part of Introduction of practice management in Year 1. It is included in the Preclinical and Clinical Operative lectures.

CLMB: Caries risk assessment is taught in the second year cariology course and implemented on at least one appropriate case in third, and again in fourth, year. It is not very popular with students and some faculty because of time consumed, patient compliance and difficulty of assessing outcomes.

CONN: (Reference: *CODE 2000 Annual Regional Report*) The caries risk protocol remains essentially the same as it was in 2000. All dentate patients are to be risk assessed at the initial exam, phase 1 evaluation, phase 2 evaluation and additionally at recalls. We have less control of the program than when we first started it. We do not know the goodness of the assessment workups at the initial exam. We have a progress which each student has to present the caries risk workup forms for the patient as a presentation to one of three operative faculty. Part of the initial assessment is a five minute stimulated salivary rate.

DAL: Generally students don't perform well in caries risk assessment. Risk assessment is taught in preclinical courses and is carried into clinical practice via our treatment planning clinics. The school attempts to provide a recall program for its patients but compliance is very poor. The use of assessment aids beyond diet analysis and high risk habit assessment are not available for student use.

HARV: No responses noted

HOW: The school is in the midst of refining the caries risk assessment and management philosophy which is initiated at the treatment planning phase. Forms have been developed and are awaiting Quality Assurance approval. Faculty from most disciplines have been consulted as to appropriate protocol considerations as it pertains to their area. Students have been introduced to the process in lecture and are required to demonstrate competency in carrying out this procedure. No preclinical component is introduced at this time.

- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Fully incorporated.
- PENN:** Caries risk assessment is taught preclinically in cariology lectures as well as in the D1 community oral health lectures. It is also addressed in the D3 year. I am not sure if there is a formal caries risk assessment program in place clinically.
- SUNY:** We will be working on incorporating a formal caries risk assessment program into the preclinical and clinical curriculum. Axiom, allows use to track carious lesions in all our patients. Enamel and /or dentinal lesions can be designated and followed. The concepts of caries risk assessment are taught in our preclinical courses. We do not currently have a formal assessment program in our clinical programs.
- TEMP:** Caries risk assessment is incorporated at the junior level. We have a detailed protocol on dental caries risk assessment and treatment plan.
- TORO:** Caries risk principles are taught at the preclinical level. In the clinical comprehensive care program students are required to perform a caries risk assessment for all new patients.
- TUFT:** Risk assessment is taught in preclinic during the sophomore year. Lectures and handouts are distributed on four major topics: dental caries, periodontal disease, trauma, oral cancer. The clinic continues with the above in treatment plan evaluations with the practice coordinators who are dental faculty who work with students to evaluate patients risks.
- USN:** No responses noted

- V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?**
Have your calibration efforts improved inter-rater agreement between faculty?
What outcome measures have you used to track the efficacy of your calibration?
Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.

- BU:** The Division Director e-mails faculty re: problems in evaluation. The faculty meets twice yearly to discuss it. The problem is getting all the faculty together at one time. It is a slow work in progress. One faculty member has evaluated the yearly trends in grading and presents his finding to the faculty. This evaluation has been extended to relate in house faculty grading to externship preceptors.
- CLMB:** Faculty calibration is elusive. Preclinical faculty are calibrated before every practical examination which are graded by at least two faculty. Clinical faculty are calibrated on typodont preparations before clinical examinations. Examination results are very good. Daily clinical evaluation is often not as equal across faculty as we would like. We keep working at it. Student surveys and evaluation of faculty, comparison of grading patterns, and Chairman admonitions help temporarily.
- CONN:** We have three full-time faculty and about 14 part-time faculty, some volunteer and some paid. When a new person starts he/she is paired with an experienced faculty person, usually full time. Grading is not a problem in the clinic. The only grading is for progressive exams, and the two faculty involved consult with each other. In the preclinic, there are set written criteria that the faculty use and that the students are supposed to use. The faculty staffing in the preclinic has been stable for many years.
- DAL:** No responses noted
- HARV:** No responses noted
- HOW:** Over the years calibration of faculty has been attempted on a formal level. However, it is a struggle to have everyone available in one space at one time. Therefore, around the time of clinical and preclinical examinations, calibration is accomplished on an informal basis. Over time those individuals available and willing to calibrate have improved in inter-rater agreement. At present there are no outcomes measures to track the efficacy of this calibration.
- LAV:** No responses noted
- UMD:** No responses noted
- MCG:** No responses noted
- MTRL:** No responses noted
- UMNJ:** No responses noted
- NYU:** Calibration of faculty is receiving increased attention in the current months.
- PENN:** Preclinically, calibration of faculty has been done with training of the graders. The same graders have been in place for several years. Preclinically we have seen interrelated agreement improvement. We have periodically checked our calibration by cross checking and cross grading mock exams and reviewing the results with faculty. Clinically, I am unaware of a calibration practice. This is an area that is known that needs to be addressed in the very near future.

- SUNY:** We are approaching this issue in two steps. Currently we have faculty workshops in each clinical discipline to standardize our entire faculty. This is an important step, especially with a faculty made up of mostly part time clinicians. The second phase of this program will be to calibrate the student evaluation of our faculty. This process is still being formalized.
- TEMP:** Faculty calibration exercises for all faculty in which faculty must receive an 80% score. If less they will get remediation from the appropriate course or clinic director. For competency examinations, identified faculty who teach pre-clinically are calibrated, have years of experience in the clinic are paired together. Students sign up for the exam only on the days that they are in clinic.
- TORO:** Preclinical: Course coordinators for years 1 and 2 and the course coordinator for the 3rd year structured restorative course do all the practical test grading.
Clinical sessions : 3 grades i.e. Honors, Pass and Needs Improvement. Grades are based on established criteria, distributed to all faculty and reinforced in departmental bulletins and at in-service meetings.
Competency exams : 3rd year coordinator conducts all clinical competency tests. In CCP only 4 coordinators grade the 2 competency tests which are marked according to established criteria.
A reduction in the clinical grades from 10 to 3 possible grades plus the introduction of criteria based grade scales has improved inter-rater reliability. No systematic analysis has been performed to date. However we do respond to direct feedback from students at all levels of training. Also, in the third and fourth years instructors who consistently over-grade students as evidenced by computer generated records/statistics are easily identified. Such information is used to counsel /caution these individuals in their grading practices.
- TUFT:** Faculty calibration remains a difficult struggle. We have tried to minimize variations using a number of techniques. Faculty members are given lectures using typodont evaluations, slide presentations and written exams. New faculty members are teamed with experienced faculty. Mock NERB exams using typodonts and patients are routinely repeated throughout the program. Faculty calibration exams have shown 80% of our faculty are within 10% of each other on grading. Yearly surveys are provided for faculty to track variations in calibration.
- USN:** No responses noted

Regional CODE Agenda

To be established by the respective Region and Regional Director. Please also report on responses to the Regional Agenda from all participants.

Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations?

(Reference: ADA news, July 11, 2005; Vol 36, No.13)

Yes. We have arranged a meeting in January with the NERB examiners who will be present to explain the present changes in the licensure examination, calibration, future changes contemplated as well as the National examination. There is a growing interest in discussing the two developing US National clinical licensure examinations.

Suggestions for CODE.

What can the organization do to improve its effectiveness?

1. A greater visible presence across country and in setting guidelines for operative procedures and education. Newer operative practices should be developed from new dental technology. An informational resource should be set up for faculty and students. Operative should not become secondary to prosthetics
2. As a force for validating "trends" in dentistry with recommendations to the ADA and public information.

What is suggested to improve the Web site?

<http://netserv.unmc.edu/code/codeFrame.html>

Other comments?

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CODE REGIONAL MEETING REPORT FORM

REGION: VI (Southeast)

LOCATION AND DATE OF MEETING:

Meharry Medical College

Nashville, TN

November 2 - 4, 2005

CHAIRPERSON:

Name: Dr. Valencia Hereford

Phone #: 615-327-6719

Address: Meharry Medical College

Fax #: 615-327-6207

1005 D.B. Todd Blvd

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Nashville, TN 37208

List of Attendees: Please complete the CODE Regional Attendees Form (enclosed at end of Agenda)

Suggested Agenda Items for Next Year:

LOCATION & DATE OF NEXT REGIONAL MEETING:

Name: Dr. Andre Ritter

Phone #: 919-966-2731

Address: University of North Carolina

Fax #: 919-966-5660

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E-mail : rittera@dentistry.unc.edu

Chapel Hill, NC 27599-7450

Date: TBA

Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;

40th and Holdrege Streets; Lincoln, NE 68583-0750.

Deadline for return: 30 Days post-meeting

Office: 402 472-1290 Fax: 402 472-5290 E-mail: lhaisch@unmc.edu

Also send the information on a disk and via e-mail with all attachments.

Please indicate the software program and version utilized for your reports.

**2005 NATIONAL CODE AGENDA
REGION VI
SUMMARY RESPONSES TO NATIONAL AGENDA**

- I. How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).**

EBD is introduced mostly through the pre-clinical lab courses with texts, journals and even some web-based sources. MCG uses their WEB-CT extensively for Operative Dentistry, NOVA has recently started using Vital Source (electronic textbook) and VCU has a formal course of instruction in EBD at the beginning of the freshman year.

**With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?
How are the changes incorporated into the curriculum?**

The decision to use new materials or technologies relative to restorative dentistry is mostly done at the department level. Generally the changes are made starting with the technique courses and subsequently continued with the students into clinic.

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

The balance between current (proven) and new (unproven) is difficult to maintain but most schools tend to use and emphasize conventional materials and methods as the standard protocol with occasional use of newer options under specific circumstances. Advances are usually presented in upper level student seminars or honors clinics as alternatives to the more traditional options.

- II. Does your school teach cuspal replacement with composite in preclinic?
What is taught and what is the rationale/evidence?
Are cuspal replacements with resin composite done in your clinics?
What circumstances and parameters or protocol may provide guidance in that determination?**

Cuspal replacement composite restorations as definitive restorations are not routinely taught in pre-clinic but they are used primarily in clinics as core build-ups for crowns. The Florida schools have to teach this procedure because it is a standard part of the Florida Board Manikin Exam.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

Technique - pre-wedge, slot prep, mechanical roughening (diamond bur or air-abrasion), etch-rinse-dry, adhesive, repair resin, cure.

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

Most schools would replace an "old" composite restoration instead of repairing it especially if there is any question about the integrity of the rest of the restoration.

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

Bevels are not used in posterior resin composite restorations in 3 of 11 region schools while they are used in non-functional (non-occlusal) areas such as the proximal or gingival margins in 8 of 11 schools.

In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?

What is the evidence for this?

When the margins are in sound tooth structure and when additional access for caries removal or convenience form for placing the restoration is unnecessary. The evidence indirectly relates to the relationship between larger preps and weaker teeth.

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

The UFL's answer provides the best summary of our general opinion - Studies (*I. Mjor and V. Gordan*) report: (1) Removal of the entire restoration invariably produces a larger defect in the tooth; (2) Bond strength and seal are clinically acceptable in repairs; (3) Repairs avoid repeated pulpal irritation; (4) Repairs are cost efficient; and (5) Long term studies show acceptable results.

Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?

If so, describe and comment.

The results have been mixed. All of our schools believe that strict adherence to sound principles including proper ferrule, adequate post length and diameter will minimize failure with any post/core system. Specific problems were noted for Fluorocore and Luxacore resins and Brasseler and EDS posts by two schools.

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

Longevity of composites and amalgam can not be discussed only within the context of bonding agents. Amalgams can last a lifetime without bonding agents. Literature - there is no conclusive answer to this question, however, the literature shows that the bond strength decreases over time.

**III. What is your school's stance on amalgam usage?
What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?**

All Region VI schools are still commonly using amalgam in the student clinics and they provided specific details on their BMP's. ULVL provided the most detailed answer to this question with each item on the ADA web-site listed and answered separately.

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

All Region VI schools cover this subject in one or more courses including a specific Cariology Course or as part of restorative or oral medicine/diagnosis courses. About half of the schools have formal and consistent protocol in place whereby most or all patients are assessed and appropriate treatment is defined.

**V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?
Have your calibration efforts improved inter-rater agreement between faculty?
What outcome measures have you used to track the efficacy of your calibration?
Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.**

There is much variation in the approach to faculty calibration. Common concepts include two or more faculty involved with grading in pre-clinic and clinic with forced consensus or a third grader to break any ties. Frequent department or section meetings to discuss grading criteria with calibration sessions that use dentoforms or photographs. Several schools do not grade daily work but schools that do use the daily grade forms to monitor faculty performance using standard criteria. Part-time faculty are generally paired with full-time to ensure consistent grading. Board performance and inter-rater agreement on grading forms are used for outcomes assessment. Increasing use of digital photography for calibration was described as an innovation for calibration efforts.

Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations?

Yes, even by the independent states that are not part of the regional boards (Alabama, Florida, North Carolina, and Puerto Rico).

2005 NATIONAL CODE AGENDA

REGION VI RESPONSES

(Evidence cited where applicable)

Region VI School Abbreviations

UAB	University of Alabama	MMC	Meharry Medical College
UFL	University of Florida	UNC	University of North Carolina
MCG	Medical College of Georgia	NOVA	Nova Southeastern University
UKY	University of Kentucky	UPR	University of Puerto Rico
ULVL	University of Louisville	MUSC	Medical University of South Carolina
VCU		Virginia Commonwealth University	

- I. **How is “Evidence based teaching and clinical practice in Restorative Dentistry” being introduced?**
What is the methodology, obstacles, and successes?
What informational sources are utilized - text, journal, web sites, other? Please identify and evaluate source(s) and value of source(s).

UAB: EB is used by various disciplines in didactic and clinical teaching with FR students being exposed early on in the curriculum to article reviews and critiques. It is mostly done through article reading and discussion. Obstacles: related to resistance of faculty trained under a different system, students who have been in practice under a relative or have had other clinical experience. Successes: students are more selective of what information to accept; and search for answers on their own, become more inquisitive vs. taking someone’s word for it.

UFL: Required Texts with required reading assignments (*Summitt, Mjor, Anusavice*), Web sites: AHA, AAOS, UI, Referenced articles in lecture presentations, assigned journal articles.

MCG: No formal course exists to teach the dental students how to evaluate the whole spectrum of scientific research progress. MCG just instituted a general research/statistic class two years ago, mainly concentrating on basic statistical knowledge and journal research methodology. However, the “pyramid of evidence” and evidence-based teaching of restorative dentistry starts in the pre-clinical Operative Dentistry course (freshman) and the fixed courses (sophomore). It is reinforced or supplemented in the junior Esthetic Dentistry course, and senior seminars. We use textbooks and literature-based lectures to provide most of the information. We use our Web-CT to provide convenient access to selected refereed articles for core information as well. Some didactic test information is exclusively found on the Web-CT. Pre-doctoral clinical practice reflects teaching in the freshman through junior courses. Senior seminars reinforce most of the previous information and provide additional material for enrichment. All of these sources are valuable although the Web-CT provides the most flexibility for staying current with the literature.

- UKY:** Textbook reading assignments prior to lecture, one-hour lecture followed by three-hour laboratory. Literature and text references are included and quoted during lecture to validate evidence-based reference. New and/or improved techniques are incorporated into faculty and student clinics when validated and proven improvements...if financially feasible.
- ULVL:** In Operative, references in the course manuals and in the PowerPoint presentations. Obstacles – Faculty are well-rooted in tradition (e.g. use of calcium hydroxide), especially part-time faculty that are still in practice. Sources – textbooks and refereed journals
- MMC:** Evidence based teaching and clinical practice in Restorative Dentistry is introduced into our curriculum in our lectures. This has proven to be successful in that the information provided as validity to what is being taught and it keeps the students abreast of current trends in Operative Dentistry and research. The informational sources utilized are: *The Journal of Operative Dentistry*, *Journal of American Dental Association*, *Journal of Dental Research* and *PubMed*.
- UNC:** In Operative, all topics are introduced using as much evidence-based information as possible.
- NOVA:** In the preclinical course, 2 assigned textbooks are being used (*Sturdevant*, *Albers*) assigned or recommended articles (e.g. *ADA*, *JOD*), and others relevant to topics. All sources have value, but all references also contain content which can be argued. In the relatively short time allotted for the course, it is difficult to go into detail with the class regarding the disputed topics. Traditional classroom format is still used, with more classroom interaction encouraged. Since each lecturer has their own style, some will interact more and some less in a traditional lecture format with multiple lecturers. Referenced material is included on written examinations. In the coming year, students will be required to complete a literature review, possibly with a visual presentation. The electronic textbook program, Vital Source™, has been added to the D-1 curriculum this year. In this program, keywords can be entered, and all sources in the program with this keyword will appear. In this way, the subject can be accessed and discussed from multiple perspectives. More of the evidence-based information is presented and discussed at regularly scheduled department meetings.
- UPR:** Faculty organize sources of information and lectures are given integrated. Information sources are Journals (*JADA*, *Am J Dent*, *Dent Mater*, *Operative*, *ADEA*, *JPD*) Textbooks (*Phillips Dent Mater*, *Sturdevant Operative*, *Shillingburg Fixed Prosth*), and Pub Med Web Site. Some faculty have been trained in black board and about 80% of the pre-clinical operative course is on *Blackboard*. This includes lectures, quizzes and written exams. Pediatric dentistry offers OSCE type of examinations at the end of the Second Year to assess clinical competence prior to start in the Clinic. Some faculty members (sponsored by The Center for Excellence) are training and developing standardized patient and case-based materials for teaching and examination of clinical skills in Operative and Fixed Prosthodontics and other disciplines. Obstacles: Faculty is providing almost all materials; methodology like black board increases the load of the faculty as well as simulation. Not all students use the internet. Faculty re-training in this modality of teaching is mandatory.

MUSC: We are starting to implement documentation of ALL clinical competencies via digital photography. It should aid in calibration and documentation of poor performance in the clinic. The last 2 years, the Operative Director has also been invited to calibration sessions with the state licensing board. The calibration sessions are conducted by professionals outside of the state or university setting.

VCU: The freshman have a formal course (OCMB 510-Evidence-Based Dentistry) of 1½ credit hours. Below is appended the course document. (*Form modified for spacial reasons by Editor*)

Date	Time	Place	Attendance	Purpose
Sept. 20	9-10:50 AM	424 Lyons	Entire class	Course introduction, group assignment, pre-test
Sept. 21	3-4:50 PM	LIMERC	1/4 of class assigned	PubMed tutorial, turn in pre-test
Sept. 27	9-10:50 AM	424 Lyons	3/4 of class	Meet to answer questions, then free to work on project. Deadline for topic selection.
Sept. 27	9-10:50 AM	LIMERC	1/4 of class assigned	PubMed tutorial, turn in quiz
Sept. 28	3-4:50 PM	LIMERC	1/4 of class assigned	PubMed tutorial, turn in quiz
Oct. 4	9-10:50 AM	LIMERC	1/4 of class assigned	PubMed tutorial, turn in quiz
Oct. 11	9-10:50 AM	Conference rooms	Entire class, working in groups	Work on project; turn in list of 10 sources.
Oct. 12	3-4:50 PM	Rm 443	Entire class	Seminar concerning evidence-based dentistry.
Oct. 18	9-10:50 AM	Conference rooms	Entire class, working in groups	Work on project. Turn in 6 paragraph summaries.
Oct. 25	9-10:50 AM	Conference rooms	Entire class, working in groups	Work on project. Turn in key source.
Nov. 1	9-10:50 AM	Conference rooms	Entire class, working in groups	Finalize paper and presentation. Deadline for peer evaluations.
Nov. 8	9-10:50 AM	424 Lyons	Entire class	Presentations, quiz
Nov. 15	9-10:50 AM	424 Lyons	Entire class	Presentations, statistical jeopardy
Nov. 22	9-10:50 AM	424 Lyons	Entire class	Presentations, statistical jeopardy

With the speed of change in the profession as to treatment options and multiple material options, who decides that a new product/technology is worthy of inclusion (here today...gone tomorrow)?

How are the changes incorporated into the curriculum?

UAB: Restorative materials and technologies in the field of restorative dentistry are decided upon by Operative, Biomaterials and Prosthodontics faculty. The school has tried to be consistent and use materials that have been tried and proven to be durable. Materials are selected based on performance and ease of handling taking into account the novice operator. Not all new technologies are introduced at the undergraduate level. Some new technologies are introduced in the didactic setting and some in the clinical. We have had equipment donated to school (some more usable than others).

UFL: Faculty members are encouraged to propose the introduction of new materials and techniques at regularly scheduled faculty meetings. These are discussed and supporting evidence is presented by the advocate. If a unanimous agreement is reached by faculty, a plan to incorporate the change is developed and implemented by the appropriate clinical and pre-clinical course directors under the direction of the Department Chairman.

- MCG:** Decisions concerning treatment options and material selection are made at the department level with input from preclinical and clinical course directors. Gradual changes are usually made starting in the preclinic and then followed up in the clinics. Occasionally when a more immediate change is necessary such as the use of a new material or device that replaces an existing one; email or instructional seminars are used.
- UKY:** Our restorative faculty in conjunction with Clinic Team Leaders discuss treatment options/materials at monthly faculty meetings. If a procedure or product is agreeable and of value, it is incorporated into lectures, pre-clinical laboratories, and student clinics.
- ULVL:** It is difficult and time-consuming to change out materials in the School. There must be good evidence that a new material is superior to one already in use. Faculty usually presents the suggested change to me (as chair of the Materials and Instrument Committee). If the change is warranted and does not impact other disciplines, I will make the decision. If the change is more universal, the committee is poled. The whole committee rarely meets since changes in operative don't affect disciplines such as radiology, oral surgery, etc. In many cases, new materials are first used in faculty practice, then the pre-clinic course, and finally adopted for clinic use.
- MMC:** The Restorative department decides what new product/technology is included in our curriculum based upon the instructors' personal use and research performed on that new product. The chairperson then looks at the departmental budget and makes a decision. Dental manufacturers also donate products for our evaluation. The changes are incorporated into the curriculum by introducing them in our lectures and in the clinics.
- UNC:** The decision is made at the Department Chair level, and both Operative and Prosthodontics faculty have input in the process.
- NOVA:** The Department Chair primarily decides materials, products, and technology used in clinical applications. The decisions are often made in consultation with Restorative and Dental Biomaterials faculty, and based on the evidence in the literature. The preclinic and clinic materials are used in coordination, when the preclinic materials are ordered at the beginning of an academic year. Most changes in clinic are based on the current evidence and clinic materials and technology are reviewed prior to clinic entry of D-3 students. Every effort is made to coordinate materials and technology.
- UPR:** Manufacturers provide new materials, instruments, and equipments for trials most of the time. Course coordinators make suggestions to Department Chair and to the Assistant Dean for Clinical Affairs. Also, recommendations are received during faculty meetings of the Department.
- MUSC:** Collective agreement by the operative faculty.

VCU: Concerning treatment options and material options we use an ad hoc approach. This is a combination of seminars from dental reps, our material scientist and faculty who do faculty practice. Changes of materials used in the curriculum reflect what is used in faculty practice for the most part.

How is a balance maintained between teaching what is fundamentally sound and supported, and presenting that which is the newest and latest, but unproven?

UAB: Difficult to achieve at times due to marketing pressures. Manufacturers have now “invaded” dental schools, specially targeting last year students. Student’s attitudes may play a part when it is believed that an “easy” technique is a better replacement for the existing method used.

UFL: The Department philosophy is basically: “Be not the first to take up the new, or the last to give up the old.” Changes are based on current usage in the community that is supported by evidence in the literature.

MCG: We feel obligated to present the most fundamentally sound information and techniques available as a basis for clinical practice. When possible (senior seminars, etc.) alternative information is presented with the pros and cons as reported in the literature.

UKY: Often financial restraints are the over-riding consideration unfortunately. Newer light curing units, for example, would be a nice enhancement to our clinics; yet financial restraints prevent their inclusion.

ULVL: In my courses, I state it pretty much as worded above. The students are taught the “supported” techniques and materials and told about the new ones (self-etching bonding).

MMC: The balance what we teach between what is fundamentally sound and supported to that what is newest and latest but unproven is maintained by staying abreast upon new information and technology published in dental and scientific journals.

UNC: The balance is maintained by teaching both and clearly indicating to students the differences between them.

NOVA: The “sound and supported” information (which can also be disputed) is presented as part of the fundamentals in direct restorative dentistry. “Newest and latest” information is sometimes brought out during lecture, as time and importance permits, and depending on quality and quantity of the evidence exists.

UPR: Faculty discretion and clinical judgment prevails at the clinical setting. Students are encouraged to use new materials and techniques under faculty approval and direct supervision. All indirect restorative treatments for patients must pass through the Quality Control Committee in the Department.

MUSC: By discussion among the operative faculty. Input from CODE is important, also.

VCU: We achieve a balance between sound and supported and newest and latest, through seminars by part-time faculty, who bring new ideas. They also teach on the clinic floor.

II. Does your school teach cuspal replacement with composite in preclinic?

What is taught and what is the rational/evidence?

Are cuspal replacements with resin composite done in your clinics?

What circumstances and parameters or protocol may provide guidance in that determination?

UAB: Not routinely (pre-clinic). Are cuspal replacements with resin composite done in your clinics? Yes. Circumstances- Cuspal replacement is usually not recommended though frequently used for patients unable to afford a cast or lab processed restoration. They are also used temporarily as build ups prior to crown preparation. When extensive caries undermines the natural crown and results in lack of resistance and retention form.

UFL: Cusp replacement with composite is taught in the pre-clinic and practiced in the clinic. Though there is a dearth of practice-based outcome measures of this technique, it is common practice in our state and required on our state board exam. Students are taught that though there is insufficient evidence to predict the longevity of these restorations, there is enough anecdotal observations to recommend them as an economical alternative to save teeth that would otherwise be lost due to the high cost of traditional methods.

MCG: No- pre-clinic. Yes in clinic, only in a core build-up for a crown. We do not think the evidence supports the use of composite for cusp replacement as a definitive posterior restoration at this time. Can a single composite resin serve all purposes? *J. J. M. Roeters, A. C. C. Shortall and N. J. M. Opdam. British Dental Journal 199(2) 73-79.*

UKY: Cusp replacements in composite are not our first course of treatment; however, circumstances sometimes make it a viable option. Yes, they are done in clinic on occasion. Circumstances: it will serve as a bonded core for a cast restoration or patient demands/finances come into play.

ULVL: Yes, in the Junior operative course. Caution should be used when placing large composite resin restorations. If used as a core, a final cast restoration should be planned.

Ritter, Andre V: posterior resin-based composite restorations: clinical recommendations for optimal success. J Esthet Restor Dent 2001,13: 88.

When the faciolingual extension of the occlusal aspect of a defect exceeds two-thirds of the distance between any primary groove and the cusp tip, resin-based composite is compromised.

Sarrett DC: Clinical challenges and the relevance of materials testing for posterior composite restorations. Dent Mater 2005, 21(1) p9-20

Clinical data indicate that secondary caries and restoration fracture are the most common clinical problems and merit further investigation. The clinical data indicates that secondary caries and restoration fracture are clinical challenges with posterior composites that merit further research.

Sakaguchi RL: Review of the current status and challenges for dental posterior restorative composites: clinical, chemistry, and physical behavior considerations. Summary of discussion from the Portland Composites Symposium (POCOS) June 17-19, 2004, Oregon Health and Science University, Portland, Oregon. Dent Mater 2005, 21(1) p3-6.

It should be noted, however, that performance depends on the specific clinical application such as the restoration's size, location, and patient expectations.

As in all aspects of science (and life) there are known knowns, known unknowns and unknown unknowns. The latter is the most interesting.

Gaengler P, Hoyer I, Montag R, et al. Micromorphological evaluation of posterior composite restorations - a 10-year report. J Oral Rehabil 2004, 31(10) p991-1000

The layer-technique using GIC as dentine replacement and resin-based composite as enamel replacement results, according to previous biocompatibility testing, and clinical data, in optimal pulp protection and correct anatomic form over a 10-year period. The myth of the need for perfect marginal integrity requires further discussion.

Liebenberg WH: Assuring restorative integrity in extensive posterior resin composite restorations: pushing the envelope. Quintessence Int 2000, 31(3) p153-64

Creugers NH, Kreulen CM, Fokkinga WA, et al. A 5-year prospective clinical study on core restorations without covering crowns. Int J Pros 2005, 18(1) p40-

Clinic- Rarely (composite cusp replacement). Generally contraindicated when there is parafunctional activity, gingival margins are located on root structure, poor oral hygiene.

MMC: No. Cusp replacement composite is not taught.

UNC: Cusp replacement composite is not taught in pre-clinic. Composites are recommended for initial lesions and conservative cavities up to 1/3 of the cuspal incline. Clinic- Not routinely. It is generally not recommended. Can be considered as an option, but there is no strong evidence supporting this recommendation

NOVA: Cusp replacement with resin composite is not taught in the preclinical D-1 course to date. Students learn technique for pin amalgam restoration in the D-1 year. This restoration technique is taught in a D-4 course for Regional Board Review, in particular, for students who are preparing to take the Florida Board Exam. In the D-2 and then D-3 years, students learn cuspal coverage treatment options with gold onlay, full gold crown, PFM crown, and full porcelain crowns. In clinical application, all treatment options are considered, however, cusp replacement in resin composite is not generally considered the treatment of choice. The ability to isolate, amount of remaining tooth structure, condition of remaining dentin, patient's occlusion, operator skill level, and need for esthetic restoration are all taken into account. Further long term clinical data will be needed before this treatment option is considered routine.

- UPR:** Yes, with composite, ceramic and metal. We teach the indirect composite technique for better proximal contacts, better seal and marginal integrity, less polymerization contraction, better anatomy and contour. Cuspal replacements are done in the clinics with composite, ceramic and metal. The determination is made between student, faculty and the patient. Determinants include occlusion, occlusion stability, cost, esthetic, caries prevalence
- MUSC:** Generally, No, but rarely, Yes. What is taught and what is the rational/evidence? Usually done as a repair. Are cuspal replacements with resin composite done in your clinics? Rarely. Circumstances and parameters or protocol may provide guidance in that determination? Clinical judgement for the individual case being treated.
- VCU:** Only as an interim or core restorations.

What technique is taught to repair an open proximal contact in a newly placed resin composite?

What is the evidence for this method?

- UAB:** Composite is removed with bur or diamond point to create access to restore contact, composite is etched and adhesive is used to bond a new layer of resin composite.
- UFL:** A slot prep is placed in the interproximal and is restored with composite. Data (*Mjor and Gordon*) suggests that the bonding strength in a new composite will be comparable to the bonding of increments during original placement.
- MCG:** Small, conservative restorations- replace the entire proximal portion if a “slot prep” large enough to provide sufficient proximal contour for a contact encompasses most of the outline form. Larger, more traditional outline- “slot prep” into the existing composite and repair with new resin. Evidence- moderate bond strength is available between repair resin and freshly placed composite in the right circumstances to avoid technique compromising conditions. Technique- prep, mechanical roughening (diamond bur or air-abrasion, etch-rinse-dry, adhesive, repair resin, cure)
- Proximal contact formation with different restorative materials and techniques. *Klein F, Keller AK, Staehle HJ, Dorfer CE. Am J Dent. 2002 Aug;15(4):232-5*
 - Repair and revision 2. Repair or replacement of composite. *Opdam NJ. Nederlands Tijdschrift voor Tandheelkunde. 108(3):90-3, 2001 Mar.*
 - The effect of various surface treatments and bonding agents on the repaired strength of heat-treated composites. *Lucena-Martin C. Gonzalez-Lopez S. Navajas-Rodriguez de Mondelo JM. Journal of Prosthetic Dentistry. 86(5):481-8, 2001 Nov.*
- UKY:** Often can prep into existing resin much like a slot preparation and restore. Evidence: Nothing very scientific though bonding radicals should be available for adequate retention.

- ULVL:** We don't teach a technique but, if we did, it would probably be to prep a box within the composite, place matrix and wedge, add composite resin. There is very little literature on this technique.
Frankenberger R, Roth S, Kramer N, et al. Effect of preparation mode on Class II resin composite repair. J Oral Rehabil 2003, 30(6) p559-64. Specimens were replaced partially by removing the central part of the proximal box with all margins located in composite. Box-only preparations exhibited a better fatigue resistance than preparations with additional occlusal retention.
- MMC:** We teach the repair of open proximal contacts on newly placed composite resin by pre-wedging, roughening a portion of the composite resin with a diamond bur, place matrix and wedge, etch, bond, and insert composite. Evidence: *Sturdevant* textbook.
- UNC:** Re-doing the proximal segment or the entire restoration with attention to the technique. This is not based on evidence, but in best clinical practice.
- NOVA:** Isolate, removal of enough material in the interproximal area, with a minimal amount of enamel margin accessed, a retentive dovetail in the existing material, then re-restore with Bitine ring matrix and wedge system.
- UPR:** Rubber dam isolation, pre-wedge, box preparation (cutting the wedge), remove the wedge, band placement, wedge is replaced, etching, adhesive, light cure, resin placement (not cured), pre-polymerized resin tag is placed assuring some pressure between axial wall and proximal surface, release the band ¼ turn, hold the tag, and light cure.
- MUSC:** Consider a new Class II restoration within the existing new Class II restoration as a repair, or re-do the entire restoration.
- VCU:** For the most part open proximal contacts require replacement, however, on occasion, if suitable, a slot prep may be done.

What technique is taught to repair an open proximal contact in an old resin composite?

What is the evidence for this method?

- UAB:** Usually the old restoration is replaced in full instead of repaired.
- UFL:** A similar repair, however, a weaker but clinically adequate bond to the old resin will be achieved.
- MCG:** Old resins are more likely to be replaced if any other defects are present and if the origin and type of material are unknown. If repaired, the technique would be as above. Effect of preparation mode on Class II resin composite repair. *R. Frankenberger, S. Roth, N. Krämer, M. Pelka & A. Petschelt Journal of Oral Rehabilitation 30(6);559 June 2003*

- UKY:** If it's an 'old' resin, our first option would be to replace the entire restoration. However, if circumstances dictated otherwise, we might consider a slot prep approach with re-etch, bonding, etc. Evidence: It appears that resin polymerization chemistry would support the rationale.
- ULVL:** Same as above (technique and evidence).
- MMC:** We do not teach the repair of open proximal contacts in an old composite resin. Students are taught to remove and replace a composite if it is old.
- UNC:** Same as above (technique and evidence).
- NOVA:** Depending on clinical and radiographic diagnostic data, periodontal involvement, caries rate, occlusion, etc., the old restoration is completely removed and the tooth re-restored, OR, repair is done (see above). Each case is evaluated on an individual basis. How "old" is an "old" resin? One cannot say at this time
- UPR:** If the restoration is acceptable except the proximal contact, rubber dam isolation, pre-wedge, box preparation exposing buccal and lingual enamel cavosurface margins (cutting the wedge), removal of the wedge, band placement, wedge is replaced, etching, adhesive, light cure, resin placement (not cured), pre-polymerized resin tag is placed assuring some pressure between axial wall and proximal surface, release the band ¼ turn, hold the tag and light cure. Evidence: (Gordan VV et al (2003) JADA 134: 317-23) In a survey of North American dental schools, they reported that 37 schools out of 64 taught undergraduate students to repair resin-based composite restorations. Longevity is expected between one and four years.
- MUSC:** Replace the restoration.
- VCU:** Open proximal contacts on old resins require replacement.

Are bevels part of routine posterior resin composite preparations? Where? What is the evidence for the bevels and the location?

- UAB:** We do not teach beveling margins routinely for posterior teeth. Minimal beveling along Bu and Li margins is acceptable. Preparation must exhibit a smooth enamel cavosurface without frail rods. Where? Do not teach bevels, definitely not occlusal cavosurface margins
- UFL:** No bevels are placed on the occlusal of posterior preparations due to the fragility of these thin areas under occlusal loading. However, bevels are encouraged on non-functional areas involving enamel to improve esthetics, seal and bond strength
- MCG:** No, not routinely used on posterior composite preps. If used, the margins are not in functional areas such as the occlusal. Bevels would be more likely used on proximal margins to remove unsupported enamel and enhance esthetics

- UKY:** Bevels are not routinely used on posterior composite restorations.
- ULVL:** Only on gingival margin IF in enamel. We did a lab study several years ago, but a more recent paper counters this: *Ritter, Andre V: posterior resin-based composite restorations: clinical recommendations for optimal success. J Esthet Restor Dent 2001, 13: 88.* Originally designed to increase the surface area for etching and retention, bevels increase the restoration size by extending the margins onto the occlusal and proximal surfaces. Additionally, beveling of the gingival margin compromises the enamel available for bonding in that critical area.
- MMC:** Not always. Where? (Specify which margins are beveled, if any). If needed, the cervical CSA is beveled to remove unsupported enamel margins if contact is broken, however this is not always the case. What is the evidence for the bevels and the location? *Sturdevant* states that a bevel is not always necessary unless any unsupported enamel rods exists.
- UNC:** No posterior composite bevels.
- NOVA:** Bevels are indicated for esthetic blending in anterior and posterior tooth for preparations resin composite. Class II tooth preparations do not include bevels in the proximal portion (Ref: *Sturdevant, Fourth Edition, p. 557*)
- UPR:** Yes, buccal and lingual margins with adequate enamel structure in direct restorations. Not at the occlusal or proximal margins.
- MUSC:** Slight flair on facial and lingual margins of proximal box.
- VCU:** Proximal, facial/lingual, and gingival margins, is accessible, are beveled.

**In preparation design, when is it acceptable to leave the facial or lingual wall of a proximal box in full contact with an adjacent tooth?
What is the evidence for this?**

- UAB:** Extension of proximal boxes is dictated by the extension of caries in the area not by the proximal relationship of the teeth. It is not necessary to place margins in more easily cleansed areas because patients are educated about methods to clean interproximally.
- UFL:** The facial-lingual width of the box should only be wide enough to allow adequate removal of the proximal caries. Remaining contacting enamel maintains contact and resistance to cusp flexure which weakens the tooth. Present cariology does not support "extension for prevention".
- MCG:** When additional access for caries removal or convenience form is unnecessary.
- UKY:** If there is a broad posterior contact and it does not shred floss after box preparation, we might consider not breaking contact to preserve sound tooth structure. Evidence: Nothing I can quote beyond common sense.

- ULVL:** When the enamel margin is sound (no decalcification). Since wear may affect the proximal contact, keeping some tooth-to-tooth contact may be beneficial. No evidence.
- MMC:** If sound tooth structure and adequate convenience form is established. What is the evidence for this? *Sturdevant* states the extent of the carious lesion dictates the facial, lingual and gingival extensions of the proximal box.
- UNC:** When the restoration can be completed without the extension and the extension needed to break contact is excessive and weakens the tooth. Evidence- larger cavities result in weaker teeth.
- NOVA:** It is acceptable to leave one of the walls when the lesion is very small, very accessible from one wall and substantially far from the other wall, and where doing so would remove a completely healthy wall.
- UPR:** No responses noted
- MUSC:** To prevent excess removal of healthy tooth structure.
- VCU:** If the adjacent tooth is malposed and breaking contact requires too much removal of sound tooth structure the proximal contact at the facial/lingual wall may be left intact.

What is the rational/evidence to support the repair versus replacement of defective composite and amalgam restorations?

- UAB:** Defective amalgams are routinely replaced. Defective composites may be repaired (if recently placed at school when there is information on material used, adhesive, etc) or replaced (when there is evidence of poor bonding and if the restoration was not placed within our system).
- UFL:** Studies (*Mjor and Gordan*) report: 1. Removal of the entire restoration invariably produces a larger defect in the tooth. 2. Bond strength and seal are clinically acceptable in repairs. 3. Repairs avoid repeated pulpal irritation. 4. Repairs are cost efficient. 5. Long term studies show acceptable results.
- MCG:** Repair is appropriate to conserve tooth structure and minimize pulp trauma when clinically indicated (limited, defined defect that offers a good prognosis for longevity). Replacement is appropriate when multiple or significant defects are present that restrict the operator's ability to create a successful repair result or when replacement offers an improved chance for longevity without significant pulp trauma.

UKY: This has been discussed at prior Regional CODE meetings with Florida taking the lead. Their clinical work indicates little recurrent decay in the face of clean margins upon repair preparation and supported by radiographs...our experience confirms. Having said this, we routinely consider replacement of 'defective' restorations unless there are other overriding concerns.

ULVL: The decision between repair or replacement is made based on the quality of the existing restoration, the needed repair strength, the biological price of a total replacement and the skills of the operator. Complete removal of failed posterior resin composite fillings is time-consuming and involves the risk of removing sound tooth substance.

- SAU, C.W., OH, G.S., KOH, H., CHEE, C.S. & LIM, C.C. *Shear bond strength of repaired composite resins using a hybrid composite resin. Operative Dentistry 1999, 24:156.* Repair strengths reaching up to 65% of the cohesive strengths of intact composite specimens.
- Frankenberger R, Roth S, Kramer N, et al. *Effect of preparation mode on Class II resin composite repair. J Oral Rehabil 2003, 30(6) p559-64* Specimens were replaced partially by removing the central part of the proximal box with all margins located in composite. Box-only preparations exhibited a better fatigue resistance than preparations with additional occlusal retention.
- Oztas N, Alacam A, Bardakcy Y. *The effect of air abrasion with two new bonding agents on composite repair. Oper Dent 2003, 28(2) p149-54.* Before adding the composite Herculite, either Optibond Solo (Kerr), Solobond M (Voco) bonding agent or no bonding agent (control group) was applied. The specimens were evaluated for shear bond strength after thermocycling. The results showed that surface treatment with air abrasion plus Optibond Solo application had the highest shear bond strength.
- Dias WR, Ritter AV, Swift EJ. *Reparability of a packable resin-based composite using different adhesives. Am J Dent 2003, 16(3) p181-5.* To compare the repair potential of a packable composite (Filtek P60) to that of a conventional hybrid composite (Pertac II) using three different adhesives: an unfilled resin (EBS-Multi), a one-bottle, acetone-based adhesive (One-Step), and a self-etching adhesive (Prompt L-Pop). Repair strengths were all significantly less than their respective controls, and repairs made using Prompt L-Pop had significantly lower mean strengths.
- Gordan VV, Mjor IA, Blum IR, et al. *Teaching students the repair of resin-based composite restorations: a survey of North American dental schools. J Am Dent Assoc 2003, 134(3) p317-23.* Thirty-seven (71 percent) of the respondents reported that they taught undergraduate students repair techniques as an alternative to replacing failing RBC restorations. Twenty-seven (73 percent) of these 37 schools reported that such teaching was at the clinical level, while only three schools (8 percent) reported that it was included in formal lectures as part of preclinical courses. The major reasons given for teaching students how to repair RBC restorations were tooth structure preservation and reduction of potentially harmful effects on the pulp. Indications included the correction of marginal defect and marginal discoloration.

MMC: If an amalgam or composite restoration is defective (open margin or fractured margin), the restoration is sometimes repaired, if no caries is evident. If there is evidence of any caries or microleakage around a defective restoration, the restoration is replaced.

UNC: At UNC repairs are recommended whenever most of the restoration is intact and the area needing repair does not reveal caries extending to other areas of the restoration.

NOVA: Clinical factors: conservation of healthy tooth structure internally and at the margins, exposing dentinal tubules if not necessary, and avoiding desiccation of dentin.

UPR: Old defective composite restorations are replaced. Sometimes, old anterior composite restorations are prepared and laminated. Margins are placed in enamel. Old amalgam restorations with defective but accessible margins or fractures can be repaired adhesively with composite. Rational includes the preservation of tooth structure, increases the longevity of restorations, reduces cost, reduces potential pulp damage.

MUSC: *Anusavice- AGD Impact 1994 and other articles. Leinfelder- 1997*

VCU: Repair vs. replacement of defective composite and amalgam restorations is done in our clinic on a per case basis. Each individual instructor makes his/her assessment and proceeds accordingly. Certainly the demonstration of leakage would lead us to replace.

Have schools seen a failure problem with bonded resin composite cores associated with post and cores for anterior teeth?

If so, describe and comment.

UAB: Up until 6 years ago we mostly used cast post/core. Failures related mostly to fractured roots or post loss. We avoid use of posts in molars as much as possible. Currently using more prefabricated posts and composite build ups. The rationale: more of the intracanal and the coronal tooth structure remains since there is minimal preparation and adhesive cementation is used, the system also allows for a modulus of elasticity approximating that of the tooth. Yes, there are failures and they usually relate to preparation problems (improper placement of the post), inadequate extension of post inside canal and lack of ferrule effect for the crown itself. Most problems associated with post failure are linked to lack of remaining tooth structure.

UFL: No data has been collected, however our Pros Department demands our students use only cast post and cores.

MCG: Core/post fracture if the post was too narrow, too short, or if insufficient ferrule was used in the crown prep.

UKY: Not if sound restorative principles are followed and good case selection in the first place.

ULVL: No responses noted

MMC: No. If so, describe and comment. No, more failure has been noted with the post than with the composite resin core

UNC: No.

NOVA: Yes, we have experienced problems first with Fluorocore, and more recently, with Luxacore.

- UPR:** Few cases where posts (V'Blocks-Brassellers, Flexi Post-EDS) were fractured at the coronal third of the root leaving a piece of metal post in the canal.
- MUSC:** No.
- VCU:** We are having good success with bonded resin composite cores associated with post and cores on anterior teeth. Again, this is on a per case evaluation and depends on many factors. The pros people regularly require cast posts in anterior teeth.

**What is the longevity of bonding agents for resin composites and amalgam?
Based on the literature, how long can the bond be expected to last in vivo?
Respond in context of bonding to various substrates.**

- UAB:** Amalgam: Evidence of clinical efficacy of bond is reported by Summitt et al. (*Oper Dent. 2004 May-Jun; 29(3):261-8*). 5 year clinical study of pin-retained vs. adhesive amalgam restorations. Performance not improved with adhesive but did not result in more failures. Composite: Clinical reports are limited, mostly based on early compositions. Reduced number of clinical studies due to cost of studies and ease of getting products in the market. Not aware of clinical reports on longevity
- UFL:** Longevity is dependent on the generation of agent used. Recent aging studies report multi component systems are most successful. We are not aware of any reliable in vivo studies of longevity in bonding agents. Studies report composite restorations average 8 years longevity. Summitt reported satisfactory results in 10-year follow up of bonded amalgam restorations.
- MCG:** The longevity is unknown as a generic answer. The literature does indicate that bond strength declines over time; more in dentin than enamel
- UKY:** I'll leave it to Gary Crim at Louisville to quote bible and verse.
- ULVL:** I don't believe that this question can be answered. No in vivo studies are carried out to the ultimate failure point of an adhesive system. What in vivo studies do confirm is that bond strengths continue to decline over time.
- Hashimoto M, Ohno H, Kaga M, et al. *In vivo degradation of resin-dentin bonds in humans over 1 to 3 years. J Dent Res 2000, 79(6) p1385-91.* Investigate the degradation of the resin-dentin bond structures aged in an oral environment for 1, 2, or 3 years. Cavities were prepared in primary molars, and an adhesive resin system (Scotchbond Multi-Purpose) was applied to the cavity. There were significant differences in tensile-bond strength among all 3 groups ($p < 0.05$), with mean values ranging from 28.3 +/- 11.3 MPa (control), to 15.2 +/- 4.4 MPa (1 to 2 years), to 9.1 +/- 5.1 MPa (2 to 3 years). Moreover, under fractographic analysis, the proportion of demineralized dentin at the fractured surface in specimens aged in an oral environment was greater than control specimens. Furthermore, degradation of resin composite and the depletion of collagen fibrils were observed among the aged specimens. Analysis of the results of this study indicated that the degradation of resin-dentin bond structures occurs after aging in the oral cavity.

- *Lundin SA, Rasmusson CG. Clinical evaluation of a resin composite and bonding agent in Class I and II restorations: 2-year results. Quintessence Int 2004, 35(9) p758-62.* Evaluate the clinical performance and longevity of Tetric Ceram and Syntac Sprint restorations in stress-bearing areas performed in general practice. After 2 years, 7 out of 148 restorations had failed, giving a failure rate of 5% of the tested materials. Five restorations failed due to hypersensitivity, one to secondary caries, and one to fracture.
- *Kolinitou-Koumpia E, Dionysopoulos P, Koumpia E. In vivo evaluation of microleakage from composites with new dentine adhesives. J Oral Rehabil 2004, 31(10) p1014-22.* To investigate microleakage in V class composite restorations with total etch versus self-etching adhesives. After 60 days, the total-etch adhesives revealed significantly less microleakage scores than the self-etching adhesive systems tested. (This study doesn't address longevity per se but does indicate a possible problem with self-etching systems.)

MMC: No responses noted

UNC: Longevity of composites and amalgam can not be discussed only within the context of bonding agents. Amalgams can last a lifetime without bonding agents. Literature- There is no conclusive answer to this question. The literature shows that the bond strength decreases over time.

NOVA: The answer is still not clear, and is still controversial. The bond is dependent upon so many factors, in particular, attention to detail during placement. It is difficult to ascertain the in vivo evidence that relates to the bonding agent per se. Regarding amalgam, the bonding agent does not bond amalgam to the tooth as it bonds composite.

UPR: Durability of resin bond of 6th Generation adhesives has been questioned due to hydrolytic instability. The use of more hydrophobic resins that show less water sorption should result in more durable dentin-resin bonds. Universality of Self - Etching primers has been questioned when combined with other bonding systems. According to Dr. Christensen [*JADA (2005) 136:201-03*] a well placed Class II composite by an average to high clinical skill dentist average ten year in service. Based on the literature, how long can the bond be expected to last in vivo? A recent clinical study suggest that both two-bottle and single-bottle adhesives perform acceptably in Class V non-carious lesions for three years (*Tar C AW et al. (2005) JADA 136:311-322*)

MUSC: No responses noted

VCU: No responses noted

III. What is your school's stance on amalgam usage? What "Best Management Practices (BMP) for amalgam waste" have been implemented at your school?

UAB: Amalgam scraps are collected in pre clinical and clinic settings. Students are given a sealed glass jar with water where the residual amalgam is to be placed. The high volume suction also removes pieces and the traps are cleaned periodically. UAB Chemical and Biohazard Waste Division will collect the waste and properly dispose of it.

- UFL:** We recommend amalgam as a safe, economical, durable restorative alternative. Amalgam waste is collected and stored under fixer solution in centrally located containers. Waste along with used amalgam capsules and vacuum traps are safely stored and collected periodically by a reprocessing service.
- MCG:** Amalgam is still used on a regular basis in the dental school. Amalgam scraps in preclinic is stored dry in sealed jars as directed by MCG biohazard collection personnel. Previously we stored the scrap under water and radiographic fixer solution. However, storage under fixer or glycerine may complicate recycling processes. Our clinics have suction traps on all units and unused scraps are stored in designated containers
- UKY:** We currently have a scavenging system within our central vacuum lines for amalgam and other solid debris. This is collected periodically by support staff and sent to a commercial waste disposal facility.

ULVL: Amalgam continues to be the primary material of choice for posterior restorations.
Best Management Practices that have been implemented:

- **Do** use precapsulated alloys (YES) and stock a variety of capsule sizes (NO)
- **Don't** use bulk mercury (YES)
- **Do** recycle used disposable amalgam capsules (YES)
- **Don't** put used disposable amalgam capsules in biohazard containers, infectious waste containers (red bags) or regular garbage (YES)
- **Do** salvage, store and recycle noncontact amalgam (scrap amalgam) (YES)
- **Don't** put non-contact amalgam waste in biohazard containers, infectious waste containers (red bags) or regular garbage (YES)
- **Do** salvage (contact) amalgam pieces from restorations after removal (YES) and recycle the amalgam waste (NOT SURE)
- **Don't** put contact amalgam waste in biohazard containers, infectious waste containers (red bags) or regular garbage (YES)
- **Do** use chair-side traps to retain amalgam (YES) and recycle the content (NOT SURE)
- **Don't** rinse chair-side traps containing amalgam over drains or sinks (YES)
- **Do** recycle contents retained by the vacuum pump filter or other amalgam collection device, if they contain Amalgam (NOT SURE)
- **Don't** rinse vacuum pump filters containing amalgam or other amalgam collection devices over drains or sinks (YES)
- **Do** appropriately disinfect extracted teeth that contain amalgam restorations by storing them in a container of glutaraldehyde or 10% formalin and recycle them along with the chair side trap waste (Note: Confirm with your recycler that they will accept extracted teeth with amalgam restorations) (We don't store extracted teeth)
- **Don't** dispose of extracted teeth that contain amalgam restorations in biohazard containers, infectious waste containers (red bags) or regular garbage (YES)
- **Do** manage amalgam waste through recycling as much as possible (YES)
- **Don't** flush amalgam waste down the drain or toilet (YES)
- **Do** use line cleaners that minimize dissolution of amalgam (NOT SURE)
- **Don't** use bleach or chlorine-containing cleaners to flush wastewater lines (YES)

Practical Guide to Integrating BMPs Into Your Practice:

Non-contact (scrap) amalgam

- Place non-contact, scrap amalgam in wide-mouthed, airtight container that is marked "Non-contact amalgam Waste for Recycling." (YES, EXCEPT FOR THE WORDING)
- Make sure the container lid is well sealed. (YES)

Amalgam capsules

- Stock amalgam capsules in a variety of sizes. (NO)
- After mixing amalgam, place the empty capsules in a wide-mouthed, airtight container that is marked "Amalgam Capsule Waste for Recycling." (YES, EXCEPT FOR THE WORDING)

- Capsules that cannot be emptied should likewise be placed in a wide-mouthed, airtight container that is marked "Amalgam Capsule Waste for Recycling." (YES, EXCEPT FOR THE WORDING)
- Make sure the container lid is well sealed. (YES)
- When the container is full, send it to a recycler. (YES)

Reusable chair-side traps

- Open the chair-side unit to expose the trap.
- Remove the trap and empty the contents into a wide-mouthed, airtight container that is marked "Contact Amalgam Waste for Recycling." (YES, EXCEPT FOR THE WORDING)
- Make sure the container lid is well sealed. (YES)
- When the container is full, send it to a recycler. (YES)
- Replace the trap into the chair-side unit (Do not rinse the trap under running water as this could introduce dental amalgam into the waste stream. (YES)

MMC: BMP for amalgam waste that have been implemented at our school is to dispose of amalgam waste in a container containing glycerin or water.

UNC: Recycling containers are used in the pre-clinical lab, amalgam traps are used in the clinics.

NOVA: BMP for amalgam are implemented, including recycling waste management.

UPR: Amalgam scrap and capsules are stored in closed containers with water. The material is handled through a private company as needed.

MUSC: We do the following:

- Use pre-capsulated alloy
- Recycle used disposable amalgam capsules
- Salvage, store and recycle non-contact scrap amalgam
- Salvage, store, and recycle contact amalgam waste
- Use chair-side traps to retain amalgam and recycle the content
- Manage amalgam waste through recycling as much as possible

VCU: We have implemented a very controlled policy for collecting and discarding used amalgam. This includes daily scrap amalgam into specially marked containers which are picked up by a certified environmental disposal agency, registered with the state.

IV. What is the progress/status of your school with regard to incorporating caries risk assessment principles into the preclinic and clinical curriculum?

UAB: We have made progress but it has been difficult to standardize faculty and treatment plans since it requires multidisciplinary interactions. A very short questionnaire is used but it is not comprehensive enough. The students are not receiving adequate amounts of information in the nutrition classes to properly counsel the patients.

- UFL:** A risk assessment form and the rationale for its use is introduced in the pre-clinical curriculum, and incorporated into every patient's clinical chart. High risk patients are identified and provided a caries medical management protocol incorporating OHI, Daily Fluoride rinse, Dietary Counseling, Retention Site elimination, CHX after treatment, and salivary culture follow-up.
- MCG:** Caries risk assessment is introduced in the preclinical operative dentistry course (freshman), and then reinforced in sophomore cariology seminars and senior restorative seminars. At this time it is inconsistently used in clinic unless the patients are singled out for additional assessment by the clinical faculty. This is one of the areas that was identified in our recent accreditation as needing improvement since MCG does not have a Preventive Dentistry section or department. Several departments are looking into consolidating our efforts in presenting the information.
- UKY:** We are currently formulating an entire caries program/course to add to our curriculum. As it has existed previously, individual course directors included this information into respective courses, but it was difficult to confirm content or currency. My suspicion is that when a faculty line becomes available, Our Dean would very much support hiring a new faculty member with specific training and skills in caries risk assessment/cariology.
- ULVL:** Sophomores receive information in the course, Introduction to Dentistry II, about caries detection/ evaluation. There is a lecture in the Junior Operative course about the dilemma of diagnosing caries. We have a cariology course that covers caries risk/ etiology and it is covered again the in the Senior Restorative Review course.
- MMC:** Students are introduced to CRA principles in Preventive Dentistry and Operative Dentistry. In our department, for patient's that exhibit a low caries risk assessment, we are conservative in our approach of managing caries i.e. Fluoride therapy, reinforce OHI, and composites resins. For moderate to high risk patients, we may recommend GI restorations (Class V), composite resins, amalgam restorations, antimicrobial rinses.
- UNC:** At UNC we are making slow progress towards this end. Caries risk assessment and management principles are introduced in the context of comprehensive diagnosis and treatment planning.
- NOVA:** Caries Risk Assessment and Risk Protocol are incorporated into the preclinic curriculum in the D-1 Cariology course. The clinic application has been carried out informally in the past few years, and this year is being carried out formally, with required documentation (a new, bright green page) in the patient record, and is part of the formal treatment plan for the patient.
- UPR:** We have two or three faculty members calibrated in caries detection by different techniques. We already have a meeting with them this month for departmental faculty calibration (lectures and exercises).

MUSC: We provide some lectures on the subject and have a Caries Management Clinic one half-day each week.

VCU: We have a formal 3 credit hour Cariology course with a special component on caries risk assessment (CRA). CRA is taught and emphasized in the pre-clinical curriculum also. A graded proficiency on a high caries risk patient must be performed in the 3rd and 4th years.

V. Faculty calibration is a fundamental issue that faculties continually struggle with. How do you calibrate faculty with regard to evaluating/grading practical exams, daily clinic work, and clinical competency exams?

Have your calibration efforts improved inter-rater agreement between faculty?

What outcome measures have you used to track the efficacy of your calibration?

Please also respond with emphasis on any innovative, technology-based approaches to calibration that may not have existed in 1999 when this was an agenda item.

UAB: PreClinical: calibration is done utilizing previous exercises graded F to A. Daily work is graded P/F; practical exams are graded by 2 evaluators and discrepancies of 10+ points are dealt with until instructors reach a consensus or bring 3rd instructor to grade. Clinic: every practical/competency is graded by 2 clinical faculty from start to finish which is used for calibration purposes as well. Improved inter-rater agreement between faculty? Discrepancies lie between full-time and part-time faculty. We usually try to schedule part-time faculty with full-time faculty to aid in calibration. New hires are scheduled with the clinic director for at least 2 quarters in the clinic. Outcome measures have you used to track the efficacy of your calibration? None at present. Innovative, technology-based approaches- We are starting to implement documentation of ALL clinical competencies via digital photography. It should aid in calibration and documentation of poor performance in the clinic. The last 2 years, the Operative Director has also been invited to calibration sessions with the state licensing board. The calibration sessions are conducted by professionals outside of the state or university setting.

UFL: Our grading criteria is documented in detail and familiar to all faculty members. Prior to a psychomotor exam, faculty review the criteria. Pre-clinic and clinical competencies are graded in faculty pairs, where adherence to criteria is discussed between graders during the process. Failing grades are corroborated by a third faculty member. Trending data is collected and reviewed on comparative faculty grading performance. Periodically calibration exercises are performed.

MCG: Our pre-clinical courses offer the best opportunity to calibrate faculty since the lab practicals are graded by groups of four instructors. Calibration exercises take place between the instructors before grading to insure consistent evaluation of the projects. Other opportunities for calibration occur between clinical instructors during our clinical competency exams. Individual student competency exams are graded by a consensus between two faculty so the unblended format and open discussion provides calibration activities. Group competency exams and Mock Boards involve blind grading by 3 instructors and "odd" graders can be identified for additional calibration as needed. Part-time faculty shadow full-time clinical instructors for their first few times in our clinics until they get used to our procedures and evaluation criteria.

- UKY:** Like everyone else, we continue to struggle with this area. We previously have done calibration exercises in various restorative pre-clinical courses, but to be honest, this has gone by the wayside in all courses due to time constraints. Calibration as it relates to daily clinic work is a huge problem. Being forced to award a 'grade' to clinical work and given the wide experience level of our full and part-time faculty continues to be a challenge. We currently screen clinical activity sheets for outliers for unacceptable work, but primarily for student feedback only. We have established clinical thresholds of experience as part of the student's successful completion of a course (or they will get an 'incomplete' until accomplished in the following year). The clinical 'grade' however is determined by a cross field of dentofrom clinical skills assessments, clinical work submitted to the laboratory, etc.
- ULVL:** Calibrating faculty regarding evaluating/grading daily clinic and clinical exams.... Three ways:
- (1) The course director for clinical operative dentistry is always one of the graders for competency exams. Other participating faculty are able to calibrate with her for competency exams.
 - (2) Selected Operative faculty who have been doing competency exams for years calibrate yearly during the Mock Board exams plus in the past we have had meetings. The course director for clinical operative would like to schedule time when we could look at dentofrom preps, grade them, and compare and talk. Hope to institute this year.
 - (3) Daily grading - group leaders/ operative faculty are in clinic and working with other faculty and discussing preps/ restorations....at least in theory.
- We believe calibration efforts have improved inter-rater agreement. Individual competency grade cards are reviewed by course director of clinical operative. Clinical board results are one outcome measure
- MMC:** We have altered our daily grading form in which it removes all subjectivity and allows the instructor to be more objective. We have categories in which each area of the preparation is graded and if the preparation or restoration falls within that particular area, then the student is given that particular grade. We have noticed an increase in our faculty being calibrated on the same level. Have your calibration efforts improved inter-rater agreement between faculty? Yes. What outcome measures have you used to track the efficacy of your calibration? Our grading forms.
- UNC:** In Operative the faculty meet regularly to discuss the criteria. Inter-rater agreement - Yes, to some extent, but still not perfect. Outcomes - nothing formally.
- NOVA:** The department faculty meets regularly (approximately once/week). During this time, most faculty members, including many of the adjunct faculty, are present. Many issues related to calibration, daily clinic work, and issues related to competency exams are discussed. In addition, during clinic, two faculty members grade each competency. In the preclinical course, the faculty members are still required to attend lecture, as there are changes in tooth preparation parameters and materials almost yearly. The preclinical faculty members also meet twice

weekly and review many issues related to the preclinical course and student performance. Course faculty receive all course handouts; are expected to write exam questions, and more faculty are invited to present lectures. Inter-rater agreement has essentially improved, more so with the faculty who have been in the preclinical course longer than the newer faculty. Outcome measures that have been utilized are student progress and performance in clinic, performance on licensure exams, types of clinical procedures treatment planned and carried out, and pre-clinic course evaluations.

UPR: We still use two faculty members to evaluate each step in pre-clinical and clinical competency exams. Faculty are assigned at random. New faculty are assigned to participate in the pre-clinical course. Student dentofoms with different quality of work (cavity preparations and restorations) are selected for faculty calibration. Inter and intra correlation agreement over 85% is acceptable. However, with the new curriculum reaching the Senior Class, all clinical competency exams will be departmental exams next year. This will allows us to name at least two examination committees of four or five members to evaluate each discipline.

MUSC: Have all faculty (full and part-time) meet together to discuss calibration. Also, have a manual of "Operative Clinic Protocols" in the clinic for reference and copy given to each faculty member. Improved inter-rater agreement? Somewhat What outcome measures have you used to track the efficacy of your calibration? Periodic discussion and review

VCU: Daily clinical work is not graded. Practicals and competencies are graded and we use an ad hoc type approach to calibrate the faculty. That is, after several cases have been graded, the entire group meets and discusses the parameters that were used to arrive at the grade and to justify the grade. We use a set of guidelines and specific criteria for each grade. For example, an open proximal contact is a failure.

**2005 REGIONAL CODE AGENDA
REGION VI
SUMMARY OF RESPONSES TO REGIONAL AGENDA**

- I. Resin-Based Composite Issues (in addition to the National Agenda items)**
Given some recent research that questions the stability of all-in-one bond agents, are schools using these agents? What is the supporting evidence for their use?

Our schools are not using all-in-one bonding agents. There is not enough evidence to replace the 2- or 3-step systems which have had very good long-term results. (See B. Van Meerbeck)

Are nanofilled composites really different? What is the supporting evidence for their use?

Lab studies may show improvements of Nano-filled composite (e.g. Filtek Supreme) in some properties but the perception is that there is no significant advantage of this material over most microhybrids.

Are surface sealants (i.e., OptiGuard, Fortify) routinely used with composite resin restorations? Why or why not?

Composite Surface Sealants are discussed in lectures but are rarely/if ever used in clinics in most schools. Reasons include- short-term effect only, alteration of built-in fluorescence of the underlying composite, contra-indicated on licensing board exam.

Have you experienced any compatibility problems with curing lights and adhesives or resin materials due to mismatches between photo-initiators and spectral outputs?

There have been rare examples of curing light - composite photo-initiator mismatches because most / all schools have QTH lights in the student clinics.

- II. Competency-Based Education Issues**
Relative to Restorative Dentistry, what is your school's current use of clinical competencies? Increasing, Decreasing, or about the same over the past 3-4 years?

The status of clinical competency experiences for our 11 schools: 5- no change, 4- increasing, 2- decreasing. There is an apparent relationship between competency status (increasing) and less time since the last accreditation.

Explain the change in status if either Increasing or Decreasing? (N/A if same)

Besides recent increases in competencies in conjunction with accreditation, other changes in status were offered: decrease if competencies were redundant or if patient availability was limited, increase with a shift toward a competency-based clinical curriculum.

If you have reduced your students' competency experiences, what are you doing in place of these exercises?

Nothing was done in place of the eliminated competencies at the two schools in which the number of competencies had been decreased because of redundancy or a perceived excess in competencies.

Has your school been through a re-accreditation visit within the last 5 years and were there any "problems" related to your competency-based curriculum?

Relative to re-accreditation and competencies- There were no problems except at one school that has recently added several clinical competency exams.

III. Special Education Issues

Have you had students with physical disabilities in your program? If so, please specify what types.

The responses for physical disabilities included several examples- Students with cancer, a seizure disorder, a paraplegic, carpal tunnel syndrome, familial tremor, and an auto accident in which 2 fingers on the right hand were lost.

Did these students require additional faculty (time or personnel)? Did the student(s) have testing and other accommodations made for them as per the requirements of the Americans with Disabilities Act? What impact did the disability have on their psychomotor skills? What was the outcome of the student(s)' predoctoral education?

More time was allotted to these students and other accommodations as needed per the Americans with Disabilities Act. Most of these students graduated although some dropped out and the one with cancer passed away before graduation.

Regarding students with learning disabilities; were accommodations made for written exams, lab practicals, clinic procedures, clinic competency exams, NDBE Part I or Part II, Regional and/or State Licensure exams? (if so, briefly describe)

Most schools had experiences with students with learning disabilities. More time and quiet testing rooms were made available for written tests although most did not have special consideration for practical exams.

2005 CODE Regional Agenda Region VI- Southeast

Region VI School Abbreviations

UAB	University of Alabama-Birmingham	MMC	Meharry Medical College
UFL	University of Florida	UNC	University of North Carolina
MCG	Medical College of Georgia	NOVA	Nova Southeastern University
UKY	University of Kentucky	UPR	University of Puerto Rico
ULVL	University of Louisville	MUSC	Medical U. of South Carolina
VCU		Virginia Commonwealth University	

I. **Resin-Based Composite Issues (in addition to the National Agenda items)** **Given some recent research that questions the stability of all-in-one bond agents, are schools using these agents? What is the supporting evidence for their use?**

UAB: UAB does not use all-in-one or self etching systems. We have used primer and adhesive combined (PBNT- Caulk/Dentsply) for approximately 3 years and we are in the process of phasing it out of clinics. We see more discoloration of margins in a short period of time and increased post-op sensitivity. Students have difficulty using it properly (multilayer applications, evaporating solvent, etc) because they feel they can speed up the process.

UFL: We are currently using 3M Single Bond. However, we are considering returning to a two-bottle system since recent studies report longer and stronger bonding results.

MCG: We do not use all-in-one bonding agents in our student clinics. Van Meerbeck's research on bond longevity supports the continued use of two- and three-step systems.

UKY: Given the questionable stability reported, we are not using all-in-one bonding agents. Manufacturers place them on the marketplace in our opinion to enhance sales and stay abreast of their 'competition'. Private practice appears to support 'faster is better'. Whether solo bonding agents are indeed 'faster' remains debatable if done well.

ULVL: Not using all-in-one agents. There is as much evidence that questions their use as supports it.

- *Senawongse P, Sattabanasuk V, Shimada Y, et al. Bond strengths of current adhesive systems on intact and ground enamel. J Esthet Restor Dent 2004, 16(2) p107-15*
The two self-etching systems demonstrated lower bond strengths than did the total-etching system on intact enamel (One-Up Bond F, 18.59 MPa; Clearfil SE Bond, 35.71 MPa; Single Bond, 47.20 MPa). No significant difference was found between the total-etching system and the two-step self-etching system on ground enamel (One-Up Bond F, 28.96 MPa; Clearfil SE Bond, 48.51 MPa; Single Bond, 51.07 MPa). Shear bond strengths on ground enamel were significantly higher than those on intact enamel except for the group that was bonded with the total-etching system. **CONCLUSIONS:** The two-step adhesives showed significantly higher bond strengths than did the one-step adhesive.

- Cehreli ZC, Kecik D, Kocadereli I. Effect of self-etching primer and adhesive formulations on the shear bond strength of orthodontic brackets. *Am J Orthod Dentofacial Orthop* May 2005, 127(5) p 573-9. The tested self-etching primer and adhesive systems produced bond strength values much lower than that of the control product. Clinically, these products might not be suitable for orthodontic bracket bonding in terms of the shear bond strength achieved after thermal cycling and water storage.
- Sensi LG, Lopes GC, Monteiro S, et al. Dentin bond strength of self-etching primers/adhesives. *Oper Dent* 2005, 30(1) p63-8. Adper Prompt Self-Etch Adhesive, 3M-ESPE (ADP) and One-Up Bond F, Tokuyama (OU) as self-etching adhesives; AdheSE, Ivoclar-Vivadent (ADH), Clearfil SE Bond, Kuraray (SE), Optibond Solo Plus-Self-Etch, Kerr (OP) as self-etching primers, Tyrian SPE, BISCO (TY) as a self-priming etchant and Single Bond, 3M-ESPE (SB), a total-etch one-bottle adhesive served as a control. The self-etching adhesives OU and ADP and the self-priming etchant TY resulted in lower dentin SBS. OP resulted in the highest mean dentin SBS, while the other materials tested in this study (SE & ADH) presented similar dentin SBS to a total-etch 1-bottle bonding system (SB).
- Turkun SL. Clinical evaluation of a self-etching and a one-bottle adhesive system at two years. *J Dent* 2003, 31(8) p527-34. The clinical performances of a self-etching adhesive system, Clearfil SE Bond, and a one-bottle adhesive system, Prime&Bond NT, were evaluated in non-carious Class V restorations for a period of two years. We can conclude that both adhesive systems tested exhibited very good clinical performance at the end of two years.
- Ireland AJ, Knight H, Sherriff M. An in vivo investigation into bond failure rates with a new self-etching primer system. *Am J Orthod Dentofacial Orthop* 2003, 124(3) p323-6. This study produced weak evidence to suggest that bond failures with a self-etching primer will be higher than those with conventional etching and priming. This increased likelihood of bond failure must be weighed against the time advantage of the self-etching primer when used at the initial bonding appointment.
- Torii Y, Ito K, Hikasa R, et al. Enamel tensile bond strength and morphology of resin-enamel interface created by acid etching system with or without moisture and self-etching priming system. *J Oral Rehabil* 2002, 29(6) p528-33. The purpose of this study was to estimate the effect of three types of different adhesive systems on enamel adhesion. Scotchbond Multi-Purpose (MP) as a traditional system, Single Bond (SB) as a wet-bonding system and Clearfil SE Bond (SE) and Unifil Bond (UB) as self-etching priming systems were used. These results indicate that the traditional system with phosphoric acid etching exhibits the most stable enamel adhesion although the enamel-bonding promoting abilities of these adhesive systems are equivalent to each other.
- Bouillaguet S, Gysi P, Wataha JC, et al. Bond strength of composite to dentin using conventional, one-step, and self-etching adhesive systems. *J Dent* 2001, 29(1) p55-61. Two conventional adhesive systems (Scotchbond Multipurpose Plus, OptiBond FL), four one-step adhesive systems (Scotchbond 1, Asba S.A.C., Prime and Bond NT, Excite) and two self-etching adhesive materials (Clearfil Liner Bond 2 V and Prompt L-Pop) were evaluated. The conventional systems produced higher bond strengths to root dentin than most one-step adhesives & one self-etching adhesive; exception- one material in each respective system.

MMC: No, we currently do not use an all-in-one bonding system. We do however, teach students about the all-in-one bonding system.

UNC: We are not recommending all-in-one adhesives.

NOVA: There are issues with the 6th-7th generation agents. The all-in-one systems have problems with bond strength, and hydrolytic degeneration which can lead to “water trees”. We do not trust these agents in our clinics; more clinical data has to surface before the change will be made.

Ref: “Eighteen-month Clinical Performance of a Self-etching Primer in Unprepared Class V Resin Restorations” Brackett et al, *Operative Dentistry*, July/August 5005, pp 424-429.

UPR: We tried Prompt L-Pop (3M) for a year with Junior and Senior students. Results were contradictory (premature loss of Class IV and Class V restorations) and we went back to etching and Prime & Bond NT (Dentsply) or Single Bond (3M). Universality of self-etching primers has been questioned when combined with other bonding systems. Durability of resin bond also has been questioned due to hydrolytic instability. The use of more hydrophobic resins that show less water sorption should result in more durable dentin-resin bonds. A recent clinical study suggests that both two-bottle and single-bottle adhesives perform acceptably in Class V non-carious lesions.

References: Yamada et al (2005) *Am J Dent* 18:155-59; Tay FR et al (2001) *J Adhes Dent* 3:207-25; Tar C AW et al. (2005) *JADA* 136:311-322

MUSC: Not using them.

VCU: We are not currently using all-in-one bond agents at VCU.
Peumans, M. et al, Clinical Effectiveness of Contemporary Adhesives: A Systematic Review of Current Clinical Trials, "Dental Materials" V (21) p864-81, Sept (2005)

Are nanofilled composites really different? What is the supporting evidence for their use?

UAB: Not aware of sufficient clinical evidence at this time.

UFL: Current literature does not report a superior bond with nanofilled agents.

MCG: Nanofilled composites appear to be variations of microhybrids, but with smaller (nano= 0.005 – 0.01 microns) particles instead of microfiller (0.01 – 0.1 microns) except for Filtek Supreme (3M-ESPE). We are not using them in our student clinics. *Roeters JJM, Shortall ACC, Opdam NJM. Can a single composite resin serve all purposes? Brit Dent J. 2005; 199: 73-79.*

UKY: "Nanofilled" composites appear little more than a marketing device/terminology for manufacturers of small particle composites.

ULVL: Microfilled resin has average particle size of .04μ and nanofilled resin is .02μ. *Gordon Christian (Dental Economics, July 2005) compares nanofilled to microfilled resins and says that nanofilled resins are stronger than microfills and as smooth as microfills.*
Mitra SB, Wu D, Holmes BN. An application of nanotechnology in advanced dental materials. J Am Dent Assoc 2003, 134(10) p1382-90. The dental nanocomposite system studied (Supreme) showed high translucency, high polish and polish retention similar to those of microfills while maintaining physical properties and wear resistance equivalent to those of several hybrid composites.

MMC: No, we feel that nanofilled composites are not really different from microhybrid composites. Their use is indicated for anterior and posterior teeth. A study presented at the March 2004 IADR meeting found that the nanofilled composite resins were not superior to microhybrid composites when it came to staining/discoloration, color stability. Nanofilled composites actually showed a stronger absorption of stains (coffee) than microhybrid.

- UNC:** The inorganic component has different characteristics than hybrid and micro-hybrid composites. The evidence is more empiric than scientific. Most of these are better classified as “nano-hybrids” anyway. There is only one true nanofill composite- Filtek Supreme.
- NOVA:** Nanofillers are different in size of particles, but a composite is a composite. Nanofiller technology is better but clinical evidence does not indicate a significant improvement over most other recent systems. Polish is longer lasting than conventional composite but microfills are equal in polish or even better. Selection of a composite is determined by clinical indications and requirements. Ref: *Sturdevant's Art and Science of Operative Dentistry, 4th edition, pp 194-196.*
- UPR:** No, it has been suggested that nanofilled composites absorb more stains and to be more color unstable when compare to microhybrid composite. However, laboratory studies suggest that nanofilled composite improve abrasive wear resistance, better surface luster and finishing and higher c=c conversion over microhybrid. References: *Turssi CP et al (2005) Dent Mater Jul 21(7): 641-48; Silikas et al (2005) Am J Dent 18(2): 95-100.*
- MUSC:** Original formula for Filtek did not have a high enough value, too gray.
- VCU:** The evidence of their difference is not strong enough at this time.

Are surface sealants (i.e., OptiGuard, Fortify) routinely used with composite resin restorations? Why or why not?

- UAB:** They are not routinely used.
- UFL:** Not routinely used here. Literature supports their use to enhance longevity of restorations; however there is disagreement among faculty members as to their efficacy.
- MCG:** We use them (Optiguard) as a final step for our composites (Point-4) because of the literature that indicates increased wear-resistance and stain-resistance. *Dickinson, GL, Leinfelder, KF. Assessing the Long-Term Effect of a Surface Penetrating Sealant. JADA, 124:68-72, 1993.*
- UKY:** As the first year composite resin preclinical course director, I lecture and support the use of surface sealants to help seal surface imperfections, cracks/crazes, etc. We have Bisco Fortify Plus and Ultradent PermanSeal available though I seldom see it used in the student clinic.

- ULVL:** No. Some of the material was used in the clinic (unauthorized) and the result was a “splint” between the adjacent teeth.
- Lee YK, Lu H, Powers JM. *Effect of surface sealant and staining on the fluorescence of resin composites. J Prosthet Dent* 2005, 93(3) p260-6. Natural teeth and several commercial resin composites emit a strong blue fluorescence when exposed to ultraviolet (UV) light, which makes teeth whiter and brighter in daylight. Spectral reflectance and color of 4 resin composites (Filtek Supreme, Gradia Direct, Simile, and Vit-I-escence) were measured with/without application of a surface sealant (BisCover). **CONCLUSION:** Fluorescence of resin composites decreased or disappeared after surface sealant application.
 - Takeuchi CY, Orbegoso Flores VH, Palma Dibb RG, et al. *Assessing the surface roughness of a posterior resin composite: effect of surface sealing. Oper Dent* 2003, 28(3) p281-6. This study assessed the in vitro influence of surface sealing on the surface roughness of a posterior resin composite before and after toothbrushing. It may be concluded that using either a surface penetrating sealant or a one bottle adhesive system did not provide the optimization of superficial integrity. The use of a dentifrice and toothbrush resulted in significant alterations to the surface smoothness of the resin composite.
 - dos Santos PH, Consani S, Correr Sobrinho L, et al. *Effect of surface penetrating sealant on roughness of posterior composite resins. Am J Dent* 2003, 16(3) p197-201. The surface penetrating sealant effectively decreased the surface roughness for Alert (0.5435 +/- 0.2182 microm) and Definite (0.2956 +/- 0.0368 microm) ($P < 0.05$), but had no effect upon Z100 (0.3331 +/- 0.0565 microm) and Prodigy Condensable (0.2760 +/- 0.0920 microm) as these have smaller filler sizes than the other composites tested ($P > 0.05$).
 - Ramos RP, Chimello DT, Chinelatti MA, et al. *Effect of three surface sealants on marginal sealing of Class V composite resin restorations. Oper Dent* 2000, 25(5) p448-53. There was better sealing at the occlusal margin, and in this region, there were no statistically significant differences among the materials ($p > 0.05$). In the cervical region, Fortify and Protect-it! showed improved results over the Control Group, and Optiguard showed similar results to the Control Group (without sealing).
- MMC:** No, surface sealants are not routinely used with composite resin restorations. We do not use them because their use is contraindicated on the Southern Regional Testing Agency Exam.
- UNC:** We are not recommending surface sealants. We feel there is not enough evidence to fully justify their use.
- NOVA:** Not routinely used, decision based on long-term vs. short term effect.
(Ref: Albers, *Tooth Colored Restoratives, Ninth Edition, p. 178*)
- UPR:** No, we don't use them. The exception is in controlling post treatment sensitivity with composite restoration (Resealing of margins).
- MUSC:** Discussed in the classroom, not routinely used.
- VCU:** No. The thinking here is that wear occurs too fast to be of much use.

Have you experienced any compatibility problems with curing lights and adhesives or resin materials due to mismatches between photo-initiators and spectral outputs?

- UAB;** We are using QTH lights in our clinics and have not had problems with them, unless there was a technical problem in the unit.

- UFL:** Not so far. We use halogen curing lights in student clinic and Ultralume LED in faculty clinic.
- MCG:** We are not using any resin-based materials that are not compatible (photo-initiator) with our standard QTH student clinic curing lights.
- UKY:** Not really. Our light curing units are in such poor disrepair and unable to get parts to repair that nuances of compatibility problems are relatively mute. We limit the number of bonding agents/composites in the student clinics and our current, antiquated lights appear to 'work' sufficiently though no one has really investigated depth of cure. We encourage students given our equipment shortcomings to fill with small increments. Given fiscal restraints, our Assoc. Dean of Student Clinics is entertaining the notion of students purchasing hand-held, portable curing lights as part of their student kits in the future.
- ULVL:** Yes. LED and GC Fuji Liner LC.
- MMC:** No
- UNC:** At times these problems have been experienced, but mostly when one-bottle adhesives are combined with auto-cure composites. We are not using any photo-cured materials that are not compatible with all VLC units, including LED's.
- NOVA:** No problems related to these issues have been evident in our clinics or the faculty practice.
- UPR:** Not really, we are using materials and curing lights from the same manufacturer.
- MUSC:** Not so far.
- VCU:** No.

II. Competency-Based Education Issues
Relative to Restorative Dentistry, what is your school's current use of clinical competencies? Increasing, Decreasing, or about the same over the past 3-4 years?

- UAB:** The number of competencies increased slightly following the last accreditation and it has remained the same since.
- UFL:** The same. We are having problems finding enough patients for all the competencies.
- MCG:** Slight decrease. Eliminated the Sealant (Sophomore Clinic) and the Crown Impression (Junior-Senior Clinic) Competencies.

UKY: There was a flurry of activity related to clinical competencies the past year or so which was frankly related to an accreditation site visit truth be known. Given the myriad of complications and the student's tendency to consider themselves 'complete' in regards to a particular competency passed (avoiding further procedures in a given arena until graduation), plus the many inequities of case selection, etc, I am not a supporter of competency based education. In my opinion, it simply does not work. This undoubtedly is not the official position of our school, however many of my fellow faculty feel similarly whether they'll admit the same to the administration or not. My feeling is this is yet another 'trend' which has come and is on it's way out in lieu of whatever is the next popular bandwagon that'll be proposed, supported by administrations peer pressure and jumped upon. How many other themes have we seen in the past several decades???

ULVL: Decreasing:
 Junior year - went from 5 to 4
 Senior Year - went from 6 plus Mock Boards to 5 including Mock Boards

MMC: About the same.

UNC: We have introduced clinical competencies recently (increasing).

NOVA: The use of clinical competencies is approximately the same during the past 3 years. Clinical competencies include patient procedures as well as typodont procedures.

UPR: About the same but, starting this year, students are required to do two implants (single tooth or implant supported overdenture).

MUSC: About the same.

VCU: Below I have appended the clinical competencies we use in the third and fourth years. In the third year the competencies are done on mannequins but in a clinical setting and under regular clinical conditions. We have increased the amount of clinical competencies in both the third and fourth years. (*This form has been edited for spacial reasons, Editor*)

*Directed Simulations: Simulations will consist of prescribed procedures, not at the student's discretion. Listed below are the procedures and points that will be obtained upon satisfactory completion.

Junior Year:	Points	Number	Total Pts
Inlay Prep (#12 MOD)	9	1	9*
RBB Prep (#6-8)	4	2	8*
CI II Amal. Prep (#13 DO)	2	1	2*
Diastema (#8-9)	4	2	8*
PFM Prep and Temp. (#30)	7	1	7
Lam. & Por. Ven. Prep (#8 & 9)	2+10	2	12
Amal. Prep MO/DOL (#15)	5	1	4.5
Comp. Core with pin (#19)	4.5	1	4.5
Total	33	11	55

Only two simulation procedures will be allowed per clinic session to ensure proper attention to the detail aspects of the procedures performed. You will not be permitted to use diastema closure simulation on lower anteriors for credit.

The competencies are:

- 2 Class I amalgam preps and restorations to be completed (together) in one clinic session
- 2 Class II amalgam preps and restorations
- 2 Class III composite preps and restorations

For the competencies other than the Class I's, the Class II and Class III competencies can be completed one at a time or up to two per clinic session. All competencies must have two graders. The graders must be (1) full-time faculty and one full- or part-time faculty

COMPETENCIES FOR THE SENIOR YEAR: (VCU SoD 2006)

COMPETENCY EXAMINATIONS (60% of total grade)

1. Operative Competencies

A. Core Build-Up Competency: (20% of grade)

The student must complete the preparation and restoration of 4 or more surfaces of a posterior tooth on a clinic patient. The tooth to be restored must have at least one proximal contact with an adjacent tooth and have opposing occlusal contact with a natural tooth or a tooth with a definitive restoration. The procedure may include a core build-up of a non-vital tooth, with/without pins or a prefabricated post and core. The treatment must be performed so that the resulting restoration is the most conservative to restore appropriate form and function. This procedure must be started and completed in the same clinic session and must have the approval of a full-time member of the Department of General Practice. All patient selection and grading guidelines as set forth in the section of this manual regarding clinical competencies will be followed. The student will be evaluated on the following criteria:

- a. Patient selection, local anesthesia selection and pain management
- b. Appropriateness of the treatment modality presented
- c. Appropriate caries removal and tooth preparation
- d. Appropriate selection of restorative material(s)
- e. Final restoration outcome

B. Class IV Competency: (20% of grade)

The student must complete the preparation and restoration of 4 or more surfaces of an anterior tooth on a clinic patient. The tooth to be restored must have at least one proximal contact with an adjacent tooth and have opposing occlusal contact with a natural tooth or a tooth with a definitive restoration. This procedure must be started and completed in the same clinic session and must have the approval of a full-time member of the Department of General Practice. All patient selection and grading guidelines as set forth in the section of this manual regarding clinical competencies will be followed. The student will be evaluated on the following criteria:

- a. Patient selection, local anesthesia selection and pain management
- b. Appropriate caries removal and tooth preparation
- c. Appropriate selection of restorative material, shades and restorative technique
- d. Final restoration outcome

In addition, the student is required to submit a report of each competency including photographs before treatment (pre-operative), during the restorative procedure (preparation finished but before restoration) and after treatment is accomplished (post-operative), as part of the competency. Visit the Blackboard site for the course where the webpage for submission is listed. These competency examinations must be completed May 1st of the D-4 year. If not, a zero (0) grade will be rendered for the examinations. The competency will still need to be completed at a satisfactory level (2.0 or better) and the zero will stand.

2. Mock Board Examination (20% of grade)

The Mock Board Examination will be given approximately 3 weeks prior to the respective clinical board examinations (SRTA and WREB). The exact dates for the examinations will follow the release of the clinical board examinations for that year. The examination will follow Board (SRTA, WREB, NERB) Protocol and will be given on mannequins. The purpose of this examination is to test the entry-level operative and restorative skills of the student, knowledge of the respective protocols and instructions for the clinical board exams, and to better prepare the student to manage the real clinic board examinations.

This competency exam must be taken by all D4 students at the appropriate time regardless of whether a student plans to take a clinical board examination or not. To give the student an opportunity to practice before the Board test, a student who obtains a failing grade in this competency must retake the examination before the Board examination date, during clinic hours and with two full time faculty members assigned to the floor to grade the new procedures.

Explain the change in status if either Increasing or Decreasing? (N/A if same)

UAB: N/A

UFL: N/A

MCG: Sealant Competency is tested in Pediatric Dentistry (redundant with Restorative) and the Crown Impression is part of the overall Crown Competency Procedure (redundant).

UKY: I'd judge it's dying a slow and justifiable death.

ULVL: There seems to be the perception that there are just not enough indications in the patient pool for operative competencies as they have existed and still have enough patients for the boards too. Also the change in the junior year is due to two reasons: one to test at a beginner's level for all classes of preps/restorations and also to reduce the competition with seniors for competencies and board patients.

MMC: N/A

UNC: The change seems to be favorable.

NOVA: N/A

UPR: N/A

MUSC: N/A

VCU: More emphasis is being placed on competencies as we are considering going to a competency based curriculum. Also, we do our best to mimic the clinical situation as encountered on the board exams.

If you have reduced your students' competency experiences, what are you doing in place of these exercises?

UAB: N/A

UFL: N/A

MCG: Nothing. Unnecessary for these competencies because of redundancy.

UKY: Though not an opinion held in vogue, I'm one of those dinosaurs who feel you gain first adequacy, then expertise with a particular procedure by repetition. Given our already crowded curriculums, this is not a popular stance with administration that continues to shove non-clinical items into an already overburdened curriculum. Trying to argue with the proponents of adding yet more and ever-more non-clinical, often basic science/research based or touchy-feely initiatives into the curriculum is like arguing against Mom and Apple Pie. Yet no administration is willing to strongly advocate moving to a 5 year curriculum. Guess what always suffers...yes, clinical dentistry.

ULVL: Junior year:
before: 2 Class IIs and 2 Class II/IVs and one on choice (Class II/III/IV or V)
now: 1 Class I, 1 Class II, 1 Class III/IV and 1 Class V
Senior year:
before: 3 class IIs and 2 Class II/IVs and 1 of choice
now: 3 Class IIs (1 amalgam, 1 composite and 1 of choice) plus 2 Class II/IV

MMC: N/A

UNC: N/A

NOVA: N/A

UPR: N/A

MUSC: N/A

VCU: N/A

Has your school been through a re-accreditation visit within the last 5 years and were there any "problems" related to your competency-based curriculum?

UAB: We will have a site visit in 2007.

UFL: Accreditation five years ago and there were no problems.

MCG: We had re-accreditation last year and no problems were identified in this area.

UKY: Yes, we had an accreditation site visit last year. No problems.

ULVL: Site visit in 2001. No problems with accreditation

MMC: No.

UNC: Yes. The clinical competency exercises have been introduced in part due to feedback from the re-accreditation visit.

NOVA: The last accreditation was in May 2000. There were no problems related to the competency-based curriculum at that time.

- UPR:** We are going to have an accreditation visit next February 2006.
- MUSC:** Yes. No problems with Operative competencies, but some problems with lack of competencies in other departments.
- VCU:** Yes we have been through a re-accreditation in the past five years. We had no problems related to competencies.

III. Special Education Issues

Have you had students with physical disabilities in your program? If so, please specify what types.

- UAB:** A student with cancer died before graduating, another student had a seizure disorder.
- UFL:** No
- MCG:** About 15 years ago we had a student that was confined to a wheelchair due to paralysis in his legs. Five years ago we had a student develop sever carpal tunnel syndrome.
- UKY:** Physical- no. Learning- yes.
- ULVL:** One student was missing a finger on the left hand. One was deaf.
- MMC:** No.
- UNC:** Not that I know of.
- NOVA:** Student with familial tremor.
- UPR:** Yes, minor (ex. one leg shorter than the other) and major (auto accident injuries).
- MUSC:** No.
- VCU:** N/A

Did these students require additional faculty (time or personnel)?

- UAB;** No
- UFL:** N/A
- MCG:** No additional faculty time or resources were needed for either student. The student in the wheelchair graduated and is still in private practice. The student with carpal tunnel syndrome was given time off for surgery and rehabilitation. When the carpal tunnel student returned, they were given a phased re-entry schedule - included a gradual increase in lab and clinic time.

UKY: The University does have these mechanisms in place, however we have not had students with substantial physical disabilities to test those waters.

ULVL: No

MMC: N/A

UNC: N/A

NOVA: Student required additional time to complete projects, along with some additional faculty instruction.

UPR: No, one student with physical impediment did not require more time and additional faculty. But several years ago, we had a junior student that lost two fingers of his right hand in an automobile accident. In order to complete his dental training he took an extra year to re-train his left hand and his accomplishments were excellent.

MUSC: N/A

VCU: N/A

Did the student(s) have testing and other accommodations made for them as per the requirements of the Americans with Disabilities Act?

UAB: No

UFL: N/A

MCG: Yes

UKY: N/A

ULVL: Yes

MMC: N/A

UNC: N/A

NOVA: Student did not declare this as a disability.

UPR: Yes, those who formally request ADA accommodations had more time allowed under supervision.

MUSC: N/A

VCU: N/A

What impact did the physical disability have on their psychomotor skills? What was the outcome of the student(s)' predoctoral education?

- UAB:** The student with a seizure disorder quietly left the clinic when they sensed a seizure coming and returned when it was over.
- UFL:** N/A
- MCG:** The student in the wheelchair graduated on time with no problems and has been practicing since. The student with carpal tunnel syndrome was unable to recover completely and withdrew.
- UKY:** N/A
- ULVL:** Minimal. One graduated. One is currently a sophomore and progressing through the curriculum.
- MMC:** N/A
- UNC:** N/A
- NOVA:** The student with familial tremor had some improvement of their psychomotor skills. The student may have been dealing with other issues and decided to discontinue pre-doctoral dental education.
- UPR:** We had a student with high academic performance with low to average psychomotor skills (clinical and laboratory performance).
- MUSC:** N/A
- VCU:** N/A

Regarding students with learning disabilities; were accommodations made for written exams, lab practicals, clinic procedures, clinic competency exams, NDBE Part I or Part II, Regional and/or State Licensure exams? (if so, briefly describe)

- UAB:** N/A
- UFL:** Written Exams, NDBE Part I or Part II: Twice as much time. Administered in privacy.
- MCG:** Written Exams, NDBE Part I or Part II: Extra test time and a quiet room.
- UKY:** In all of these cases, students are given additional time to complete the required task at hand. I cannot speak to National Boards though suspect they are given additional consideration. Regional/State Licensure exams: I'm not sure special consideration is currently given; though suspect they would support such an initiative within constraints.
- ULVL:** Written Exams, NDBE Part I or Part II: Yes. Separate testing area

- MMC:** No responses noted.
- UNC:** I can only speak for the first two (written and lab practicals). UNC has a center that assists students with learning disabilities. Accommodations were made so that these students had more time than other students to complete exams and practicals.
- NOVA:** Written exams, Lab practicals: Yes, as directed by the Office of Academic Affairs; this includes additional time and/or quiet room. Re: practicals, student chose not to use the additional time.
- UPR:** Yes, more time allowed. One student needed an extra year to complete the DMD Program and pass the National Boards.
- VCU:** Written exams: VCU actually has a separate "entity" that deals with testing of students who fit into the category of "learning disability". A separate facility with individual rooms is made available and proctors are supplied. All other testing (laboratory, clinical etc) is done under normal conditions.
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Is there Regional interest in discussing the two developing U.S. National Clinical licensure examinations? (Reference: ADA news, July 11, 2005; Vol 36, No.13)

All schools are interested in this subject even the schools that are not part of a regional testing agency.

- NOVA:** Florida is not yet part of a regional testing agency. There has been a change in the past year in that the Florida Board Exam is being administered by the NERB testing agency. The exam, however, is still the same exam format and the same procedures are tested. The licensure is only for Florida.

Suggestions for CODE.

What can the organization do to improve its effectiveness?

- UFL:** Have consensus recommendations, and suggest members encourage their colleges comply with uniform techniques and materials
- UKY:** Restorative dentistry in general and operative dentistry specifically continues to be the bottom-dwellers in academia as it relates to salary and thereby recruitment of the highest caliber educators and researchers nationally. You get what you pay for. Anything the organization can do to enhance operative/restorative dentistry's reputation via faculty development/recognition and supporting a 'specialty' board process could only help.
- UPR:** Coordinate the development of seminars (continuing education) for new faculty training, calibration and development in academics, calibration in caries detection innovative techniques, case based questions, etc.

What is suggested to improve the Web site?

<http://netserv.unmc.edu/code/codeFrame.html>

No responses noted

Other comments?

1. Is your college administration planning or do you currently have in-place a “generalist” “comprehensive” or multi-disciplinary clinical curriculum? How is this affecting the teaching of Operative Dentistry? Has there been any effect on the continuity between pre-clinic and clinic? The organization of Operative as a Department or discipline? Faculty hires? Full-time vs. Part-time? G.P. vs. specialist? Faculty calibration?
2. Do you incorporate vital pulp therapy in your pre-clinical and clinical curriculum and practice? Are you in concurrence with treatment taught in Endodontics? Pedodontics? Prosthodontics?

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