

**Conference of Operative Dentistry Educators**  
**(CODE)**



***REGIONAL REPORTS***

*FALL 1999*

<http://www.uchsc.edu/sd/rstdenti/OpDSect/code.html>

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**Conference of Operative Dentistry Educators (CODE)**  
Forward - Larry D. Haisch, D.D.S.

CODE continues to be an invaluable resource for the sharing of information discussing concerns and solutions by Operative Dentistry educators at the Regional meetings. The collegial interaction and networking which takes place can only continue to improve the teaching of Operative Dentistry in North America.

As charged by the Executive Council of the Operative Section of American Association of Dental Schools, the National Director attended the Fall meetings of Regions II, III, and IV. The other regional meetings will be attended in the next two years. The experiences and observation of those meetings reconfirmed the comments made in the previous paragraph.

Utilizing electronic media for communication (e-mail) and information (Web site), has been accomplished but at a basic level. The Fall 1999 CODE regional reports are to be placed on the Web Site for the first time. In this manner more of our colleagues should be able to access the information. Each person needs to advise their administration of CODE and what it accomplishes - direct them to the information. Remember we are all part of the profession of dentistry. Communication is necessary not only within our organization, but with other dental organizations. The Academy of Operative Dentistry, the dental licensure boards, the Academy of General Dentistry, the American Dental Association, to name a few.

CODE is to be or will be based on the desires of the membership. The CODE Advisory Committee needs to hear from you as to future direction.

Thank you to the 1999 CODE Fall Regional Meeting host/coordinators for all their efforts on behalf of CODE. Drs. James Simon (Region I), Pat Kelsey (Region II), William Tate (Region III), Robert Rashid (Region IV), Richard Lichtenthal (Region V), and Jim Knight (Region VI).

Thank you to the Regional Directors for the work accomplished in their respective regions, and the assistance/advice, guidance provided the National Director. Finally, thank you to Dr. Craig Passon for assisting CODE in improved communication via the web site.

<http://www.uchsc.edu/sd/rstdenti/OpDSect/code.html>

The web site will be transferred to the AADS server in the future.

The Section of Operative Dentistry of the American Association of Dental Schools 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 a regional meeting 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 to 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 AADS 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
- Attend the region's meeting
- See that meeting dates, host person and school are identified for the following year
- Do follow-up assist on dues "non-payment" by schools
- See that reports of regional meetings are submitted within 30 days of meeting conclusion to the national director
- See 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

<u>Region</u>		<u>Regional Director</u>	<u>Term</u> (subsequent terms - 3 years)
I	Pacific	Dr. Jim Simon University of the Pacific San Francisco, California	2000-2002
II	Midwest	Dr. John Killip University of Missouri Kansas City, Missouri	2000-2002
III	South Midwest	Dr. Terry Friuts University of Oklahoma Oklahoma City, Oklahoma	1998-2000
IV	Great Lakes	Dr. Bob Rashid Ohio State University Columbus, Ohio	1998-2000
V	Northeast	Dr. Warren Scherer New York University New York, New York	1998-2001
VI	South	Dr. Kevin Frazier Medical College of Georgia Augusta, Georgia	1998-2001
II	At-Large	Poonam Jain Southern Illinois University Alton, IL	1998-2001
II	National Director	Dr. Larry D. Haisch National Director University of Nebraska Lincoln, Nebraska	1998-2001

## Regions and Schools

<p><b><u>Region I (Pacific) - 9</u></b></p> <ul style="list-style-type: none"> <li>✓ Loma Linda</li> <li>Alberta - C</li> <li>✓ British Columbia - C</li> <li>✓ UCLA</li> <li>✓ UCSF</li> <li>✓ Oregon</li> <li>✓ Pacific</li> <li>✓ USC</li> <li>✓ Washington</li> </ul>	<p><b><u>Region II (Midwest) - 10</u></b></p> <ul style="list-style-type: none"> <li>✓ Colorado</li> <li>✓ Creighton</li> <li>✓ Iowa</li> <li>✓ Manitoba - C</li> <li>✓ Marquette</li> <li>✓ Minnesota</li> <li>✓ UMKC</li> <li>✓ Nebraska</li> <li>✓ Saskatchewan - C</li> <li>✓ Southern Illinois</li> </ul>
<p><b><u>Region III (South Midwest) 7</u></b></p> <ul style="list-style-type: none"> <li>✓ Baylor</li> <li>✓ Louisiana State</li> <li>✓ Mississippi</li> <li>✓ Oklahoma</li> <li>✓ Tennessee</li> <li>✓ Texas, Houston</li> <li>✓ Texas, San Antonio</li> </ul>	<p><b><u>Region IV (Great Lakes) 11</u></b></p> <ul style="list-style-type: none"> <li>Case Western</li> <li>✓ Detroit</li> <li>✓ Illinois</li> <li>✓ Indiana</li> <li>✓ Michigan</li> <li>✓ Northwestern</li> <li>✓ Ohio State</li> <li>✓ Pittsburgh</li> <li>SUNY - Buffalo</li> <li>✓ West Virginia</li> <li>✓ Western Ontario - C</li> </ul>
<p><b><u>Region V (Northeast) - 18</u></b></p> <ul style="list-style-type: none"> <li>Boston</li> <li>✓ Columbia</li> <li>✓ Connecticut</li> <li>✓ Dalhousie - C</li> <li>✓ Harvard</li> <li>✓ Howard</li> <li>Laval - C</li> <li>✓ Maryland</li> <li>McGill - C</li> <li>✓ Montreal - C</li> <li>✓ New Jersey</li> <li>✓ NYU</li> <li>Pennsylvania</li> <li>✓ SUNY - Stony Brook</li> <li>✓ Temple</li> <li>✓ Toronto - C</li> <li>✓ Tufts</li> <li>✓ US Naval Dental School</li> </ul>	<p><b><u>Region VI (South) - 11</u></b></p> <ul style="list-style-type: none"> <li>✓ Alabama</li> <li>✓ Florida</li> <li>✓ Georgia</li> <li>✓ Kentucky</li> <li>✓ Louisville</li> <li>✓ Meharry</li> <li>✓ North Carolina</li> <li>✓ Nova Southeastern</li> <li>✓ Puerto Rico</li> <li>✓ South Carolina</li> <li>✓ Virginia</li> </ul>

✓ = Paid Member - December 1999

C = Canadian

66 Schools (10 Canadian, 56 United States)

**Enclosure #1**  
**CODE REGIONAL MEETINGS REPORT FORM**

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REGION: I (Pacific)

LOCATION/DATE OF MEETING:

University of the Pacific School of Dentistry, 2155 Webster Street, San Francisco, CA  
September 30-October 1, 1999

CHAIRPERSON:

Name: James F. Simon Phone #: (415) 929-6581

Address: 2155 Webster Street Fax #: (415) 929-6654

University of British Columbia E-mail address: jsimon1@uop.edu

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LIST OF ATTENDEES: (including Phone #, Fax #, E-mail address - sample format attached)

Please attach

SUGGESTED AGENDA ITEMS FOR NEXT YEAR:

LOCATION/DATE OF NEXT YEAR'S MEETING:

Name: Tar-Chee Aw Phone #: (206) 543-5948

Mailing Address: University of Washington Fax #: (206) 543-7783

Department of Restorative Dentistry; Box 357456 E-mail address: tcaw@u.washington.edu

Seattle, Washington 98195

*Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;  
40<sup>th</sup> 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 or via e-mail with an attachment,  
indicating the software program and version utilized.*

**1999 National CODE Agenda**

1. **Vital pulp treatment**

a. **When, where, and who teaches this topic in your curriculum?**

**Loma Linda:**

Taught in the endodontics course to sophomores; 1 hour lecture on direct and indirect pulp treatment from a diagnostic standpoint and clinical testing for vitality.

**UBC:**

Our curriculum at UBC is currently undergoing major reconstruction. In the new PBL (Problem Based Learning) curriculum vital pulp treatment is being addressed by operative dentistry (end of year 2, and in year 3), by endodontics (year 3), and by oral biology (via cases in years 2 and 3).

**UW:**

Oral Biology 2<sup>nd</sup> year, Restorative 3<sup>rd</sup> year clinical protocols.

**UCSF:**

Endo Department Primarily.

**UCLA:**

1<sup>st</sup> year Operative – pre-clinical: Bases, Liners and varnishes  
2<sup>nd</sup> year Endodontics – pulpal treatment / Histology, testing.  
3<sup>rd</sup> year Histology, Oral Biology, Microbiology.

**Oregon:**

Operative and Endo

**UOP:**

Taught in endodontics course. Also covered in second year when Dentin bonding is covered.

b. **Is this treatment utilized in patient care by students?**

**Loma Linda:** Yes.

**UBC:**

Yes.

**UW:**

Yes.

**UCSF:**

Yes, on a routine basis for selected cases.

**UCLA:**

Yes, it is. The SOD outlined in pre-clinical is duplicated in the Restorative clinic.

**Oregon**

Yes.

**UOP**

Yes, very selectively.

c. **What criteria/protocol are following in deciding to do or not do vital pulp treatment?**

**Loma Linda:**

Status of the pulp condition is determined based on patient symptoms and various pulp tests (EPT, cold, hot).

**UBC:**



Clinical criteria include history of pain (or none), degree (and type) of bleeding, pulp testing, and radiographic data.

**UW:**

Size of exposure, mechanical or carious exposure, pulp history – vitality and symptoms, finances. Vital pulp, mechanical exp.

**UCSF:**

Patient age, pulp vitality, size of exposure, mechanical vs. caries exposure; tooth being symptomatic prior to treatment would indicate to do the endo and not a pulp cap. Also, if tooth is too hyperemic so that you cannot stop the bleeding, pulp cap is contraindicated.

**UCLA:**

1. Patient Symptoms
2. Depth and Chronicity of decay, dycal, leave caries, liner – NOT ETCHING / BONDING
3. Vital pulp verified by tests
4. Remaining tooth structure adequate to support, Non-Pulpal Retained Build-Up or Base
5. Isolation. Moisture Control. Quality

**Oregon:**

Condition of the pulp – asymptomatic / symptomatic  
Symptom of the pulp – reversible / irreversible

**UOP:**

No history of pain. Ability to control bleeding. Small exposure. Tooth then restored with direct composite.

- d. **What concrete evidence supports the concept of vital pulp treatment? Please site the scientific evidence.**

**Loma Linda:**

See the textbook by Walton and Torabinejad – Principles and Practice of Endodontics

**UBC:**

The evidence base is weak because of wide range of clinical variables and rapid change and replacement of biomaterials (both brands and types).

**UW:**

Sturdevant.

**UCSF**

Reports by CVC, Stanley, Pashley and Shovelton, Textbook "The Science of Endodontics" with chapter on "Pulpal Reaction to Caries and Dental Procedures" by Syngcuk Kim and Henry O. Trowbridge.

**UCLA:**

Sturdevant 3<sup>rd</sup> ed. and Hilton's review of the literature has identified several studies supporting this treatment technique – however, clinical trials have been few and often equivocal.

**UOP:**

Articles by Cox.

2. **List five of the most important operative dentistry topics which need to be studied via clinical trials**

**Loma Linda:**

- a. Long term DBA effectiveness
- b. Wear/marginal adaptation of new composites
- c. Use of cad-cam technology
- d. Effect of (use and abuse) of air-abrasion for restorative procedures
- e. Toxicity of new restorative materials

**UBC:**

Vital pulp treatment, long-term and dentin and enamel bonding/sealing, resin modified glass ionomers, interfaced vs. non-interfaced bonded amalgams, electronic caries detection, assessment of amalgam and opposite restorations for replacement vs. repair, and evaluation of appropriateness of nonintervention. (We count different in Canada)

**UW:**

- a. Durability of posterior composites (direct & indirect)
- b. Durability of all-ceramic restorations
- c. Significance of fluoride-releasing materials
- d. Significance of resin/resin-ionomer cements
- e. Does usage of new tech – air abrasion, lasers, plasma-arch lights, result in better outcomes
- f. Restoration of vital pulp exposures in all ages
- g. Strengthening of teeth by bonded composites
- h. Posts, cores – efficacy of various systems

**UCSF:**

- a. Dentin Bonding and longterm bondstrength
- b. Wear Resistance of Posterior Composite
- c. Repairability of composite vs. complete replacement
- d. Future need or uses for amalgam (Build-ups only?, restorations?, etc.)
- e. Future of Lasers in tooth preparation for restoration

**UCLA:**

- a. Liners and varnishes vs. DBA's with amalgams
- b. Etiology and treatment of cervical lesions – abfractions, etc...
- c. Protocols for minimally invasive operative = NO TX vs. SEAL vs. FLOWABLE COMPOSITE
- d. Longevity of ceramic inlays, posterior composites
- e. RESIN MODIFIED CEMENTS: Longevity / retention / micro-leakage. v.s. "traditional" cements.

**Oregon:**

Composite / bonding / sealant. Do away with amalgam?  
Air abrasion  
Painless dentistry  
Treatment planning

**UOP:**

- a. Vital Pulp Treatment
- b. Minimal Caries Treatment – electronic caries Detection
- c. Air abrasion
- d. Durability of posterior esthetic materials
- e. Esthetic Post and cores

**3. Calibration of faculty**

- a. **What is the protocol for calibrating and standardizing your operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**

**Loma Linda:**

Loma Linda uses a grading from that is criteria based. A separate sheet with specific criteria is provided and discussed with current and new faculty. Students are also provided with the same criteria sheet.

This same form is used from the pre-clinical courses on through to the clinical competencies so that the student is familiar with the grading criteria. With this form, the instructor is only concerned with identifying the criteria-based errors and is not burdened with a grade determination. The grade is figured separately based on the achievement of the criteria.

**UBC:**

A, B. Meetings prior to each session to calibrate; dedicated "supervising" faculty to assist and oversee calibration; post-session evaluations; course post-mortems; quarterly gatherings of faculty (part-time and full-time together) with special topic (expect) presentations. Our standardization and interrater calibration has been rendered all the more challenging with the advent of PBL and ICC (Integrated Clinical

Care) programs because of the increase in number of part-time faculty, the loss of division-based control and monitoring of in-service training for faculty, and the irregularity of scheduling and clustering of individual operative clinic procedures, including patient management.

**UW:**

Slides, handouts. Preclinic – template, rotation, experience (diffusion).  
Honors students.

**UCSF:**

Peer review. Calibration exercise(71 specimens). CRES MANUAL.

**UCLA:**

About ½ of faculty go through preclinical course and are calibrated through group grading, discussions and mentoring from senior course member. Remaining faculty are not calibrated and clinical faculty lack formal calibrating exercises.

**Oregon:**

Orientation / staff meeting; group calibration in pre-clinical; group discussion; recent graduates know criteria.

**UOP:**

PreClinic – very specific grading criteria. Meeting together to calibrate and continuous calibration during grading sessions.  
Clinic – faculty grade in teams and work together to calibrate during test cases.

**b. How often is calibration/recalibration done?**

**Loma Linda:**

With this criteria-based grading form, we have found close calibration among the faculty. Most of the examiners have been using this form for the past two years and appear to be comfortable with it.

In the pre-clinical courses, we calibrate the instructors prior to a grading session by having them initially grade six of the projects and then comparing the results among the group. We are also in the process of setting up a standardized set of models with criteria-based errors for current and new faculty.

**UBC:**

A, B. Meetings prior to each session to calibrate; dedicated “supervising” faculty to assist and oversee calibration; post-session evaluations; course post-mortems; quarterly gatherings of faculty (part-time and full-time together) with special topic (expect) presentations. Our standardization and interrater calibration has been rendered all the more challenging with the advent of PBL and ICC (Integrated Clinical Care) programs because of the increase in number of part-time faculty, the loss of division-based control and monitoring of in-service training for faculty, and the irregularity of scheduling and clustering of individual operative clinic procedures, including patient management.

**UW**

Semi-annual meeting for clinic protocol. Pre-class meeting before each lab session.

**UCSF:**

Twice a year.

**UCLA:**

Pre-clinical: every quarter – several times.  
Clinical: not performed.

**Oregon:**

Almost every pre-clinical lab.  
On going in clinic.

**UOP:**

PreClinical – prior to the first practical exams and then as needed.  
Clinical – continuous.

**c. What evidence supports your protocol for calibration and recalibration?**

**Loma Linda:**

Individual scores given by each instructor are recorded and then compared with the group. Each instructor then receives the overall composite scores and is able to self-evaluate where he/she compares within the group.

**UBC:**

Regular retrieval of student feedback about faculty members and course offerings (both in simulation and clinically), and comparison of evaluations (both qualitatively and quantitatively) of students.

**UW:**

Historical/empirical/anecdotal.

**UCSF:**

Competency exam graders need to be calibrated so as to have consistency in grading the students preparations and restorations. The CE is a requirement for graduation (Perio, Op. Dent, C & B, Endo, Behavioral Sciences) and standardization is essential to fairness. New faculty have to be instructed on the competency criteria so as not to interject personal biases.

**UCLA:**

None. KNIGHT's work out of Detroit Mercy is quite good and may be implemented at UCLA (some day).

**Oregon:**

Consistency of what we do in clinic.

**UOP:**

Individual instructor scores are recorded and compared to the group. Students are asked to evaluate clinical and preclinical faculty at the end of each course.

**4. Competency evaluation**

**a. How is competency based operative evaluation determined?**

**Loma Linda:**

Students are required to do the following competencies:

Junior year: Class II Ag; CI III, IV, or V composite; cusp replacement Ag; and full gold crown

Senior year: Bridge, ceramo-metal, partial coverage crown and two mock boards.

**UBC:**

Competency based tests (process and product) and daily formative feedback.

**UW:**

Competency exam – weekly criteria-based evaluation. Clinic – daily grade sheets. Written diagnosis and treatment planning test at end of 2<sup>nd</sup> year.

**UCSF:**

CRES MANUAL CRITERIAL APPLIED TO COMPETENCY CLINICAL EXAMINATIONS.

1. SKILLS ATTAINMENT
2. COMPETENCY EXAM

**UCLA:**

Class II Amalgam Exam at evaluation of Pre-clinical and passing grades in all other quarters.

Competency exams, 5 amalgam, 2 composite + 1-2 mockboards.

**Oregon:**

Group evaluation

**UOP:**

Third year –           5 Amalgam Test Cases  
                              2 Composite Test Cases

Second Year – 2 Amalgam Test Cases  
1 Composite Test Cases

**b. How is the weak student identified?**

**Loma Linda:**

Through the grading and evaluating process.

**UBC:**

The weak student is identified through formative feedback and specific instructor identification, and by poorer/failing performance on competency tests.

**UW:**

Evaluation procedures – grade sheets, incident reports, tracking of student progress database.

**UCSF:**

Daily notations on progress and performance in the Blue Coaches Group notebooks by daily attending faculty. These are reviewed regularly. Students are interviewed by Group Coach once each quarter formally and as often as needed informally to discuss progress, areas needing improvement, professionalism, etc. Weaker students are discussed at periodic meetings of the Group Coaches and course directors.

**UCLA:**

By bench instructors via daily work/exams and very very rarely by clinical faculty during patient care.

**Oregon:**

Quickly.

**UOP:**

PreClinic – instructor evaluations  
Clinic – instructor evaluation

**c. What measures are taken to upgrade competency of the weak student?**

**Loma Linda:**

Remediation and retaking the competency or mock board.

**UBC:**

Personal interview, review, and practice.

**UW:**

Individual remediation. Basic science tutor, dental school tutors, faculty (FT instructor or Clinical affairs). Big brother/big sister matchups. Faculty advisor programs.

**UCSF:**

A more concerted effort is given to bringing the weaker student up to par. The more advanced students in each coaching group are encouraged to help the weaker students as time permits. Weaker students will often have to take the CEs several times to reach a passing grade reflecting at least minimal competency.

**UCLA:**

Remediation exercises as determined by the course chair and exam make-ups. Monday evening tutorial 2.5 hours with one instructor.

**Oregon:**

Tutoring 1 on 1.

**UOP:**

PreClinic – Saturday morning sessions with one instructor and two Second Year students.

5. **Computer based interactive education**

a. **What interactive computer-based teaching tools are you using to teach operative dentistry?**

**Loma Linda:**

None available at this time.

**UBC:**

Web CT (for Web-basing all suitable course materials); PowerPoint presentation format drawing on digital cameras (including intraoral camera), and video digital projection; AXIUM digital clinical records management program, digital x-ray, OSCE (utilizing Internet materials), Internet access to biomaterials information.

**UW:**

Nothing interactive – web and CD-ROM lecture and lab material – text, pictures and graphics.

**UCSF:**

None that are interactive, only one dealing with anatomy for local anesthesia. Have some video tapes.

**UCLA:**

All lectures on Web Site.

**Oregon:**

None – no money

**UOP:**

Every operative preclinical procedure has been video taped and placed on CD for computer use. They are not interactive and are without audio. Students will be purchasing lap top computers next year.

b. **Who developed them?**

**UBC:**

Web CT and AXIUM are commercially available programs which were initially developed at UBC

**UW:**

Individual faculty, health sciences resources, university resources.

**UCLA:**

N/A

**UOP:**

Two members of the Operative faculty with support from computer education specialist and Dean.

c. **Would your school/region participate in development and in what manner?**

**UBC:**

We're already involved in software development (see B, above).

**UW:**

Yes. Collaborative exchange, dialogue, discussion. Ideas and software. Consortium.

**UCSF:**

Yes, but who will fund it and develop it? Resources are slim.

**UCLA:**

I doubt we would be able to find either the money or the faculty (with ample time) to dedicate to this.

**Oregon:**

As time permits.

**UOP:**

We have already given copies to many of the West Coast Schools on various preparations.

**6. Posterior esthetic restorations - report on direct and indirect**

**a. Are they included in the curriculum? What discipline?**

**Loma Linda:**

Direct restorations: Part of Operative I (Freshman) and Operative II (Junior) courses

Indirect restorations: Part of Operative II (Junior) course

**UBC:**

Yes.

**UW:**

Yes. Operative and Fixed.

**UCSF:**

Both direct and indirect composite restorations are included in the Operative Dentistry curriculum as well as ceramic inlays and onlays. Indirect composite inlays are sent to a commercial lab for fabrication as well as porcelain restorations. Taught in Preclinical course. Lacey covers indirect in lecture. No lab in clinic.

**UCLA:**

Yes in operative for inlays, fixed for onlays, operative for composites / direct procedures.

**Oregon:**

Yes.

**UOP:**

Yes. Operative.

**b. Where (pre-clinic and clinic)**

**Loma Linda:**

Pre-clinical: Freshman and Junior years

Clinical: Senior study club and with certain covering instructors. Not widely available as a general clinical procedure at this time.

**UBC:**

Both preclinical (simulation) and clinical.

**UW:**

2<sup>nd</sup> year operative, fixed 2<sup>nd</sup> year ceramic (didactic). 4<sup>th</sup> year clinical class – for indirect all-ceramic restorations. Instructor discretion for clinical post comp.

**UCSF:**

Both.

**UCLA**

Both.

**UOP**

Taught in preclinical and are allowed to place in Senior Esthetic clinic with close supervision.

**c. Required experiences?**

**Loma Linda**

None at this time as part of graduation requirements

**UBC:**

In simulation only.

**UW**

Class attendance, clinical experience.

**UCSF:**

It is not a requirement, but most of the students want to learn these techniques and apply them clinically. More and more patients are demanding the esthetic restorations.

**UCLA:**

Yes, in pre-clinical ONLY.

**UOP:**

Simulation only: PRR, Sealant, Class II MO, and MOD Inlay.

**d. What materials and/or systems utilized?**

**Loma Linda:**

Kerr Herculite XRV & Surefil (Caulk)

3M Scotchbond MP

All-Bond system

**UBC:**

Composite (operative), porcelain inlay and PFM (prosthodontics)

**UW:**

Herculite, Allbond, Empress2, OPC.

**UCSF:**

Use of routine composite materials. Currently the so called "Condensable" composite are not used.

**UCLA:**

Direct: Opti Bond and Herculite XRV and Optiguard

Indirect: Empress I, occasionally ARTGLASS or Bellglass.

**Oregon:**

3M and Kerr XRV / Z100

Multipurpose

**UOP:**

Surefil, Prime & Bond NT

Tetric Ceram / Heliomolar, Optibond Solo

**e. What are the results? Also site the evidence for the reported results.**

**Loma Linda:**

Anecdotally, results have been positive; however, we have no systematic follow-ups.

**UW:**

Good, due to tight control, and good case selection.

**UCSF:**

Good result as seen on 6 month internal routine recalls of patient.

**UCLA:**

Anecdotal --\_ Results guarded.



UOP:

Presently are at one year recall on 30 Surefil Molar restoration as part of research project sponsored by Caulk/Dentsply.

## CODE Questions

### 1. What is CODE doing well?

UW:

Participation, discussion, exchange of ideas.

UCSF:

A good means for faculty of different schools to get together and compare notes. The yearly report from all the regional is way information.

UCLA

Bringing minds and ideas together – very well done!

UOP

Inviting State Board members to attend.

### 2. Where do you desire improvement?

UW:

Standardizing teaching, closer association with licensing boards, ADA, NIDCR, IADR, AADS etc., setting standard of care/testing/teaching.

UCSF:

To develop an E-mail network to further communication. Semi-annual newsletter (besides the report).

### 3. In \$24 US/\$30 Canadian school dues adequate? Comments are expected.

UW

Seems minimal – does it cover the activities of CODE?

UOP:

Does it cover cost?

### 4. How can participation by faculty in CODE regional meetings be encouraged/improved?

UW:

Credible, worthwhile, accomplishment – connection to Operative Academy activities. Impact on testing standards. Research collaboration? Action/follow up/after talking.

UCSF:

Funding by the Dental School. Hold in conjunction with a regional Dental Meeting, such as CDA, or at the National AADS Meeting.

UOP:

Send reports and announcements to attendees not Department Chairs.

Please indicate the office / position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc., are to be mailed. NOTE: Regional Director – this information from each school is to be transmitted to the National Director.

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Enclosure #1  
CODE REGIONAL MEETINGS REPORT FORM

**REGION:** II (Midwest)

**LOCATION/DATE OF MEETING:**

Creighton University School of Dentistry,  
September 20, 21, 1999

**CHAIRPERSON:**

**Name:** Pat Kelsay

**Phone #:** (402) 280-5093

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**LIST OF ATTENDEES: (including Phone #, Fax #, E-mail address - sample format attached)**

Please attach

**SUGGESTED AGENDA ITEMS FOR NEXT YEAR:**

**LOCATION/DATE OF NEXT YEAR'S MEETING:**

**Name:** John Killip

**Phone #:** (816) 235-2100

**Mailing Address:** UMKC School of Dentistry

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**Date:** September 18, 19, 2000

Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;  
40<sup>th</sup> 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 or via e-mail with an attachment,  
indicating the software program and version utilized.

## 1999 National CODE Agenda

Based on review of the 1998 Fall Regional CODE reports by the CODE Advisory Committee. Refer to Conference of Operative Dentistry Educators Regional Reports, Fall 1998 – previously sent to each CODE dues paying member school, the CODE Advisory Committee and the Executive Council of the Operative Section, American Association of Dental Schools.

### 1. Vital pulp treatment

#### a. When, where, and who teaches this topic in your curriculum?

##### Creighton University:

Sophomore year preclinical curriculum taught in the Operative and Endodontic laboratories by faculty.

##### University of Missouri/KC:

Operative section: Lecture presentation in the second semester of this first year.

Lecture presentations second year and third year.

We have recently changed Endo faculty and I am not familiar with their materials.

##### University of Iowa:

Freshman Operative Lecture

Sophomore Operative Lecture

Sophomore Pediatric Lecture

Junior Pediatric Lecture

##### University of Colorado:

This topic is taught through out the curriculum in the basic and clinical sciences. Several divisions talk about vital pulp treatment; all with a different focus or purpose however. The clinical curriculum is where most of the learning occurs through applied practice. No single entity within this School is responsible for the sole teaching of this subject. However, it is generally assumed that Operative Dentistry is ultimately responsible.

##### Southern Illinois Univ.:

Sophomore Operative – lectures and pre-clinic (extracted teeth)

Junior and senior student presentations

Endodontics, pedo

##### University of Minnesota:

3<sup>rd</sup> year

Operative Dentistry

Dr. Zidan

##### UNMC College of Dentistry:

Division of Operative Dentistry, 2<sup>nd</sup> year preclinical course (didactic); 3<sup>rd</sup> and 4<sup>th</sup> year operative dentistry clinics (practical).

#### b. Is this treatment utilized in patient care by students?

##### Creighton University:

Yes

##### University of Missouri/KC:

Yes occasionally in the clinic along with CaOH, in two of our teams the faculty are using bond material under amalgam restorations while in the other two teams we use the CaOH and Copalite.

##### University of Iowa:

Yes

##### University of Colorado:

Yes, students utilized the treatment taught for vital pulp treatment in the clinics.

##### Southern Illinois University:

Yes

**University of Minnesota:**

Yes

**UNMC College of Dentistry**

Yes

c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?

**Creighton University:**

1. Symptoms
2. Pre-op tests
3. Size of exposure
4. Color of exposure
5. Age of patient
6. Size of restoration
7. Contamination

**University of Missouri/KC:**

Faculty experience and preference. There are not any clinical comparison studies being conducted at this time in our clinic.

**University of Iowa:**

Radiographs, pre-existing symptomatology, chairside diagnosis (Cold, EPT, etc)

**University of Colorado:**

The following criteria are evaluated; History of the tooth, signs and symptoms, value of the tooth to the treatment plan, clinical findings (size of the caries; quality of the caries; size of exposure; etc.), proposed final restoration.

Caries

We always attempt to avoid a pulp exposure

Asymptomatic tooth; no exposure; some caries remains.

Place calcium hydroxide; a base; sealer; and final restoration.

Symptomatic tooth; small (<0.5 mm) exposure; some caries may remain.

Place calcium hydroxide; provisional restoration (IRM); then reevaluate later for final restoration or RCT.

Symptomatic tooth; large (>0.5 mm) exposure; some caries may remain. Schedule for RCT or Extraction.

Mechanical Exposure

Generally, the same as above.

**Southern Illinois University:**

Whether exposure is carious or mechanical.

Only those carious exposures are treated which stop bleeding in a minute or less.

If the tooth is to receive a crown – all exposures lead to RCP.

**University of Minnesota:**

1. Quality of isolation
2. Size of exposure
3. Ability to stop bleeding
4. History of pain
5. Patient age and health
6. Ability of patient to seek emergency follow-up care, if needed.
7. Radiographic evidence of periapical pathology.

**UNMC College of Dentistry:**

All of the criteria below should be present before vital pulp therapy is undertaken:

Vital preoperative pulpal status

Asymptomatic tooth, except for cold sensitivity

Good isolation of cavity

Minimal-sized pulp exposure (< 1mm diameter)

Normal appearance and hemostasis of pulpal tissue at exposure site

- d. **What concrete evidence supports the concept of vital pulp treatment? Please site the scientific evidence. Additional comments welcome.**

**Creighton University:**

Pameiser → Scientific presentation – June 1999

**University of Missouri/KC:**

Refer to attached articles

**University of Iowa:**

"Treatment Options for the Vital Exposed Pulp," Swift, E, et al PPAD, Vol. 11, Aug. 99, pp. 735-739

**University of Colorado:**

We rely on the research of Harold Stanley and Charlie Cox for vital pulp treatment.

**Southern Illinois University:**

Although many studies have been published, they have been done on healthy teeth on primates. Healthy but contaminated pulps are not similar to pulps responding to decay.

**University of Minnesota:**

1. Patterson and Watts, Further studies on the exposed germ free dental pulp. Int'l Endo J (1987) 20; 112-121.
2. Cox et al., Biocompatibility of Surface-sealed dental materials against exposed pulps. J. Prosthet Dent (1987) 57: 1-8.
3. Fitzgerald and Heys, A clinical and histological evaluation of conservative pulpal therapy in human teeth. Oper Dent (1991) 16: 101-112.

**UNMC College of Dentistry:**

Concerning calcium hydroxide vital pulp treatment, decades of use and validation of its present form (suspended in a resin vehicle) by Stanley (Stanley, HR. Dycal therapy for pulp exposures, Oral Surg, Oral Med 24:818-827, 1972) and many subsequent investigators. We acknowledge that the stimulation of reparative dentin is of less importance than previously thought, and recognize the fragility and solubility of calcium hydroxide products, attempting to overlay them with resin-modified glass ionomer whenever space permits.

Concerning vital pulp treatment by etching exposure sites and surrounding dentin, and application of a hydrophilic resin adhesive, we have not incorporated this into our curriculum because other investigations have not confirmed the findings of Cox et al (Cox, CF et al. Biocompatibility of surface-sealed dental materials against exposed dental pulps. J Prosthet Dent 57:1-8, 1987), and some sharply contradict these findings (Pameijer, CH, Stanley, HR. The disastrous effects of the "Total Etch" technique in vital pulp therapy in primates). The available evidence, all primate studies, does not justify discarding an effective technique.

2. **List five of the most important operative dentistry topics which need to be studied via clinical trials**

**Creighton University:**

- a. Condensable composites
- b. Pulp capping procedures
- c. Flowable composites
- d. Management of excessive occlusal wear
- e. Crown margin design – placement

**University of Missouri/KC:**

- a. Critical need for cavity design in light of the newly developed materials.
- b. This one is hard to word. Comparison of long term results of when current materials are used in accordance with the manufacturer's protocol.
- c. Longevity of posterior composite (condensable/flowable).
- d. Comparison of bonding agents versus Copalite under amalgam restorations.
- e. Pulp capping
- f. Root caries

**University of Iowa:**

- a. Restoration longevity/survival rates.
- b. Caries inhibition by fluoride releasing materials.
- c. Complex amalgams vs. cast coverage.
- d. Restoration of endodontically restored teeth.
- e. Early detection methods of caries.

**University of Colorado:**

- a. Caries inhibition of fluoride releasing restorative materials.
- b. Clinical performance of indirect esthetic restorations.
- c. Clinical performance of amalgam bonding in lieu of other forms of retention.
- d. Outcomes of minimally invasive operative dentistry versus traditional operative dentistry.
- e. Clinical evidence to support the use of compomers for restorations.

**Southern Illinois University:**

- a. Treatment of stained grooves on occlusal surfaces of posterior teeth.
- b. Pulp capping
- c. Decay removal – carious vs. sclerotic dentin under amalgam restorations.
- d. Long term clinical trials on bonded amalgams and composite restorations.
- e. How long does the dentin composite resin bond last in the oral cavity?

**University of Minnesota:**

- a. Criteria for selection and treatment of dried pulp exposures.
- b. Predicting and preventing cusp fractures.
- c. Accuracy of caries risk assessment and outcomes of caries control measures.
- d. Etiology and treatment (or no treatment) of abfraction lesions.

**UNMC College of Dentistry:**

- a. Performance of ceramic restorations of various materials and preparation design.
- b. Performance of large posterior resin restorations.
- c. Performance of various materials in restoration of root caries.
- d. Performance of various materials in restoration of large abfraction lesions.
- e. Performance of hybrid ionomer luting agents with ceramic restorations.

**3. Calibration of faculty**

- a. **What is the protocol for calibrating and standardizing your operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**

**Creighton University:**

Calibration and standardization is done on a weekly basis in the preclinical laboratories. Grades are given by multiple faculty and discussion ensues if variances are observed. The clinical faculty are standardized less frequently. The grades given by each clinical instructor are analyzed and reported. Behavior modification is expected.

**University of Missouri/KC:**

Two summers ago we had the opportunity of spending ½ day per week with our operative and generalist faculty. During that time we had members of each department educate and calibrate the faculty members. Since that time the operative calibration has consisted of sessions with the preclinical faculty prior to each semester and during exam periods in the laboratory. We have not had the opportunity to work with the clinical faculty or generalist faculty. I have not even had ½ a day with each of the new generalist faculty members that have been added since 1997. Nor have these generalist faculty members been rotated through the preclinical labs in all of the disciplines.

**University of Iowa:**

Clinical

Nothing at present other than written criteria in evaluation and competency forms.

Currently working of new model using slides with simulated preparations.

Preclinical

Set of models for calibration showing degrees of variation from ideal.

**University of Colorado:**

We have no FORMAL calibration program. The faculty of restorative dentistry meet often to discuss issues of importance to changes in operative dentistry treatment; we communicate freely with one and other about changes that should be made; most faculty work in the pre-clinical courses and the clinic. Most of the faculty rotated through the pre-clinical courses to learn the new topics being taught.

**Southern Illinois University:**

Independent grading of student preps followed by discussions.

Each practical exam – grading session.

**University of Minnesota:**



Clinical faculty: no calibration of current or new faculty. 3 full-time faculty grade competency exams.

Preclinical faculty: new faculty attend lectures. Current faculty attend short meeting with course director prior to each lab to review what is expected of students. Course director reviews criteria prior to each competency exam then does a post-exam review of all scores to identify misapplication of grading criteria. One examiner grades only one cavity preparation or restoration feature for all students. Student's grade is a sum of all examiners grades which tends to balance "easy" grades and "hard" grades.

**UNMC College of Dentistry:**

All full-time faculty attend all operative dentistry lectures, and preclinical practical examinations and clinical competency examinations are exclusively graded by the full-time faculty. This collaborative grading and associated discussion, amongst a small group (5) of faculty has served as an effective means of calibration, for both new and long-time faculty members.

**b. How often is calibration/recalibration done?**

**Creighton University:**

Weekly in freshman and sophomore years.  
Quarterly in the Junior clinic.

**University of Missouri/KC:**

Not often enough.

**University of Iowa:**

Clinical

Preclinical

Each year with new faculty.

**University of Colorado:**

Not done on a regular basis. This is a continuous process with no regular schedule.

**Southern Illinois University:**

At the beginning of the fall semester.  
At every practical exam.

**University of Minnesota:**

Answered in "a"

**UNMC College of Dentistry:**

Approximately 4 times/semester preclinically, and yearly for clinical competency examinations. Calibration for the latter is simplified by use of pass/non-pass grading.

**c. What evidence supports your protocol for calibration and recalibration? (Please site)**

**Creighton University:**

Student performance on competency examinations.

**University of Missouri/KC:**

None at the present time.

**University of Iowa:**

**University of Colorado:**

No evidence to offer at this time.

**Southern Illinois University:**

**University of Minnesota:**

None

**UNMC College of Dentistry:**

None

**4. Competency education**

**a. How is competency based operative evaluation determined?**

**Creighton University:**

Competency examinations

**University of Missouri/KC:**

Clinical proficiency exams conducted on typodonts in the fall and winter semester of the senior year. Patient mock boards in the winter semester of the senior year.

**University of Iowa:**

Freshman – Practical examinations

Sophomores – Competency discontinued – only daily feedback and evaluation forms

Juniors – Set criteria for given number of competency restorations

**University of Colorado:**

Students work under a comprehensive care clinic format. There are no specific operative dentistry “requirements” (numbers) nor are there any specific procedures which must be performed (for example numbers of class II amalgams). The students treat their patients according to the patients needs and in a timely fashion. Operative dentistry competency evaluation is determined through several measures. These include; numbers of operative dentistry related activities the student experiences (there is no set number); kinds of operative dentistry activities experienced; quality of clinical performance during that treatment session; subjective assessment by the students Comprehensive Care Group Leader; and performance on operative dentistry clinical competency examinations (there are 9 to be taken at interval over one and a half years). The sum of these measures indicates a students progress towards competency.

**Southern Illinois University:**

Through clinical competencies

Didactic grades

Overall through rigorous overseeing of grades by SPAC (Student Progress and Awards Committee)

**University of Minnesota:**

Competency is composite, amalgam, cast gold mock boards

3 full-time faculty evaluate

**UNMC College of Dentistry:**

Clinical competencies, amalgam and resin restorations, in the 3<sup>rd</sup> and 4<sup>th</sup> years.

**b. How is the weak student identified?**

**Creighton University:**

Pass/Fail of the competency exam

**University of Missouri/KC:**

Good question. Not a good answer. Poor quality care provided to patients. In one of our clinical teams the faculty meet weekly and discuss student progress, we have a good handle on who our weak students are. In our other two clinical teams this process is just beginning to occur.

**University of Iowa:**

Failures on competencies

Clinical procedure log for daily performance

E-mail to course director concerning problems with daily performance (documentation)

**University of Colorado:**

They are identified by their Group leader and brought to the attention of the Chairs. We have an intermediate level of evaluation at which the students are expected to achieve a certain level of performance. Based on the outcomes of the measures at that time weak students can be identified.

**Southern Illinois University:**

Didactic grades  
Failure to complete all clinical competencies  
Daily clinical work

**University of Minnesota:**

Preclinic: bench instructor's evaluations and practical exams

**UNMC College of Dentistry:**

Poor performance in daily work is confidentially recorded in a faculty notebook in clinic, to hopefully identify weak students before they identify themselves through failure of a competency exam

- c. What measures are taken to upgrade competency of the weak student?

**Creighton University:**

Remediation and retesting

**University of Missouri/KC:**

Additional typodont work and very close faculty supervision. Both very time consuming processes for the student and especially faculty.

**University of Iowa:**

Remedial work  
May revert to dentoform if necessary  
Tutors (pre-clinical)

**University of Colorado:**

Weak students are identified and then are required to work more closely with their Group leader for a set period of time or until a level of achievement is reached. Special enhancement sessions can be established in addition to the one-on-one assistance. Very weak students are set back and may have to repeat a semester or a year.

**Southern Illinois University:**

Remediation of preclinical courses.  
Tutors for help in lab.  
Some students may be sent back to lab if incompetent in clinic.

**University of Minnesota:**

Preclinic: course director meets with student to identify appropriate remediation. Usually a 3<sup>rd</sup> or 4<sup>th</sup> year student is assigned to tutor the weak student under the direction of the course director.

**UNMC College of Dentistry:**

Measures range from coaching, to reading assignments, to removal of a student's clinical privileges until remediation is undertaken on a dentoform patient simulator, depending on the severity of the deficiencies.

5. Computer based interactive education

Region VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for educational purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.

- a. What interactive computer-based teaching tools are you using to teach operative dentistry?

**Creighton University:**

None

**University of Missouri/KC:**

None  
We have just taken delivery on one Dent Sim unit and have not engaged students in its use.

**University of Iowa:**

Computer based lectures – non-interactive

**University of Colorado:**

We have no formal interactive computer-based teaching tools at this time. However, most of the operative dentistry courses will be on the Web. We are moving in the direction of online courses with minimal "lecturing". With the entire campus moving to a new site within the next five to ten years there is a moratorium on extensive construction on the present campus. The new campus will make extensive use of this sort of technology.

A simulation lab is planned but will not be build on this campus. The School does own a DenX Dental Simulator. However, it is just beginning to be used. There has been no formal development on this instrument. We also have the Visible Human Haptic Robotics laboratory available to us.

**Southern Illinois University:**

None

Elmo in the preclinic

Anatomy and dental morphology have some interactive software

**University of Minnesota:**

None

**UNMC College of Dentistry:**

None

**b. Who developed them?**

**Creighton University:**

**University of Missouri/KC:**

**University of Iowa:**

**University of Colorado:**

Dr. Craig Passon is the person doing most of the development in this area.

**Southern Illinois University:**

**University of Minnesota:**

**UNMC College of Dentistry:**

**c. Would your school/region participate in development and in what manner?**

**Creighton:**

Yes – Testing

**University of Missouri/KC:**

I would like to work with other schools – I do not know the amount of time or financial support that would be identified for this project.

**University of Iowa:**

Yes

**University of Colorado:**

Perhaps. The tools are what need to be developed; the content should be supplied by each school for their school.

**Southern Illinois University:**

**University of Minnesota:**

Possibly but would prefer collaboration with other schools to develop outcome assessments to support treatment planning decisions.

**UNMC College of Dentistry:**

No, unless evidence becomes available that such tools improve the clinical performance of dental students.

**6. Posterior esthetic restorations – report on direct and indirect**

**a. Are they included in the curriculum? What discipline?**

**Creighton University:**

Yes – Operative

**University of Missouri/KC:**

Direct Operative second semester two lectures three lab periods.

Direct Crown & Bridge lectures related to build up materials.

Indirect????

**University of Iowa:**

Yes, preclinical and clinical.

**University of Colorado:**

Yes, they are included. Operative Dentistry

**Southern Illinois University:**

Yes, Operative only

**University of Minnesota:**

Yes, Operative and Pros (PFM)

**UNMC College of Dentistry:**

Direct posterior resin restorations are part of the operative dentistry curriculum, and used routinely in operative dentistry clinics. Teaching of indirect posterior esthetic restorations is shared between fixed prosthodontics and operative dentistry.

**b. Where (pre-clinic and clinic)**

**Creighton University:**

Clinic and preclinic

**University of Missouri/KC:**

See above – clinic used for small two surface as well as single surface restorations.

**University of Iowa:**

Both

**University of Colorado:**

Direct are taught in the pre-clinic and clinic curriculums

Indirects are taught in the pre-clinic curriculum only.

**Southern Illinois University:**

Both

**University of Minnesota:**

Pre-clinic and clinic

**UNMC College of Dentistry:**

Both

**c. Required experiences?**

**University of Missouri/KC:**

Preclinical – typodont and natural teeth exercises.  
Clinical – no specific requirements comprehensive patient care.

**University of Iowa:**

Sophomore – not required, but all do posterior esthetic restorations.  
Junior – Class I and II requirements

**University of Colorado:**

No, Operative Dentistry has no requirements for any restoration. Students can perform direct esthetic restorations at any time they are appropriate. They do not place indirect esthetic restorations. Students are not penalized for not placing posterior esthetic restorations.

**Southern Illinois University:**

No

**University of Minnesota:**

No

**UNMC College of Dentistry:**

No

**d. What materials and / or systems utilized?**

**Creighton University:**

TPH → Heat / Pressure → / Prodigy / Optibond

**University of Missouri/KC:**

Caulk TPH

**University of Iowa:**

Herculite, Prodigy, P-60, Z100, Z250, Heliomolar

**University of Colorado:**

We use Kerr Prodigy with Kerr Optibond FI or Coltene Synergy Compact with Kerr Optibond. We have no flowable composite. Our sealant is Ultradent UltraSeal XT Plus.  
No indirect restorations are placed.

**Southern Illinois University:**

Concept  
Belleglass HP  
Targis Vectris

**University of Minnesota:**

Direct composite – 2100 and SBMP  
Indirect porcelain – Empress (in-house)

**UNMC College of Dentistry:**

Direct - Z100/ScotchBond Multipurpose  
Indirect - Empress

**e. What are the results? Also site the evidence for the reported results.**

**Creighton University:**

Indirect results – marginal – time consuming – question the advantage over direct composites.  
Direct results – better  
Replacement frequency and secondary caries

**University of Missouri/KC:**

No in house clinical trials.

**University of Iowa:** Esthetic and positive

**University of Colorado:**

We have no direct clinical results to report. The placement of direct posterior esthetic restorations has only been allowed for a short period of time. At the present time performance seems to be acceptable. The decision to use these materials was based on a review of the literature focusing on clinical performance.

**Southern Illinois University:**

Good in the last two years.  
No fractures so far.

**University of Minnesota:**

Data unavailable.

**UNMC College of Dentistry:**

Both systems appear to be effective if cases are properly selected. The only evidence is that directors and the Chair would be involved in replacing failures, and report little or no incidence of failed restorations.

**Regional Agenda Items (Please Report on Them)**

1. How to manage biofilm at individual operatories (flush, in-line water filters, individual unit water supply, etc.)

**Creighton University:**

Flush water lines

**University of Missouri/KC:**

No policy

**University of Iowa:**

Flush; units tested regularly with samples collected by staff and analyzed at State Laboratory

**University of Colorado:**

Flush with movement underfoot for more extensive method of management

**Southern Illinois University:**

Flush; manufacturer tests unit

**University of Minnesota:**

Filter developed by on-site personnel

**UNMC College of Dentistry:**

No policy

2. Radiographs and Film Type: D- vs. E-Speed Film

**Creighton University:**

D speed used regularly because diagnostic quality of E speed leaves much to be desired

**University of Missouri/KC:**

E speed with no noted problems

**University of Iowa:**

E speed on routine basis with D speed used for regional licensure examinations

**University of Colorado:**

E speed with no noted problems

**Southern Illinois University:**

E speed routinely but D speed for licensure examinations

**University of Minnesota:**

E speed with frustrations over diagnostic quality

**UNMC College of Dentistry:**

E speed with no noted concerns

**CODE Questions**

**1. What is CODE doing well?**

**Creighton University:**

Acting as liaison between Operative faculty and regional examination.

**University of Missouri/KC:**

CODE is alive and very well in our region.

**University of Iowa:**

Inter school communication.  
Social interaction with school.

**University of Colorado:**

The regional meetings are the most important function of CODE at this time. CODE has made good progress to reinvigorate itself this past year and half.

**Southern Illinois University:**

Interaction among faculty, camaraderie.  
Exchange of ideas, discussion of problems.

**University of Minnesota:**

**UNMC College of Dentistry:**

**2. Where do you desire improvement?**

**Creighton University:**

**University of Missouri/KC:**

**University of Iowa:**

Treatment outcomes  
Faculty calibration instruments

**University of Colorado:**

The CODE regions need to join forces to develop national projects which benefit operative dentistry at all schools. CODE should also be a leader in developing positions about the future of operative dentistry.

**Southern Illinois University:**

Clinical research, multi-center trials

**University of Minnesota:**

**UNMC College of Dentistry:**



3. Is \$25 US/\$30 Canadian school dues adequate? Comments are expected.

Creighton University:

Dues are minimal.

University of Missouri/KC:

I am not familiar with the financial needs of the organization – you tell us if they are meeting your needs.

University of Iowa:

Raise if necessary financially.

University of Colorado:

This all depends on the mission of CODE. Do we need more money? What do we want to do and what will it take. This sounds like a job for the CODE Advisory committee.

Southern Illinois University:

Yes, unless regional director feels otherwise.

University of Minnesota:

UNMC College of Dentistry:

4. How can participation by faculty in CODE regional meetings be encouraged/improved?

Creighton University:

University of Missouri/KC:

At UMKC we see the value and have many of our generalist faculty members asking to attend the meeting annually. We are bringing one generalist faculty member to the meetings each year. CODE is important to UMKC.

University of Iowa:

Local agenda must be good.

Good social activities.

Encourage social and educational interaction.

University of Colorado:

Give them something to come for. What benefit is derived from attending their regional meeting that could not have been gained without coming?

Southern Illinois University:

Participation is, in general, quite good.

University of Minnesota:

UNMC College of Dentistry:

Suggested National Agenda Items

1. Esthetic Onlay - - Materials and Tooth Preparation

2. Postoperative Sensitivity Associated With Class II Direct Composite Resins
3. Technique Sensitivity and Success of Single Liquid Adhesives versus Multiple Component Systems
4. How to Teach a Lesion Specific Preparation in a Preclinical Environment (as opposed to a material specific approach)
5. Status of Operative Dentistry Within Schools: Is It Its Own Entity or Part of a Larger Department?

**Suggested Regional Agenda / CODE Items**

1. Report data on Class II direct composite failure studies
2. CRDTS and WREB Examination updates

MIDWESTERN CODE MEETING ATTENDEES

<u>Name</u>	<u>School</u>	<u>Phone</u>	<u>E-mail Address</u>
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Henry St. Germain	Nebraska		
Scott Shaddy	Creighton	402 280-5076	

**Enclosure #1**  
**CODE REGIONAL MEETINGS REPORT FORM**

**REGION:** III

**LOCATION/DATE OF MEETING:**

University of Texas HSC – Houston  
Dental Branch  
Department of Restorative Dentistry & Biomaterials  
6516 John Freeman Avenue  
Houston, Texas 77225-0068  
November 17-19, 1999

**CHAIRPERSON:**

**Name:** William H. Tate **Phone #:** (713) 500-4264

**Address:** U of Texa HSC - Houston **Fax #:** (713) 500-4100

Dental Branch; Dept. of Restorative Dent. & Biomaterials **E-mail address:** wtate@mail.db.uth.tmc.edu

6516 John Freeman Ave; Houston, TX 77225-0068

**LIST OF ATTENDEES:** (including Phone #, Fax #, E-mail address - sample format attached)

Please attach

**SUGGESTED AGENDA ITEMS FOR NEXT YEAR:**

- Discuss the perceived value of air abrasion units for cavity preparations.
- Discuss limitations of direct posterior resin composite restorations. What are the criteria for treatment planning these restorations in each institution's clinics.
- Discuss materials used to finish and polish posterior resin composite restorations. Which are most effective and which are most cost effective.
- Is tooth whitening taught in the operative department. Discuss fees, requirements and tracking of these procedures.
- Discuss the possibility of developing a bank of test questions from old board exams related to operative dentistry.
- Dentin desensitization, cavity desensitization.
- Use of condensable posterior composite.
- Amalgam liners, what types?
- Treatment of root caries.

**LOCATION/DATE OF NEXT YEAR'S MEETING:**

**Name:** Terry Fruits **Phone #:** (405) 271-5735

**Mailing Address:** Dept. of Operative Dentistry **Fax #:** (405) 271-3006

U. of OK, College of Dent.; P.O. Box 26901 **E-mail address:** Terry-fruits@ouhsc.edu

Oklahoma City, OK 73190 **Date:** TBA

Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;  
40<sup>th</sup> 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 or via e-mail with an attachment,  
indicating the software program and version utilized.

**Region III CODE Meeting**  
November 17-19, 1999  
**University of Texas HSC – Houston**  
**Dental Branch, Houston, Texas**

As usual, the National agenda is a challenge. The agenda is based on the suggestions made by each Region plus the separate responses from the Regional Directors. One question is related to the Special Projects activity conjoint with the Academy of Operative Dentistry and the Section of Operative Dentistry of AADS. The approach to their mission is "Recommendations for Clinical Practice in Operative Dentistry."

Each Region is to attempt to respond in an "evidence based" manner vs. a consensus based or anecdotal information. Is the response based on research and clinical experience? A suggested example of concern shared by Dorothy McComb at the last meeting of the Executive Council of the Operative Section ..... Caries – detecting dyes. "Most consensus seems to indicate that these are necessary to remove all decay as they stain bacteria. However, the evidence shows that the dyes stain dentin below a certain level of mineralization, including normal dentin at the amelodentinal junction and circumpulpal dentin. There will be over removal of sound dentin if the dye is used as a marker of decay."

Give thought and discussion at the Regional meeting to evidence based responses.

Each Region is encouraged to have a Regional agenda, which is also reported on with the National Agenda. The Regional meeting reports are to be submitted in publishable form within 30 days of the conclusion of the meeting to the National Director.

#### **1999 National CODE Agenda**

Based on review of the 1998 Fall Regional CODE reports by the CODE Advisory Committee. Refer to Conference of Operative Dentistry Educators Regional Reports, Fall 1998 – previously sent to each CODE dues paying member school, the CODE Advisory committee and the Executive Council of the Operative Section, American Association of Dental Schools.

1999 National CODE Agenda

1. Vital pulp treatment

- a. **When, where, and who teaches this topic in your curriculum?**
- i. Operative Dentistry and Biomaterials, Freshman year, Introduction to Operative Dentistry – 1 hour lecture: Sealers, liners and bases, preclinic laboratory project: apply calcium hydroxide liner and RMGI liner/base and dentin bonding agent
  - ii. Operative Dentistry and Biomaterials, Sophomore year, Dental Materials Science – 1 hour lecture: Sealers, liners, and bases.
  - iii. Pediatric Dentistry, Sophomore year, 2 hour lecture: Treatment of Traumatic Injuries
  - iv. Endodontics, Sophomore year, no lecture, assigned chapter : Vital pulp therapy
  - v. Operative Dentistry and Biomaterials, Junior year, Advanced Operative Dentistry – 1 hour lecture: Vital pulp therapy
  - vi. When indicated vital pulp therapy is performed in the second year in Introduction to Clinical Operative Dentistry, in the third year in Advanced Operative Dentistry, and in the fourth year in General Dentistry.
- b. **Is this treatment utilized in patient care by students?** YES
- c. **What criteria are followed in deciding to do or not to do vital pulp treatment?**
- i. There is no history of spontaneous pain.
  - ii. Pulpal response to thermal or electrical testing is within normal limits.
  - iii. Pain elicited during pulp testing with hot or cold stimulus does not linger after the tooth returns to mouth temperature. Not longer than 20-30 seconds.
  - iv. No radiographic evidence of a periradicular lesion.
  - v. The tooth is **not** strategic for future fixed or removable prosthodontics
- d. **What concrete evidence supports the concept of vital pulp treatment? Please site scientific evidence. Additional comments welcome.**
- i. Vital pulp therapy effectiveness of treatment.  
**Sawusch, E.H.:** Direct and indirect pulp capping with two new products. J. Amer Dent Assoc 104:459-462, 1982. Indirect pulp capping with Dycal treated with Improved Dycal Thirty-six indirect pulp caps- permanent teeth 67 teeth indirect pulp- 100% success  
**Haskell** JADA 97:607-12, 1978 Calcium hydroxide sealed with???130 human permanent 87% success. mean 11.7 yrs. (5-22 yrs)  
**Nyborg, H.** 1955 Capping of the pulp 296-364 CaOH paste with Ringers 81 teeth permanent teeth evaluated Histologically & clinically. 124 teeth clinical evaluation only 62% success at recall > 2 yr. For most teeth. 86% success rate  
**Law DB and Lewis TM.** The effect of calcium hydroxide on deep carious lesions. Oral Surg 14:1130-1137, 1961. Ca(OH)<sub>2</sub> and sterile water 20 permanent teeth 80% success, two years clinical and radiographic evaluation. 36 permanent teeth for 13.4 exp Dycal vs regular Dycal 21/23 successful with exp. Dycal noted assoc. With failed cap and failed permanent restoration.  
**Horsted** Endod Dent Traumatol 1:29-34, 1985. Calcium hydroxide ZOE or ZnPO<sub>4</sub> cement and restoration. 510 human permanent (210 direct exam) Exposures-70% cavity preparations, 15% carious, 15% unknown 82% 5 yr survival rate.No difference between carious and non carious exposures.  
**Matsuo T; Nakanishi T; Shimizu H; Ebisu S.** A clinical study of direct pulp capping applied to carious-exposed pulps. J Endod 1996;22(10):551-6 carious-exposed 44 teeth. 81.8% success; degree of bleeding of pulpal exposure was related to the success rate YEARS F?U???  
**Kashiwada** Bull Toko Dent Med Univ 38:45-52. 1991 10% hypochlorite- 4 min. hemostasis and disinfection. Clearfil Photo Bond applied and cured. Teethmate cured Human permanent Exposed teeth restored with porcelain inlay or metal inlay or onlays.60/64(94%) exposures successful after 18 mos  
**Heitmann Quint Int** 26:765-770, 1995. CaOH placed, etched CaOH removed primed Heliobond, 20 s VLC X 2 Lined with Tetric then Restored with Tetric. Permanent human molars and premolars 100% success, 2-6 months recall

**Kotoh J** Dent Res 76:160(Abstr. 1192) 1997. 5 liner bond 3 LinerBond II, 3 Superbond C&B, 1 D-Liner and Super Bond, 2 Ca(OH)<sub>2</sub> & Superbond mixed All permanent teeth. 100% success, 17 mos recall

**Ciavarelli L, De Fazio P, Scarano A, Piattelli A.** Histological analysis of direct capping with enamel dentin system in vivo. J Dent Res 77:(Abs#912), pg 21 capped with Prime & bond 2.1 restored with z-100. Human permanent bicuspids. Ext 15, 30, 45, 90, 180, 360 days after capping. Gp 1 earliest showed mild to moderate inflammation absence of inflammation shows reversable effects and there is new bridge formation

**Katoh Y.** Wound healing process of pulp directly capped with adhesive resins. J Dent Res 77:(Abs#913), pg 220, 1999. 10% NaOCl for 1-5 min. Capped with caOH restored with composite resin, Capped with 3 types of adhesive resin. 21 teeth in 9 patients exposed vital teeth 1.7mm diameter Extracted 37-194 days after mean 79 days Healing began with disappearance of inflammation, collagen fiber matrix formation, calcification, calcification of the matrix, and dentin bridge formation. Progress began at the periphery & progressed to center

**de Blanco LP** Treatment of crown fractures with pulp exposure. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1996;82:564-8. Thirty permanent incisors with vital pulps and crown fractures were treated by a partial pulpotomy amputation of 1 to 2 mm of the exposed pulp, calcium hydroxide powder, & temporary restoration Clinical and radiographic assessment of the hard tissue barrier was done after 3 months and again after 1 to 8 years. 100% success.

**Cvek M.A** clinical report on partial pulpotomy and capping with calcium hydroxide in permanent incisors with complicated crown fracture. J of Endo 4:232-37, 1978. Partial pulpotomy and calcium hydroxide dressing. 60 perm incisors. treated due to trauma Mean f/u was 31 mos. 98% success no clinical signs or radiographic signs

**Fuks AB, Chosack A, Klein H, Eidelman E.** Partial pulpotomy as a treatment alternative for exposed pulps in crown-fractured permanent incisors. Endod Dent Traumatol 1987;3:100-2. Partial pulpotomy and calcium hydroxide dressing 63 permanent incisors treated due to trauma 94% success rate clinical and x-ray evaluation

ii. Pulp Capping success rates in primates

**Pitt Ford** OOO 71:338-42, 1991 Dycal, VLC Dycal, Prisma-Bond immediately or 24 Hrs. Am and ZOE seal 64 teeth Pulpal inflammation in 1/30 After two mos. Complete dentin bridging in 28/30 teeth capped with Dycal or VLC Dycal. Prisma bond showed complete dentin bridging in 4/2 teeth and pulpal inflammation in 2/22.

**Pameijer CH, Stanley HR.** The disastrous effects of the Total Etch technique in vital pulp capping in primates. Am J Dent 1998;11:S45-S54. Total etch & All-Bond 2 Total etch & ProBond Total Etch and Permagen Total etch & Ultrablend CaOH Total etch and Dycal No etch & Dycal 7/ group% non vital @ 75 days 57% 29% 83% 57% 14% 0%

**Otsuki M, Sonoda H, Kitasako, M, Arakawa.** Pulpal response to two adhesive systems using self-etching primers. J Dent Res 77:(Abs#1243), pg 261, 1999. Clearfil Liner Bond 2V restored with VLC or autocure composite resin. Other group\_ Treated with Mac-bond II. 90 teeth Animals sacrificed at 3,30 90 days. No difference in pulpal response. Only slight pulpal inflammation with the self etching primers in non human primate teeth.

**Dogon IL, Erickson ER, Dobeck JM.** Pulp capping with two adhesives with and without Ca(OH)<sub>2</sub> in M. Fascicularis. J Dent Res 77:(Abs#797), pg 205, 1999. Compare Single Bond, Scotchbond MP to Dycal. Measured at 3, 6, and 9 mos. 43 of 47 exposures had bridging with Dycal. Only 4/23 with MP and 3 of 23 had bridging with Single Bond.

**Pameijer CH, Stanley HR.** Pulp capping with total etch and other experimental methods. J Dent Res 77:(Abs#911), pg 219, 1999. Evaluated at days 5, 25, & 70. Exposed pulps applied Conesepis for 60 s. & capped with 2% NaOCL & total etch. 105 18-21 teeth/ group 92 % bridge formation attempted 85% formed complete. Gp 2 mod Ca PCA 100% bridge formation at 25& 75 days. Gp 3 Mg(OH)<sub>2</sub> 42% bridge formation. Gp 4 Benzalkonium chloride 10% no attempt at bridge formation. Gp 5 Fuji glass ionomer cement. Had 50% bridging. Conclusion the belief that any material placed on a pulp will allow bridge formation as long as the cavity is disinfected is a fallacy.

**Kitasako Y; Inokoshi S; Fujitani M; Otsuki M; Tagami J.** Short-term reaction of exposed monkey pulp beneath adhesive resins. Oper Dent 1998(6):308-17. Monkey pulpal responses to four adhesive resin

systems used as direct pulp cap histopathologically evaluated at 3, 7, 14, 30, and 60 days after operation. No serious inflammatory reaction of the pulp, such as necrosis or abscess formation, was observed. Slight inflammatory cell infiltration was the main inflammatory reaction of the exposed pulp, and the exposed area became occluded with dentin bridging as the observation period increased. Healing of exposed dental pulp beneath adhesive resin capping slightly differed depending on the materials used.

2. **List five of the most important Operative Dentistry topics which need to be studied via clinical trials**

- a. Efficacy of fluoride-releasing materials
- b. Marginal integrity of indirect restorations over time
- c. Finishing of composite resins – surface texture
- d. Systemic effects of resins
- e. Finishing of porcelain onlays

3. **Calibration of faculty**

- a. **What is the protocol for calibrating and standardizing your Operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**

Time is set aside for the department to work on projects similar to what the students are required to complete. The projects are graded by each instructor without knowing whose work is being evaluated. Using a desk top video camera the project is displayed to allow for a group discussion.

- b. **How often is calibration/recalibration done?**

Once a year. For a clinical evaluation we use two instructors to grade competency exams. Each instructor independently evaluates the step, then comes to an agreement on the final grade.

- c. **What evidence supports your protocol for calibration and recalibration? (Please cite)**

Don't have any.

4. **Competency education**

- a. **How is competency based Operative education determined?**

The school administration is requiring competency-based education in all areas. For operative dentistry this is determined by decision of the course directors and department head. The decision for specific restorations is based partly on state board examinations and the direction our department believes operative dentistry will proceed into the future. This direction is derived from several sources – dentists in the community, literature reflecting trends in dentistry and presentations in the dental community..

- b. **How is the weak student identified?**

Weaker students are identified by their performance qualitatively and quantitatively. Instructors can observe directly the difficulty a student has both clinically and pre-clinically. Scores from daily work and performance on competency exams. At certain intervals a required number of restorations are expected to be completed. Inadequacies would require closer observation of that student.

- c. **What measures are taken to upgrade competency of the weak student?**

Poor performance in both clinic and pre-clinical area require remediation. Students will be given extra attention and additional work to complete before continuing. All competencies must be completed to a satisfactory level to finish the course.

5. **Computer based interactive education**



Region VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for educational purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.

a. **What interactive computer-based teaching tools are you using to teach Operative Dentistry?**

None. Only additional help is that for some lectures that are presented electronically, a CD-Rom is available in the library to review the presentation.

b. **Who developed them?**

Within our department. Usually the person who presents the lecture.

c. **Would your school/region participate in development and in what manner?**

Yes. Because of shortage of manpower we could possibly only beta-test a program.

6. **Posterior esthetic restorations – report on direct and indirect**

a. **Are they included in the curriculum? What discipline?**

Yes. Operative Dentistry

b. **Where (pre-clinic and clinic)**

Both

c. **Required experiences?**

In the freshman course only direct composite restorations. In our sophomore course the last four weeks are devoted to indirect composite inlay restorations in a preclinical setting. In our third year direct posterior composites are required as well as successfully completing a Class II resin competency. They are not required to do an indirect resin but can substitute a gold casting with a resin inlay. We expect to have porcelain onlays available within the next couple of years.

d. **What materials and/or systems utilized?**

Our students are fabricating their own composite inlays from either Z100 or Herculite XRV. We also have BelleGlass available.

e. **What are the results? Also cite the evidence for the reported results.**

Last year was the first year to offer the sophomores a course in indirect resin inlays. In this preclinical course all restorations were successfully completed. The students produced their own restorations using natural teeth. All restorations were turned in. I sectioned the teeth to measure and compare the margins and film thickness of two dual cured resin cements we were considering to use. All restorations fit were acceptable. This included a system requiring the adhesive to be light-cured before the restoration was seated. In clinic we have very few problems. I know this is short term but that's all we've got.

**Regional Agenda Items**

1. **Do you teach and/or are you using air abrasion or laser technology?**

We do not teach these techniques. We are using them for some research projects measuring cutting efficacy and output of material.

2. **What is your diagnostic criteria and teaching for fissure caries. What is your criteria for evaluating conservative pit and fissure preparations and restorations?**

Explorer catching and visual inspection of fissure. Absence of space in fissure and not sticking with explorer. Smooth margins of restorations.

3. **How do you prepare your students for the National Board Examination?**

Use of National Board Examination question in our exams. 1993 is the most current exam we have.

**CODE Questions**

1. **What is CODE doing well?**

Provides opportunity for peer support group of operative instructors

2. **Where do you desire improvement?**

3. **Is \$25 US/\$30 Canadian school dues adequate? Comments are expected.**

I'm not aware of expenses, so I assume this fee is adequate.

4. **How can participation by faculty in CODE regional meetings be encouraged/improved?**

Time is our most precious resource. Possibly scheduling meeting on Weekends or times when school is out.

5. **Please indicate the office/position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc., are to be mailed. *NOTE: Regional Director – this information from each school is to be transmitted to the National Director.***

*Alan H. Ripps, D.M.D.  
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1999 National CODE Agenda

1. Vital pulp treatment

a. When, where and who teaches this topic in your curriculum?

Department of Operative Dentistry in the preclinical courses and in clinic.  
Department of Pedodontic Dentistry in preclinical courses and in clinic.  
Department of Endodontics in preclinic and in clinic.

b. Is this treatment utilized in patient care by students?

Direct and Indirect pulp caps are performed by students in our Operative clinics.  
Pulpotomies are performed in out pedodontic clinics.

c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?

Basic pulp cap criteria are:

- i. Area of exposed pulp is very small "pinpoint."
- ii. Hemorrhage appears normal and is easily controllable.
- iii. No evidence of periapical lesions (infections) on radiographs.
- iv. Tooth must be vital (Responsive to pulp tests)
- v. Have no history of spontaneous pain (Pain that begins without stimuli such as cold, hot, sugar, or biting pressure)
- vi. External stimuli (i.e., cold, hot, etc.) should elicit a fairly normal response from the tooth. Any pain from these stimuli should not remain for an extended period of time following the removal of the stimuli.
- vii. Tooth will not need to be relied upon in the future as an abutment for a fixed or removable partial denture.
- viii. Patient is not medically compromised. Also must consider the age of the patient in regard to the ability of the pulp tissue to survive this insult.

d. What concrete evidence supports the concept of vital pulp treatment? Please site the scientific evidence. Additional comments welcome.

Animal studies show evidence that dycal, resin modified glass ionomer, and adhesive resins can effectively provide vital pulp therapy in the form of a direct or indirect pulp cap procedure.

Kitasako Y, Inokoshi S, Tagami J. Effects of direct resin pulp capping techniques on short term response of mechanically exposed pulps. *Journal of Dentistry*, 1999; 27:257-63.

Kitasako Y, et al. Short-term reaction of exposed monkey pulp beneath adhesive resins. *Operative Dentistry*, 1998; 23:308-17.

Tarim B, Hafez AA, Cox CF. Pulpal response to a resin–modified glass-ionomer material on nonexposed and exposed monkey pulps. *Quintessence International*, 1998; 29:535-42.

Cox CF, et al. Biocompatibility of primer, adhesive and resin composite systems on non-exposed and exposed pulps of non-human primate teeth. *American Journal of Dentistry*, 1998; 11Spec No:S55-63.

Akimoto N, et al. Biocompatibility of Clearfil Liner Bond 2 and Clearfil AP-X system on nonexposed and exposed primate teeth. *Quintessence International*, 1998; 29:177-88.

Cox CF, et al. Biocompatibility of various dental materials: pulp healing with a surface seal. *International Journal of Periodontics & Restorative Dentistry*, 1996; 16:240-51.

Tsuneda Y et al. A histopathological study of direct pulp capping with adhesive resins. *Operative Dentistry*, 1995; 20:223-9.

(Paterson RC. Bacterial contamination and the exposed pulp. Br Dent J, 1976; 140:231-236.)

A fairly good success rate for direct pulp cap procedures was found in the following study on human patients:

Matsuo T, Nakanishi T, Shimizu H, Ebisu S. A clinical study of direct pulp capping applied to carious-exposed pulps. Journal of Endodontics, 1996; 22:551-6.

2. **List five of the most important Operative Dentistry topics which need to be studied via clinical trials.**

- a. Long term effectiveness of posterior resin composite restorations. We need to know the limitations of this material. Are we allowing dental manufacturers, patients, and the monetary goals of the dental practice dictate which treatments and materials we utilize in the treatment of our patients? (For example the extensive use of posterior resin composite restorations)
- b. Either eliminate polymerization shrinkage in resin composite, or definitively establish the best methods for controlling it clinically.
- c. What quantity of fluoride needs to be released from a restorative material to be truly clinically effective in preventing recurrent caries? Are any of today's products really meeting that standard for a meaningful duration?
- d. Determine the long term effectiveness of the dentinal seal developed with the total etch/dentin bonding agents for bonded amalgam restorations. Will it eventually hydrolyze and leak, if so when?
- e. Determine the long-term effectiveness of direct posterior resin composite restorations versus indirect posterior resin composite restorations.

3. **Calibration of faculty**

- a. **What is the protocol for calibrating and standardizing your Operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**

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. 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 which 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 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.

- b. **How often is calibration/recalibration done?**

About four times per semester. After each practical examination.

- c. **What evidence supports your protocol for calibration and recalibration?**

None to our knowledge, other than the fact that over the past 25 years the results of this technique has yielded evaluations that are reliable between our faculty members. Both the grades assigned and the reasons for assigning the grades are very reliable from one instructor to another. No statistical analysis has been performed.

4. **Competency education**

## University of Oklahoma College of Dentistry

### a. How is competency based Operative education determined?

Preclinical Competency Assessment:

Practical & Didactic Exams – Students are evaluated on performance of preparations and insertions of Class I & II amalgam restorations and Class III, IV, and V composite restorations. Daily Projects - Students are evaluated on all aspects concerning the fundamentals of operative dentistry during daily projects in the preclinical lab sessions.

Daily Clinical Judgement Evaluations – Students are evaluated during each session of the preclinical laboratory on the following criteria.

- Organization/Neatness
  - Misplacement or loss of grade forms
  - Failure to secure signatures at necessary check steps
  - Disorganized work areas
  - Incomplete armamentaria
  - Failure to bring course syllabus to class
  - Dull hand instruments
- Knowledge of Procedure
  - Gross violation of procedural steps and principles
  - Shows lack of knowledge concerning daily procedure
- Time Management
  - Leaving laboratory early before projects are completed
  - Absent from laboratory session
  - Non-productive use of time
- Professional Manner
  - Failure to secure Permission to Proceed
  - Behavior that reflects a lack of concern for classmates
  - Inability to accept constructive criticism
  - Cynical or unprofessional attitude
  - Improper attire
  - No lab coat or safety glasses
  - Not wearing gloves or mask
- General Progress
  - Multiple projects past due date
  - Struggling with basic concepts or skills

Clinical Competency Assessment:

Clinical Procedure Exams (Practical Exams) - Students are evaluated on performance of preparations and insertions of Class I & II amalgam restorations and Class III, IV, and V composite restorations.

Daily Clinical Procedures - Students are evaluated on all aspects concerning the fundamentals of operative dentistry during daily procedures in the clinical sessions.

Daily Clinical Judgement Evaluations – Students are evaluated during each session of the preclinical laboratory on the following criteria:

Professionalism (Appearance and attitude)  
Patient Management (Empathy, Education)  
Clinical Judgment (Application of Knowledge)  
Organization of Work Area (Efficiency, Neatness, & Instruments)  
Operative Skill  
Time Management  
Records  
Attendance in Clinic

### b. How is the weak student identified?

Quarterly assessments are made of the progress of all students in both the preclinical and clinical courses. Any student that is significantly behind in clinical activity or in completion of preclinical projects is contacted and counseled. Students that have been identified as deficient in the quality of their work are also notified and counseled. Some remediation type of work may be necessary if the deficiencies are too significant.

c. **What measures are taken to upgrade competency of the weak student?**

The student may be assigned a faculty mentor or a tutor. Often the deficient student may be required to complete some form of remediation on any aspect for which they have been identified as deficient. Students in extreme difficulties may be asked to repeat the year if the deficiencies are not correctable.

5. **Computer based interactive education**

Region VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for education purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.

a. **What interactive computer-based teaching tools are you using to teach Operative Dentistry?**

No interactive computer software is being used to teach Operative Dentistry at this time.

b. **Who developed them?**

NA

c. **Would your school/region participate in development and in what manner?**

We would participate to the degree that our computer expertise and budget would allow.

6. **Posterior esthetic restorations – report on direct and indirect**

a. **Are they included in the curriculum? What discipline?**

Direct posterior esthetic restorations are included in the operative dentistry courses. Compomers or Glass Ionomers are included in the pedodontic dentistry courses.

b. **Where (pre-clinic and clinic)**

The students are introduced to posterior resin composite restorations in the preclinic course the first semester of their sophomore year. They are currently allowed to treatment plan and restore small occlusal lesions on molars or premolars, and small two surface class II lesions on premolars in esthetically sensitive areas.

c. **Required experiences?**

None as of yet.

d. **What materials and or systems utilized?**

We use total etch techniques utilizing Allbond 2 and TPH or Herculite Composite.

e. **What are the results? Also cite the evidence for the reported results.**

We do not have long term results in our clinics yet. We have only recently begun to allow an increased number of these procedures to be performed in the clinic. The students seem to have a great deal of difficulty effectively finishing the resin composite to the cavosurface margins. They tend to have difficulty recognizing areas where the resin composite material is high.

We have no evidence to cite for any of these reported results.

### Regional Agenda Items

1. **Do you teach and/or are you using air abrasion or laser technology?**

No. Our AEGD program purchased a unit, and it is my understanding that they have found very little practical use for it.

2. **What is your diagnostic criteria and teaching for fissure caries? What is your criteria for evaluating conservative pit and fissure preparations and restorations?**

As mentioned in an earlier response, we are attempting to introduce more conservative treatments involving the use of resin composites and sealants into our clinics. Our criteria is based on the following:

Diagnostic criteria for pit and fissure caries includes a combination of the visual observation of the tooth surface and the utilization of a sharp explorer to feel for softness in the enamel. Radiographs are also utilized but they are usually of very little aid in detecting this type of caries in the incipient state.

Treatment planning for the restoration of pit and fissure caries relies upon a combination of factors: 1) the extent of the carious lesion; 2) the caries history of the patient; 3) the presence of any abnormal occlusal functions (bruxing, clenching, etc).

Criteria for evaluating the student's performance on conservative pit and fissure preparations and restorations includes the following:

- a. Decision-making exhibited by the student in determining the proper extent of tooth removal and appropriate restorative material to be used.
- b. Complete yet conservative removal of the caries leaving sound tooth structure.
- c. Complete and effective seal of all questionable pits and fissures.
- d. Adherence to basic cavity principles (as stated in Black's seven steps of cavity preparation) as applicable to the specific conservative type of preparation and restorative material.

3. **How do you prepare your students for the National Board Examination?**

We have arranged for our students to take a mock National Board Examination offered by the University of Illinois. This may give them some idea of their weak areas so they may better prepare for the actual board exam.

Many of our students have been encouraged to enroll in the Kaplan Program which is a preparation course for the National Board Exam.

We attempt to make sure that we are covering topics related to the types of questions asked most frequently.

### CODE Questions

1. **What is CODE doing well?**

I think that in the last year or two there has been a good effort at improving the overall organization of CODE.

2. **Where do you desire improvement?**

I would love to see the encouragement of more collegial sharing via a web site. This could be an ongoing interchange of ideas. Perhaps a topic of the month with the opportunity for the schools across the country to offer their thoughts and ideas on a bulletin board type of set up. I don't know if this is possible or practical but it is an idea. This might disseminate more information on current topics without the headaches of paperwork.

3. **Is \$25 US/\$30 Canadian school dues adequate? Comments are expected.**

## University of Oklahoma College of Dentistry

These dues are adequate if they are meeting the financial needs of running the national CODE organization. We are not privy to the financial requirements of CODE, so it is difficult to answer this. We are pleased with the functioning of CODE, but if there is a deficiency that we are not aware of we would be willing to support a small increase in the dues.

4. **How can participation by faculty in CODE regional meetings be encouraged/improved?**

Some of the difficulty in allowing more faculty to attend from any one school is the fact that someone has to stay home to "mind the store". Other than having the meeting at a time when students are not in class, there may not be a way to avoid this problem.

5. **Please indicate the office/position with complete mailing address at your school to which regional reports, dues statement, roster requests, etc., are to be mailed. NOTE: Regional Director – this information from each school is to be transmitted to the National Director.**

Dr. Terry Fruits  
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University of Oklahoma Health Sciences Center  
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1999 National CODE Agenda

1. Vital pulp treatment

- a. When, where, and who teaches this topic in your curriculum?

Endodontics provides the majority of discussion of this topic. The endodontic department spends 3 hours in D-2 year lecture followed by small group seminar discussions. This subject material is reinforced daily within the endodontic, emergency and restorative clinics. The D-4 year also contains an advanced endodontics course which contains 4 hours of lecture on vital pulpal treatment as well as 4 more hours on trauma to the vital pulp. The operative lectures in the D-1 and D-2 years contain a 1 hour lecture in each session on pulpal protection.

- b. Is this treatment utilized in patient care by students?

Daily and as a matter of routine

- c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?

Criteria as outlined in Chapter 21 of Walton's "Preventive Endodontics: Protecting the Pulp". The criteria includes:

Depth of cavity preparation  
Age of patient  
History of the tooth (caries, multiple restorations, etc)  
Frictional heat  
Drying of the dentin  
Exposure of dentin  
Quality of the existing restoration  
Role of bacteria  
Pins

- d. What concrete evidence supports the concept of vital pulp treatment? Please site the scientific evidence. Additional comments welcome.

Walton's text contains 93 references at the end of Chapter 21. Also, Seltzer and Benders text "The Dental Pulp" and Harold Stanley's book and slides on pulp are other cited references.

2. List five of the most important Operative Dentistry topics which need to be studied via clinical trials

- a. Direct posterior composites (all types of systems)
- b. Long term clinical analysis of various curing systems (including lasers)
- c. Air abrasion: long term clinical performance of materials inserted in air abraded preparations.

3. Calibration of faculty

- a. What is the protocol for calibrating and standardizing your Operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.

New faculty members are paired with of two or more full time faculty members both clinically and preclinically. Additionally, new faculty members attend the preclinical lecture and laboratory sessions in operative.

- b. How often is calibration/recalibration done?

Annually or as new faculty members are added to the staff. Recalibration generally performed prior to the laboratory courses beginning.

- c. **What evidence supports your protocol for calibration and recalibration? (Please cite)**

**4. Competency education**

- a. **How is competency based Operative education determined?**

UT is currently working on competency statements and methods of measuring competencies. Currently an operative feedback sheet is utilized within the clinic which provides some indication of the students overall and specific performance within the clinical environment.

- b. **How is the weak student identified?**

Pre-clinical: through practical exams  
Clinical: analysis of feedback sheets indicating specific areas of weakness

- c. **What measures are taken to upgrade competency of the weak student?**

Preclinical students are provided individual instruction and remedial work Clinical students may be required to perform certain procedures on a typodont or mannequin prior to being allowed to perform specific treatment on patients. These are determined on a case by case basis.

**5. Computer based interactive education**

Region VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for educational purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.

- a. **What interactive computer-based teaching tools are you using to teach Operative Dentistry?**

None at this point in time

- b. **Who developed them?**

- c. **Would your school/region participate in development and in what manner?**

**6. Posterior esthetic restorations – report on direct and indirect**

- a. **Are they included in the curriculum? What discipline?**

Not currently

- b. **Where (pre-clinic and clinic)**

N/A

- c. **Required experiences?**

N/A

- d. **What materials and/or systems utilized?**

N/A

- e. **What are the results? Also cite the evidence for the reported results.**

N/A

Regional Agenda Items

1. Do you teach and/or are you using air abrasion or laser technology?

No

2. What is your diagnostic criteria and teaching for fissure caries. What is your criteria for evaluating conservative pit and fissure preparations and restorations?

Clinical and radiographic evaluation of individual lesions. Conservative pit and fissure preparations and restorations may range from sealants, preventive resin restorations, or amalgams depending on each individual case.

3. How do you prepare your students for the National Board Examination?

Some course directors provide written study guides and/or offer elective lecture material covering commonly asked board material. Students also generally purchase the dental decks for their individual use.

CODE Questions

1. What is CODE doing well?

2. Where do you desire improvement?

3. Is \$25 US/\$30 Canadian school dues adequate? Comments are expected.

4. How can participation by faculty in CODE regional meetings be encouraged/improved?

5. Please indicate the office/position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc., are to be mailed. NOTE: Regional Director – this information from each school is to be transmitted to the National Director.

1999 National CODE Agenda

1. Vital pulp treatment

a. When, where, and who teaches this topic in your curriculum?

Vital pulp therapy for permanent teeth is taught by Operative Dentistry, using a protocol that has been developed by multiple departments including the Department of Endodontics. It is introduced in the sophomore preclinical Operative Dentistry course and is expanded via a lecture during the junior course. It is further taught, one-on-one during clinical courses, as patient needs indicate.

b. Is this treatment utilized in patient care by students?

Yes

c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?

Protocol for decision to perform an indirect pulp capping (IPC) procedure calls for pre-operative diagnosis and treatment planning. Indications for IPC include deep caries lesion(s) encroaching on the pulp, no history of spontaneous pain, and a pre-operative determination of tooth vitality.

A direct pulp cap is never planned, but, for the rare occurrence of a mechanical pulp exposure during tooth preparation, it may be indicated. For a direct pulp capping procedure, the tooth should be a permanent tooth and the exposure should be small, trauma to the pulp minimal, and the history and preoperative evaluation indicate the pulp is healthy.

A copy of the current protocol for direct and indirect pulp capping procedures is attached (Attachment 1).

d. What concrete evidence supports the concept of vital pulp treatment? Please cite the scientific evidence. Additional comments welcome.

Aponte, A.J., Hartsook, J.T. & Crowley, M.C.: Indirect pulp capping success verified. J. Dentistry for Children 33(3):164-166, 1966.

Quote: P 166, "1. In this study, residual carious dentin following calcium hydroxide indirect pulp capping was free of microorganisms six to 46 months (average 28 months) after treatment, in 93 per cent of the 30 primary molars investigated. 2. The dentin of these 30 teeth upon re-entry, was hard to the touch and had a shiny appearance. 3. Evidence of reparative dentin was present repeatedly in the postoperative bitewing radiographs."

Berk, H. & Krakow, A.A.: A comparison of the management of pulpal pathosis in deciduous and permanent teeth. Oral Surgery, Oral Medicine, Oral Pathology 34(6):944-955, 1972.

Quote: P 953, "...the rationale for indirect pulp capping is that few bacteria remain in the deeper dentin layers and that, even if they find their way into the pulp, they would be inactivated. Yet, when one is confronted with the problem clinically, there is still no definitive way of determining whether one is dealing with an infected carious lesion or has reached a bacteria-free demineralized (or incompletely mineralized) zone. Disclosing dyes which are being developed have not as yet proved effective for making this distinction (Kronchke, A, Int. Dent J. 20:338-343, 1970). The decision, therefore, must still be made by the clinician, who would be guided by the quality of the dentin, the depth of the lesion, and the clinical symptoms and radiographic appearance. When dentin is soft and mushy so as to offer only minimal resistance to a sharp excavator, it should always be removed. When caries extends into that portion of the tooth originally occupied by the pulp chamber and can be excavated to uncover harder dentin which offers reasonable resistance to a sharp excavator, indirect pulp capping can be employed. This indicates that the pulp has responded physiologically to the carious process by forming reparative dentin... When time is not a factor, it may be desirable to place the final restoration at the same visit."

Berk, H. & Krakow, A.A.: Efficient vital pulp therapy. *Dental Clinics of North America*, Jul 1965, pp 373-385.

Quote: P 375, "After the cavity preparation has been completed, all the necrotic and obviously infected dentin is removed from the side wall, and as much is removed from the pulpal floor as can be excavated with a sharp spoon excavator without exposing the pulp, provided vital dentin or semi-hard dry flaky dentin has been encountered. Whether this is incompletely calcified secondary dentin or decalcified primary dentin is of no consequence, since this layer is often free of bacteria and, if properly treated, will calcify. The cavity preparation is cleansed, and a layer of calcium hydroxide (Pulpdent cavity liner) is placed on the floor of the cavity to coat all the exposed dentin.... and a final restoration is placed at the same visit."

Charbeneau, G.T.: *Principles and Practice of Operative Dentistry*, 3rd Ed, Lea & Febiger, Philadelphia, 1988.

Quote: P 170, "Much controversy has existed concerning the specific technique invoked in indirect pulp capping. Early research (Howes et al, *J. Dent. Res.* 43:808, 1964) indicated that indirect capping with calcium hydroxide left a persistence of cultivable organisms for prolonged periods. Such work indicated the necessity to reenter these teeth after the pulp had produced reparative dentin, remove the residual caries and finally place a permanent restorative material. More recent research (Aponte et al, *J. Dent. Child.*, 33:164, 1966; Fairbourn et al, *J. Am. Dent. Assoc.* 100:547, 1980; Knight & Marchelya, Master's Thesis, Univ of Mich, 1981) has shown that indirect pulp capping with calcium hydroxide results in caries which is operationally sterile indicating there is no need to reenter the tooth. These data indicate that placement of the permanent restoration at the time of the initial treatment may be appropriate."

Dumsha, T. & Hovland, E.: Considerations and treatment of direct and indirect pulp-capping. *Dental Clinics of North America* 29(2):251-259, 1985.

Quote: P 253, "The question arises as to whether it is necessary to reenter the restoration at some later point in order to remove the remaining demineralized sequestrum. Any procedure that involves removal of restorations and subsequent removal of liners and bases may cause further insult to pulp. At this time, there is insufficient evidence to support reentry into the tooth for these purposes. If the patient is asymptomatic, periodic post-treatment radiographs are negative, and the tooth is responsive to vitality testing, sound judgment suggests no further treatment is indicated."

Eidelman, E., Finn, S. & Koulourides, T.: Remineralization of carious dentin treated with calcium hydroxide. *J. Dentistry for Children* 32:218-225, 1965.

Quote: P 223, "1. Thirty deeply carious, clinically vital, human primary and permanent molars were divided into an experimental group consisting of twenty-five teeth and a control group consisting of five teeth, and treated with a commercial preparation of calcium hydroxide for the experimental group and pink wax for the control group, in an indirect pulp capping procedure. 2. The teeth were reopened after 2, 4, 6, 8 and 12 weeks of treatment, and a sample of carious dentin obtained from each tooth. 3. Quantitative analysis of phosphorous was used for evaluation of the effect of the treatment. 4. There was a highly significant increase in phosphorous content in a sample of carious dentin treated with a calcium hydroxide preparation, as compared to a sample of carious dentin from the same cavity removed before treatment. No significant changes were found in the control group treated with wax.... 8. Post-operative radiographs showed evidence of sclerosis in the dentin overlying the pulp in most of the cases of the experimental group. This finding was not evident in the control group."

Fairbourn, D.R., Charbeneau, G.T. & Loesche, W.J.: Effect of Improved Dycal and IRM on bacteria in deep carious lesions. *J. American Dental Association* 100:547-552, 1980.

Quote: P 551, "After five months, the mean CFU/mg carious dentin for all bacteria dropped from 191,232 to 11,344 (Improved Dycal group) and from 171,160 to 9,880 (IRM group). This was statistically significant ( $P < .01$  and  $P < .001$  respectively). After five months, the mean CFU/mg for *L. casei* dropped from 41,827 to 462 (Improved Dycal group) and from 78,080 to 596 (IRM group). This was statistically significant ( $P < .01$  and  $P = .02$ , respectively). Nine of the 20 teeth treated with Improved Dycal were operationally sterile ( $< \text{or} = 300$  CFU/mg) on reentry, and five of the 20 teeth treated with IRM were operationally sterile on re-entry. It can be concluded that: --Both Improved Dycal and IRM caused a significant decrease in bacteria in deep carious lesions when placed in contact with the carious dentin for five months. --There was no statistically significant difference between the two treatment methods. --Reentry to remove the residual carious dentin after indirect pulp capping with Improved Dycal or IRM may be unnecessary, if the final restoration maintains its seal."

Going, R.E., Loesche, W.J., Grainger, D.A. & Syed, S.A.: The viability of microorganisms in carious lesions five years after covering with a fissure sealant. *J. American Dental Association* 97:455-462, 1978.

Abstract: Carious lesions that were covered with a pit and fissure sealant for five years yielded bacterial cultures that were predominantly negative. Sixteen of 18 test sites judged to have active caries in 1972 were found inactive in 1977; ten of 12 sites suspected to have caries in 1972 were deemed to have inactive caries in 1977. Sealant treatment resulted in an apparent 89% reversal from a caries-active to a caries-inactive state. These data confirm and extend previous observations that a limited number of cultivable organisms persist in some lesions but their numbers are few, and they do not appear capable of continuing the destruction of tooth structure.

Handelman, S.L., Leverett, D.H. & Iker, H.P.: Longitudinal radiographic evaluation of the progress of caries under sealants. *The J. of Pedodontics* 9:119-126, 1985.

Abstract: Occlusal surfaces of carious and noncarious first permanent molars were initially sealed for subjects 6 to 9 years of age with an ultraviolet light-polymerizing sealant. If at the time of annual recall examination, sealants were judged to be defective, they were resealed. Radiographs were rated by a panel of judges for caries penetration for up to three years. Sealed teeth were grouped as "always intact" at recall examination, "sometimes intact" if they were intact for at least one recall examination, or "never intact" at recall examination. There was little or no progress of caries under clinically "always intact" sealants or sealants that were "sometimes intact". Sealants rated as "never intact" demonstrated some caries progression with time.

Handelman, S.L., Washburn, F. & Wopperer, P.: Two-year report of sealant effect on bacteria in dental caries. *J. American Dental Association* 93:967-970, 1976.

Abstract: Teeth in which caries had penetrated the pits and fissures were sealed with an ultraviolet-light-polymerized sealant. Samples of carious dentin were taken from teeth that were not sealed and from teeth that were sealed, up to two years after the sealant had been placed. The major reduction in viable microorganisms occurred during the first two weeks, and there was a gradual reduction in the total count thereafter. At the end of two years, there was a 2,000-fold decrease in the number of cultivable microorganisms. Preliminary clinical and radiographic findings suggest that there was no progression of the carious lesions, but further studies are needed before this technique can be considered an alternative to conventional procedures.

Jensen, O.E. & Handelman, S.L.: Effect of an autopolymerizing sealant on viability of microflora in occlusal dental caries. *Scand. J. Dental Research* 88:382-388, 1980.

Abstract: A total of 106 molars with occlusal caries were sealed with an autopolymerizing sealant. Samples of the carious dentin were obtained 1, 3, 7, 14 and 28 d, and 2, 4, 6, and 12 months after sealant placement. The samples were cultured on enriched nonselective medium, a streptococcal medium, a *Streptococcus mutans* medium, and a medium for acidogenic microorganisms. The bacterial counts were compared with control samples obtained from nonsealed occlusal carious lesions, half of which had acid conditioner applied to the occlusal surface for 1 min prior to sampling. The mean total viable counts decreased by approximately 99.9% during the 1-year study period, from  $925.1 \times 10^4$  CFU/mg of sample to  $0.9 \times 10^4$  CFU/mg of sample. Statistically, there was a very strong linear relationship ( $P < 0.001$ ) between the reduction in bacterial counts and time. A similar reduction was observed for the total streptococcal count and the *S. mutans* count. The etching procedure itself reduced the number of cultivable organisms by about 75%. Sealant material that was polymerized directly in culture media did not result in any inhibition of bacterial growth. Although slight fluctuations in the relative proportion of the microflora were observed at the different sampling intervals, there were no significant changes in the relative distribution of bacterial types with time.

Jordan, R.E., Suzuki, M. & Skinner, D.H.: Indirect pulp-capping of carious teeth with periapical lesions. *J American Den Assoc* 97:37-43, 1978.

Abstract: Twenty-four vital teeth with deep carious lesions associated with radiographically demonstrable periapical lesions were treated conservatively by means of the indirect pulp-capping technique. Eleven teeth showed apparent resolution of periapical pathology, and absence of pain, and continued vitality when followed up as long as seven years postoperatively.

Kerkhove, V.C., Jr., Herman, S.C., Klein, A.I. & McDonald, R.E.: A clinical and television densitometric evaluation of the indirect pulp capping technique. *J. Dentistry for Children* 34:192-201, 1967.

Quote: P 200, "The experimental sample of 76 mandibular teeth with deep carious lesions, included 19 first primary molars, 37 second primary molars and 20 first permanent molars. Thirty-five teeth were treated with zinc oxide-eugenol and 41 teeth were treated with calcium hydroxide methyl cellulose. The patients were recalled at three-, six-, and 12-month intervals and periapical radiographs taken..... Radiopacity of the dentin between the indirect pulpcapping material and the pulp chamber was measured visually and with the television instrumentation and compared with measurements of similar non-carious area of dentin in the same tooth (control area). During the period of one year, six primary teeth had to be removed because of developing periapical pathology. The additional 70 teeth remained asymptomatic and radiographically negative. The 70 teeth that were re-entered at the end of 12 months revealed caries arrestment, a sound pigmented dentin base and no discernible pulp exposures.... The amount of increased radiopacity was very slight and for the most part, was only evident with the more sensitive television method. It was apparent that time is an important factor relative to the increased radiopacity of the treated dentin."

King, J.B., Crawford, J.J. & Lindahl, R.L.: Indirect pulp capping: A bacteriologic study of deep carious dentine in human teeth. *Oral Surgery, Oral Medicine & Oral Pathology* 20(5):663-671, 1965.

Quote: P 670, "...it was concluded that the deep layer of residual carious dentine in teeth treated by the indirect capping method is almost always contaminated with cultivable microorganisms prior to treatment. This layer can be rendered sterile, or the number of organisms can be greatly reduced, by capping with either calcium hydroxide or zinc oxide and eugenol. Although silver amalgam, used alone as an indirect capping agent, failed to produce sterility of this layer of dentine, the number of cultivable organisms was reduced and treatment of these teeth was judged to be clinically successful."

Leung, R.L., Loesche, W.J. & Charbeneau, G.T.: Effect of Dycal on bacteria in deep carious lesions. *J. American Dental Association* 100:193-197, 1980.

Quote: P 197, "The significant decrease in bacteria in carious dentin four weeks after being covered with Dycal and sealed with an improved zinc oxide-eugenol interim dressing indicates that such a one-step indirect pulp capping procedure to make the residual carious dentin operationally sterile is a feasible and promising approach."

Mertz-Fairhurst, E.J. et al: Clinical performance of sealed composite restorations place over caries compared with sealed and unsealed amalgam restorations. *J. American Dental Association* 115:689-694, 1987.

Abstract: The 2-year clinical evaluations of paired occlusal restorations are presented. Each study participant received a sealed composite restoration placed over a carious lesion and either a traditional outline-form (unsealed) amalgam or an ultraconservative sealed amalgam restoration. Caries was removed before placement of both types of amalgam restorations. No important clinical differences developed among the three groups of restorations.

Mertz-Fairhurst, E.J., Schuster, G.S., Williams, J.E. & Fairhurst, C.W.: Clinical progress of sealed and unsealed caries. Part II: Standardized radiographs and clinical observations. *J. of Prosthetic Dentistry* 42:633-637, 1979.

Quote: P 636, "At the present time, a trend has been shown that the progress of sealed caries is markedly slowed by sealant therapy as compared to open lesions. This fact has been substantiated by depth measurements, viable bacterial counts, standardized radiographs, and clinical observations. The radiographic and clinical observations agreed with the previously reported two parameters in confirming that (1) sealed cavities showed little or no change in depth and (2) open lesions showed a significant increase in depth as compared to sealed lesions."

Mertz-Fairhurst, E.J., Schuster, G.S., Williams, J.E. & Fairhurst, C.W.: Clinical progress of sealed and unsealed caries. Part I: Depth changes and bacterial counts. *J. of Prosthetic Dentistry* 42:521-526, 1979.

Quote: P 525, "Conclusions: 1. A method for measuring depth changes in carious lesions has been developed. 2. A method for estimating bacterial viability in the study lesions has been developed. 3. Sealed cavities showed little or no change in depth over a 1-year period. 4. Open lesions showed a significant increase in depth as compared to sealed lesions. 5. Elimination or marked decrease in viable organisms under the sealant occurred."

Mjor, I.A.: Bacteria in experimentally infected cavity preparations. *Scandinavian J. of Dental Research* 85:599-605, 1977.

Abstract: The presence of bacteria on cavity walls was assessed histologically following experimental infection by inserting soft carious human dentin or guttapercha temporary filling in 40 monkey teeth. Eighty-five infected cavities which had been restored using zinc oxide-eugenol cement (34 teeth), Ca(OH)<sub>2</sub> (39 teeth) or amalgam (12 teeth) were also evaluated. Bacteria could regularly be demonstrated in cavities where soft carious human dentin had remained in the cavities for 82 days, but not, or only very rarely, in any of the other series. It was concluded that vital dentin has considerable resistance against infection and that cavity sterilization appears to be of questionable value."

Retzlaff, A.E. & Castaldi, C.R.: Recent knowledge of the dental pulp and its application to clinical practice. *J. Prosthetic Dentistry* 22(4):449-457, 1969.

Quote: P 453, "The "indirect" technique involves leaving the deeper layers of caries intact and sealing in a capping material of zinc oxide and eugenol or calcium hydroxide followed by a semipermanent restoration usually of amalgam."

Reuver, J.: [594 pulp cappings in a dental office – a clinical study (1966-1990)]

Abstract: In a dental office 592 direct and indirect pulp cappings were followed up to 24 years. 404 of these pulps remained vital. The success of this treatment seemed to be related to age, type of tooth, and the extent of pulp exposure. In some advanced cases the clinical outcome was better than expected. (German)

Sawusch, E.H.: Direct and indirect pulp capping with two new products. *J. American Dental Association* 104:459-462, 1982. Quote: P 460, "The clinical procedures in all instances were standardized to include: local anesthetic, rubber dam isolation, conformity to the rules of preparing cavities, removal of carious dentin with a large round bur, deriding the cavity with tap water and air when indicated, placing the medication (Improved or Experimental Dycal), a zinc phosphate or zinc oxide-eugenol base where indicated, and restoration with appropriate material."... P 461, "Thirty-six indirect pulp cappings were performed on permanent teeth... No failures have occurred during the span of the study in the permanent teeth treated by indirect pulp capping with Experimental Dycal... Of the 67 teeth treated with Improved Dycal..., all were indirect pulp cappings. Twelve indirect pulp cappings were on permanent teeth.... Four failures occurred and all of the failures were in primary teeth." P 462, "Pulp failures in this study tended to be associated with failed restorations."

Stanley, H.R.: *Human Pulp Response to Restorative Dental Procedures*, Shorter, Gainesville, 1981.

Quote: P 72, "...if all of the carious lesion is removed but the last deep layer overlying some intact bacterial-free primary or reparative dentin, the bulk of the lactic acid producing complex has been eliminated. The placing of a satisfactory restoration deprives those remaining bacteria of an abundant food supply, and prevents their multiplication and the production of lactic acid of sufficient quantity to continue the carious process. Since the by-products of the active carious process are no longer penetrating the remaining dentin, whether carious or intact, the degree of irritation that previously had prevented the continual formation of reparative dentin has been eliminated, and undifferentiated mesenchymal cells are now permitted to differentiate into new odontoblasts, and the deposition of new reparative dentin begins. Those few persisting carious organisms that may filter through the remaining dentin will be phagocytized immediately by leukocytes in the rejuvenated pulp tissues. The balance of power has shifted from one in favor of the carious lesion and a gradually dying pulp to one with the potential for complete resolution of many pulpal lesions, except those presenting discrete abscess formations.

Stanley, H.R.: Pulpal response to dental techniques and materials. *Dental Clinics of North America* 15(1):115-126, 1971.

Quote: P 124, "if all of the carious lesion is removed but the last deep layer overlying some intact bacterial-free primary or reparative dentin, the bulk of the lactic acid producing complex has been eliminated. The placing of a satisfactory restoration deprives those remaining bacteria of an abundant food supply, and prevents their manipulation and the production of lactic acid of sufficient quantity to continue the carious process."

Stark, M.M., Nicholson, R.J. & Soelberg, K.B.: Direct and indirect pulp capping. *Dental Clinics of North America* 20:341-349, 1976.



Quote: P 346, "Two schools of thought still exist on the advisability of re-entering the treated tooth several weeks following the initial treatment. Those supporting re-entry emphasize the need to remove any necrotic material and evaluate the success of treatment. The risk of creating an exposure by removing the previously placed restoration and treatment materials might be likened to a surgeon's performing a second operation to determine the success of the first. Radiographic and clinical evaluation of the results of indirect pulp therapy techniques would seem more prudent and less traumatic.... Most pulp investigators agree that sealing the cavity against the oral environment is the single most important factor in promoting pulpal healing. In most instances amalgam preceded by an application of a varnish affords the best marginal seal and the most durable restoration."

Wei, S.H.Y., Kaqueler, J.C. & Massler, M.: Remineralization of carious dentin. J. Dental Research 47(3):381-391, 1968.

Quote: P 390, "The hypothesis that demineralized carious dentin may be remineralized in vitro was confirmed. Based on radiographic and microradiographic evidence, a 10% stannous fluoride solution appeared to remineralize carious dentin more rapidly than, and was superior to, other remineralizing solutions and calcifying solutions. Reduced staining of carious dentin with toluidine blue and orange G indicated increased resistance to dye penetration. Deposition of finely granular, electron-dense material in the dentinal matrix was seen with the electron microscope."

Woehrlen, A.E., Jr.: Evaluation of techniques and materials used in pulpal therapy based on a review of the literature, part I. J. American Dental Association 95:1154-1158, 1977.

Quote: P 1157, "Although residual carious dentin left in the tooth cavity probably contains an appreciable number of microorganisms, there is little evidence to indicate that such microbes are harmful if they are left in the cavity under a serviceable restoration - the indirect pulp cap. King, Crawford, and Lindahl (Oral Surg 20:663, 1965) theorized that the layer or residual carious dentin may be "sterilized" or that the number of microorganisms can be greatly reduced when this layer is capped with either calcium hydroxide or ZOE. Their findings support the procedures advocated by many clinicians who remove only the superficial necrotic layer of dentin..... What, then, is the fate of organisms remaining in dentin? Fisher (Br Dent J 121:413, 1966) reviewed this problem. His results indicated that organisms, especially lactobacilli and anaerobic streptococci, may remain viable under nonantiseptic fillings for considerable periods of time. He found that on reentering the carious lesion, the organisms cultured did not always immediately show the normal morphologic characteristics. Fisher concluded that if organisms do remain viable under these restorations, acid formation is inhibited. It is impossible to sterilize the cavity floor with any drug in a short period of time without causing severe damage to the pulp."

**2. List five of the most important Operative Dentistry topics which need to be studied via clinical trials**

- a. Sealant success rates comparing various supposed success-enhancing techniques, including use of hydrophilic primers and the mechanical preparation of fissures prior to sealing.
- b. Comparison of success rates of traditional and more contemporary restorations of amalgam and resin composite.
- c. Repeat of the Mertz-Fairhurst study, published as Ultraconservative and cariostatic sealed restorations: Results at year 10, J Amer Dent Assoc 129 (1):55-68, 1998.
- d. Longevity of bonded ceramic overlays compared to traditional gold onlays, ceramometal crowns and gold crowns.
- e. Use of remineralization therapy for early enamel caries lesions.
- f. Parameters for decision-making for resin composite restorations as to any unsupported enamel that may be allowed to remain during tooth preparation on functioning occlusal surfaces (e.g. narrow marginal ridges).
- g. Comparison of Class 2 amalgam restorations and Class 2 resin composite restorations, both restoring teeth with minimal proximal lesions involving dentin, with proximal margins in contact with adjacent teeth and with them separated from adjacent teeth. This is needed to determine if there really is a value in breaking proximal contact to the longevity of restorations.

**3. Calibration of faculty**

- a. **What is the protocol for calibrating and standardizing your Operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**

See attached Division Operating Instruction, entitled "Faculty Calibration" (Attachment 2). The faculty calibration program is designed primarily for preclinical courses and is an integral part of operation of the Division of Operative Dentistry. It consists of three parts as follows:

- i. Development of faculty member skills to enable each to demonstrate to students the step-by-step procedures necessary to produce clinically acceptable tooth preparations and restorations.
- ii. Prepare all laboratory instructors in preclinical courses to be able to impart the knowledge to students as to the important aspects of daily projects (those aspects that are important in determining grades on future practical examinations).
- iii. Calibrate the eight graders to promote accuracy and consistency in grading practical examinations.

- b. **How often is calibration/recalibration done?**

*The various aspects of calibration are done at various times:*

- i. Faculty skill development is done twice each semester.
- ii. Calibration of all laboratory instructors for grading daily projects is done once each semester.
- iii. Calibration of graders for grading each practical examination is done while students are taking the examination, so that is done five or six times each semester.

- c. **What evidence supports your protocol for calibration and recalibration? (Please cite)**

None, but we have seen marked improvement in willingness and ability of faculty to demonstrate since the first part was initiated nine years ago, and we have seen improvement in consistency of grading and in student ratings of faculty consistency since we began calibrating all instructors on grading.

#### 4. **Competency education**

- a. **How is competency based Operative education determined?**

The different levels of competence in operative dentistry expected from each of the various classes of dental students is determined through a combination of evaluating daily exercises and administering competency examinations. All of these have specific criteria, and the student is evaluated based on how well he/she meets those criteria.

- b. **How is the weak student identified?**

In pre-clinical courses, daily exercises are evaluated on a satisfactory/unsatisfactory basis, and any exercise on which student performance has been rated unsatisfactory must be reaccomplished until performance is at a satisfactory level. Practical examinations are given on tooth preparation and restoration to determine a student's level of competence. The student's grade in the course is determined by the grades he or she earns on the practical examinations.

In the clinical course, in addition to daily evaluations and five specific competency examinations, quarterly meetings of the faculty of each team (of approximately 23 students) are held to evaluate the overall clinical progress of each individual student. Each student is provided with feedback in the form of a formative evaluation as a result of the meeting.

- c. **What measures are taken to upgrade competency of the weak student?**

In preclinical courses, students who do not perform up to expected standards are provided with tutors and are encouraged to seek faculty input and help. Students who fail to achieve an acceptable level of competence by the end

of the course may, at the discretion of the Student Promotion Committee, be given the opportunity to remediate the course.

5. Computer based interactive education

*Region VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for educational purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.*

a. What interactive computer-based teaching tools are you using to teach Operative Dentistry?

None at present. However, we are moving in that direction. With the class entering in August 2000, each student will have a laptop computer. All manuals and synopses will be provided to students on a disk instead of on paper. UTHSCSA is working with a private vendor and several other dental schools to place dental textbooks, selected by the faculty, in electronic form and distribute them on disk to students. Graduating students will be able to take the primary e-textbook with them; other textbooks will be time-stamped, so they are available for reference only during school years. Other selected reference material will also be available on disk or on the intranet.

As the evolution proceeds, interactive material, such as diagnostic scenarios and radiographs for simulated situations created in typodont teeth, will be added.

b. Who developed them? N/A

c. Would your school/region participate in development and in what manner?

Yes. Time permitting, in whatever manner is needed.

6. Posterior esthetic restorations – report on direct and indirect

a. Are they included in the curriculum? What discipline?

Yes. Taught by Restorative Dentistry faculty (Divisions of Operative Dentistry and Esthetic Dentistry)

b. Where (pre-clinic and clinic)

Both in preclinical courses and in the clinic

c. Required experiences?

Since we have no specific requirements, these experiences are not required. All graduates have had experience with posterior resin composite restorations. Approximately 20% have had experience with bonded ceramic onlays and/or inlays.

d. What materials and/or systems utilized?

For posterior resin composite restorations:

Bonding Systems

- Scotch Multipurpose
- Optibond Solo

Resin Composites

- Heliomolar
- Z-100 (3M)

Ionomer liners

- Vitrebond (3M)
- Fuji II LC (GC)

For bonded ceramic restorations:

Porcelain Systems

- Fortress (Mirage)
- Ceramco II (Ceramco)

Luting System

- WetBond (Mirage)

e. **What are the results? Also cite the evidence for the reported results.**

The school's Quality Assurance Committee recalls patients to look for problems with treatment and with materials. No trend toward a greater percentage of failed posterior esthetic restorations has been reported. Many faculty are using these restorations in their practices with excellent results over long term.

On evidence, there is an abundance of clinical evidence on Class 1 and 2 resin composite restorations. When the studies compare them to amalgam restorations, they generally have a slightly higher failure rate. But, dental schools who don't teach them seriously will have most of their graduates doing them in their practices without having been prepared to do them well.

One study, which began with 180 Class 2 resin composite restorations, is being carried out at UTHSCSA. Four-year performance data will be presented at the 2000 meeting of the AADR; three-year performance data were presented at the 1999 meeting, and the reference is as follows:

Burgess JO and others. Clinical evaluation of base, sandwich and bonded Class 2 composite restorations. J Dent Res 78 (Special Issue):531, 1999, Abstract 3405.

On bonded ceramic onlay restorations, there is limited clinical evidence of their efficacy, but one study is being carried out at UTHSCSA. Four-year data will be presented at the 2000 meeting of the AADR; performance has been exceptionally good. Two-year data were presented at the IADR meeting in Nice; the reference is as follows:

Barghi N, Berry TG, Chan DCN. Bonded posterior etched porcelain onlays: two year clinical evaluation. J Dent Res 77 (Special Issue B):803, 1998, Abstract 1372.

**Regional Agenda Items**

1. **Do you teach and/or are you using air abrasion or laser technology?**

Yes. There is a lecture in the Junior year Operative Dentistry didactic course on air abrasion. Students have used the technology in the clinic for the past year and a half. Beginning in January 2000, there will be a 30 hour elective for 20 students, allowing them to gain experience on extracted teeth.

2. **What is your diagnostic criteria and teaching for fissure caries. What are your criteria for evaluating conservative pit and fissure preparations and restorations?**

The diagnostic and treatment planning criteria are summarized on an updated paradigm flow chart (Attachment 3) titled "Assessment and Management of Fissured Tooth Surface."

The preclinical teaching in Operative Dentistry of treatment of fissure caries lesions involves the utilization of situation typodont teeth in which minimal dentinal pit lesions defects have been created along with the deepening and widening of the resin groove anatomy to represent fissures. UTHSCSA teaches preventive, minimal restorations in which only dentin demineralization and overlying unsupported occlusal enamel have been removed in the tooth preparation. Then, amalgam or resin composite is placed to fill these preparations, and a flowable resin composite/sealant (Ultradent XT) is placed over the restoration and in the etched (or opened with #1/8 bur and etched) fissures. Both Preventive Resin Restorations (PRRs) and Preventive Amalgam Restorations (PARs) are taught preclinically and accomplished in the clinic. Presently, the restorations are a part of the preclinical course only as daily work assignments; no examinations on the techniques are given. This will change as the curriculum evolves.

Attached are the grading criteria sheets used for a preventive resin restoration, both the preparation and the restoration (Attachment 4).

**3. How do you prepare your students for the National Board Examination?**

Several attempts have been made in the past to formalize a review schedule for National Board Examinations. Each department reviewed for the students the most important material in each discipline and presented past National Board exams if they were available. These reviews were, however, poorly attended and could not be correlated with improvement to examination scores, so they were discontinued. Presently, the academic schedule is synchronized with Board dates to insure that no course exams are scheduled in the week prior to Boards. Students are given an open Wednesday afternoon in which to study.

Beginning this year, students may elect to take the Boards electronically during the weeks after Thanksgiving. Those who fail will retake the exam in March. Students must pass Part 1 to become seniors and must pass Part 2 to graduate.

The Division of Operative Dentistry includes a manual section for National Board review (see attachment ??) in which tested statements, the stem and correct answer, are printed for each restorative material and topic. However, the section is now out of date since few old exams have been released. In addition, the emphasis and format of the Boards is increasingly of a case-based nature, so the questions currently distributed to students prior to Boards are not of the kind they will encounter on the Boards.

CODE Questions

1. **What is CODE doing well?**

Bringing about routine communication between the Operative Dentistry faculties of dental schools. This allows sharing of problems and solutions and stimulates innovation.

2. **Where do you desire improvement?**

Increased association with AADS.

3. **Is \$25 US/\$30 Canadian school dues adequate? Comments are expected.**

Probably not. As the organization develops, it will determine its functions and goals. At the same time, it should determine the budget necessary to allow performance of those functions and achievement of the goals. Dues should be established to support the operation.

4. **How can participation by faculty in CODE regional meetings be encouraged/improved?**

Representation from each school at the annual should be a requirement for membership.

5. **Please indicate the office/position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc., are to be mailed. NOTE: Regional Director – this information from each school is to be transmitted to the National Director.**

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STUDENT PROTOCOLS FOR  
INDIRECT AND DIRECT PULP CAPPING PROCEDURES

INDIRECT PULP CAP

- I. **INTRODUCTION** - When there is a very deep carious lesion in a vital permanent or primary tooth, an indirect pulp cap (IPC) should be considered. Indirect pulp capping is a procedure designed to prevent pulp exposure by removing soft, wet carious dentin but leaving a thin layer of dry (fibrous) demineralized dentin, which, if removed, would expose the dental pulp. A bacteriostatic or bactericidal dressing or liner is then placed over the demineralized dentin to reduce the permeability of the dentinal tubules to noxious stimuli. The pulp must be vital and healthy. It must have the ability to remineralize the demineralized dentin and to form sclerotic and reparative dentin. Given the choice, **an indirect pulp cap is greatly preferred to a direct pulp cap. There simply are no advantages to exposing a pulp** which has the ability to protect itself.
- II. **DIAGNOSIS** - The pre-operative status of the pulp and periradicular tissues should be carefully evaluated. The tooth should be considered a good candidate for an IPC only if the following conditions exist:
- A. There is no history of spontaneous pulpal pain.
  - B. There is no history of pain that lingers after the tooth has returned to mouth temperature following the application of a hot or cold stimulus.
  - C. Pain elicited during pulp testing with a hot or cold stimulus does not linger after the tooth returns to mouth temperature.
  - D. A periapical radiograph shows no evidence of a periradicular lesion of endodontic origin.
  - E. Pulpal response to thermal or electrical tests is within normal limits.
- III. **TREATMENT PLANNING**  
An IPC will be accomplished at the restoration appointment if the tooth is to receive a direct restoration (bonded amalgam, composite, or ionomer); the restoration will be placed over the IPC. If the tooth is to receive an indirect restoration, the supervising faculty member, in consultation with the student, will make a determination as to the amount of time that should elapse prior to definitive restoration, usually 4 to 8 months. If an amalgam buildup is indicated, it should be performed at the time of the IPC, time permitting, and it should be bonded. Prior to definitive restoration, normal vitality must be determined. Supervising faculty in consultation with the student may determine that an endodontic procedure is indicated instead of an IPC.
- IV. **TREATMENT:**  
Indirect Pulp Capping Procedure:
- A. Isolation - After anesthesia, isolate the tooth with a rubber dam.
  - B. Preparation - Prepare the tooth for a final restoration leaving demineralized dentin only in the area immediately adjacent to the pulp. Use a caries indicator stain if necessary to assure complete carious dentin removal (other than that immediately adjacent to the pulp). After this is accomplished, use a spoon excavator or a large round bur in a low speed handpiece, revolving at a very low speed. Use very gentle, featherweight strokes over the area of the demineralized dentin to remove only the wet (soft, amorphous) carious dentin. Leave the dry, fibrous, demineralized dentin that gives some moderate resistance to gentle scraping with a spoon. In other words, leave the last deep layer of demineralized dentin which, if removed, would likely expose the pulp.
  - C. Lining - Place a calcium hydroxide liner (Dycal or Life) over the demineralized dentin. Additional cavity sealing is indicated, so a dental bonding system (such as Scotchbond Multipurpose or Amalgambond Plus) should be used. If, in the judgment of the instructor and student, additional protection of the liner is indicated, a stronger material such as an ionomer base (Fuji II LC, Vitrebond), may be placed over the calcium hydroxide liner prior to application of the bonding material.
  - D. Restoration:
    - 1. Direct restorations - For direct restorations (bonded amalgam, composite, ionomer), place the final restoration. If time does not allow for placement of a final restoration at the first appointment, an ionomer (Fuji II LC, Ketac Silver) or IRM temporary restoration should be placed and the patient reappointed for the final restoration as soon as possible. The indirect pulp cap should not be disturbed during the subsequent restoration process.
    - 2. Indirect restorations - For indirect restorations (cast metal restorations, ceramic onlays or crowns), place a definitive buildup if time allows (bonded amalgam, composite, ionomer) at the appointment in which the IPC was performed. Delay the final restoration for a period of months, usually 4 - 8 months. Prior to proceeding with definitive restoration, assure normal vitality of the pulp.

**V. PRECAUTIONS DURING TREATMENT**

- A. Assure no carious or demineralized dentin is left in the area of the DEJ.
- B. Avoid being aggressive in carious dentin removal in the area of the pulp in order to prevent accidental pulp exposure.
- C. For direct restorations or substructures (build-ups) for crowns or FPD retainers, bond the restoration to reduce initial leakage.
- D. If a temporary restoration has been previously placed over an indirect pulp cap and the tooth is reentered for a restorative procedure, do not remove the indirect pulp capping material.

**DIRECT PULP CAP**

**VI. INTRODUCTION** - The need for a direct pulp cap should be avoided by using an indirect pulp cap when the carious lesion is deep in a normally vital tooth. A direct pulp capping procedure may be indicated in the management of a mechanical exposure in a permanent tooth when the exposure is small, trauma to the pulp is minimal, and the history and preoperative evaluation indicate that the pulp is healthy. A mechanical exposure which occurs at the cervical level (such as in a Class 5 preparation) may not be suitable for direct pulp capping; pulp tissue coronal to the exposure could have its blood supply compromised by hemorrhage or inflammation caused by the exposure.

**VII. DIAGNOSIS** - Diagnostic considerations for the direct pulp cap include those listed above for an indirect pulp cap plus the following:

- A. The exposure is small.
- B. Rubber dam isolation is complete, and there is no contamination with blood or saliva.
- C. Any bleeding from the exposure can be easily stopped.
- D. There is no sign of suppuration or necrotic pulp tissue.

**VIII. TREATMENT:**

**Direct Pulp Capping Procedure:**

- A. After hemostasis, immediately place calcium hydroxide (Dycal or Life) over the exposure. Be gentle and avoid pressure. A stronger material such as an ionomer base (Fuji II LC, Vitrebond), may be placed over the calcium hydroxide liner prior to etching for application of the bonding material.
- B. Complete the cavity preparation.
- C. Etch and use an appropriate dental bonding system.
- D. Complete the restoration with amalgam, composite, or ionomer.
- E. Reevaluate in 4 - 8 months. If the pulp is normally vital, the tooth is asymptomatic, and an indirect restoration is in the treatment plan, proceed with that restoration without disturbing the pulp cap.

This protocol was developed by the Departments of Restorative Dentistry and Endodontics, and was coordinated with the Departments of Dental Diagnostic Science, General Dentistry, Pediatric Dentistry, and Prosthodontics, UTHSCSA Dental School, February 1991; revised October 1995 and October 1999.

**DEPARTMENT OF RESTORATIVE DENTISTRY**

**UTHSCSA DENTAL SCHOOL**

**DIVISION OF OPERATIVE DENTISTRY**

**OPERATING INSTRUCTION CUR 1**

**1 September 1998**



Curriculum

FACULTY CALIBRATION

The purposes of the faculty calibration program are threefold. First, the program should help all faculty members in preclinical courses to develop the competence and confidence necessary to enable them to demonstrate to students step-by-step procedures in achieving successful preparations and restorations in preclinical courses. Secondly, it should help assure accuracy and consistency among all faculty in evaluating preparations and restorations so that faculty may help students evaluate their procedures in the same way graders will evaluate them. Thirdly, it is to assure as much accuracy and consistency among graders as is possible.

This operating instruction establishes procedures for calibration of full-time and part-time faculty for both teaching and grading. It establishes the position of the Director of Calibration for the Division, and it defines responsibilities of that position and of faculty as pertains to calibration.

I. **Director of Calibration** - The Director of Calibration is appointed by the Division Head to carry out a program of calibration of faculty teaching in preclinical courses. Duties of the Director of Calibration are as follows:

- A. **Calibration for Tooth Preparation & Restoration** - The Director of Calibration will:
1. prior to each preclinical course, appoint two primary graders, with the approval of the Course Director and Division Head, from among the full-time faculty.
  2. prior to or very early in each preclinical course, working with the Course Director, select two to four preparations and one or two restorations for faculty teaching in the course to perform as calibration projects.
  3. distribute teeth to be prepared and/or restored, typodonts, burs (as necessary), amalgam and appropriate evaluation sheets to each faculty member teaching in the upcoming preclinical course, and provide instruction as to expected completion date for calibration projects.
  4. arrange for faculty, after having completed their preparations and restoration(s), to return typodonts to him/her (the Director of Calibration), then send them to the primary graders for grading (anonymously if requested by operator).
  5. when graded preparations and restorations are returned to him/her, make a record of the grades and the projects graded, then return teeth and graded evaluation sheets to the operator.
  6. after all projects are graded, report to the faculty as a group (after a preclinical course lecture) on their performance on each project (anonymously).
  7. maintain records on individual faculty member performance on calibration projects and provide additional instruction/practice if performance indicates less than a "3" average on calibration projects.
- B. **Calibration for Grading Daily Projects** - The Director of Calibration will:
1. select one or two of each preparation and restoration performed by students as practical examinations during each preclinical course for grading by faculty.
  2. prior to the teaching of a type of restoration in a course, set up the selected preparations and restorations with evaluation sheets for faculty to grade.
  3. record items marked as meeting criteria, needing improvement, clinically unacceptable but correctable, and clinically unacceptable and uncorrectable for each faculty member and the primary graders (see paragraph 1.a.(1) above), and compile a summary of evaluation items marked and grades given for each project graded.

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Distribution: 1 - Administrative Assistant; 1 - each full-time and part-time faculty member, Operative Dentistry; 1 - Chairman, Restorative Dentistry  
Review: Annually in January by Operative Full Time Faculty and Staff  
Responsibility: Division Head  
Supercedes OI CUR 1 dated 1 January 1995

4. present the compilation of grading results to faculty at a meeting after a lecture prior to faculty going to laboratory to teach that type of procedure.
5. assure that faculty who have given grades or marked items significantly different from the norm review the preparation or restoration again with the summary of marks and grades.

- C. **Calibration of Practical Exam Graders** - The Director of Calibration will, either directly, or with the help of other faculty members:
  - 1. accumulate slide photographs of preparations and restorations accomplished by students and/or faculty which illustrate properly and improperly accomplished aspects.
  - (2) during each practical examination, present photographic slides to the graders along with a consensus as to how they should be marked for grading.
  
- II. **Faculty of Preclinical Courses** - Regarding calibration, duties of faculty who teach in preclinical courses will be as follows:
  - A. **Calibration for Tooth Preparation & Restoration** - Faculty of preclinical courses should:
    - 1. perform projects as identified by the Director of Calibration and submit them for evaluation within the time frame established by the Director of Calibration. Projects should be performed with teeth mounted in typodonts and typodonts mounted on poles in preclinical laboratories.
    - 2. strive to accomplish preparations and restorations which would receive high grades, and maintain an average grade on procedures they have accomplished of at least "3".
    - 3. check out instruments and handpieces from the third floor dispensary for these exercises.
    - 4. obtain typodonts, teeth, burs, amalgam, and evaluation sheets from the Director of Calibration.
    - 5. satisfactorily reaccomplish any project which would be graded as less than satisfactory.
  
  - B. **Calibration for Grading Daily Projects** - Faculty of preclinical courses will:
    - 1. grade calibration exercises in a timely manner and return typodonts, instruments, and evaluation sheets to the Director of Calibration for compilation of results. Part-time faculty should attempt to perform calibration exercises during practical examinations or during breaks from laboratory teaching.
  
  - C. **Calibration of Practical Exam Graders** - Graders should:
    - 1. assemble with the Director of Calibration or his designee and the Course Director during each practical examination for viewing and discussion of calibration photographic slides (and typodonts with the actual preparations and restorations if possible).
    - 2. strive to become calibrated in grading practical examinations.
  
- III. **Primary Graders** - Two primary graders will be appointed by the Director of Calibration with the concurrence of the Course Director and Division Head, from the full-time faculty. These individuals will:
  - A. by forced consensus, evaluate the calibration projects performed by faculty (paragraph 1.a.(4) above) and submit their consensus evaluations to the Director of Calibration.
  - B. by forced consensus, evaluate and grade each calibration exercise (paragraph 1.b.(3) above) and submit consensus evaluations to the Director of Calibration.

JAMES B. SUMMITT, DDS, MS  
Professor and Head  
Division of Operative Dentistry

# Assessment and Management of Fissured Tooth Surface

No Caries or Arrested Caries  
in Fissure with  
Caries Susceptible Morphology

Enamel Demineralization  
in Fissure **or** Questionable  
Dentin Caries  
at Base of

Obvious Cavitation  
or Dentin Caries  
in Fissure

Low

Caries  
Risk  
?

Moderate  
or  
High

Low

Caries  
Risk  
?

Moderate  
or  
High

Open Suspect Fissure  
#1/8 round bur or  
air abrasion

Enamel

Demineralization  
involves ?

Dentin

No treatment

Sealant

Enamel PRR

Restoration  
AM, PAR, CR  
PRR (Involving dentin)

## Appropriate Preventive Care Based on Caries Risk

Hygiene

Diet

Fluorides

Monitor  
Status

Antimicrobials

Sealant  
Repair

### Abbreviations

AM Amalgam restoration  
CR Composite resin restoration

### Evidence of Dentin Caries

Softened dentin  
Discoloration or opacity seen  
through enamel.  
Dentin radiolucency

**1999 National CODE Agenda**

1. *Vital pulp treatment*

a. *When, where, and who teaches this topic in your curriculum?*

In the second year dental student (D-2) class in pre-clinical operative, one of our endodontic professors does one lecture on this topic. He goes into more detail in his D-2 endodontics class. In the third year (D-3) didactic course, I review the proper procedures for direct and indirect pulp caps.

My recommendation to students is: use calcium hydroxide on exposures (when indicated) and very near exposures and cover with a glass ionomer liner. In very deep areas without the danger of exposure, I recommend a glass ionomer liner directly on the dentin in that area.

b. *Is this treatment utilized in patient care by students?*

Absolutely.

c. *What criteria/protocol are followed in deciding to do or not do vital pulp treatment?*

If there is a question about the condition of the pulp, we determine the status by performing what we call a S.O.A.P. on the tooth.

First comes the Subjective information from the patient:

- i. chief complaint
- ii. thermal sensitivity (as reported by the patient) and
- iii. chewing sensitivity (as reported by the patient).

Second is the Objective information determined by examination:

- i. percussion
- ii. palpation
- iii. any restorations, caries, the presence of a sinus tract, and/or fractures (restoration or tooth) and
- iv. radiographic findings.

Third is the Assessment based on the above information.

Fourth is formulating a Plan.

Please see the following Addendum #1 for greater details.

Common Symptoms and Signs Associated  
with Normal & Diseased States of the Pulp

Symptoms	+	Signs	-	Pulpal Diagnosis
<ul style="list-style-type: none"> <li>• Absence of symptoms</li> </ul>	+	<ul style="list-style-type: none"> <li>• Absence of signs</li> </ul>	-	Normal Pulp
<ul style="list-style-type: none"> <li>• No prior pain episodes</li> <li>• Pain is mild</li> <li>• Pain is not spontaneous</li> <li>• Pain of short duration from thermal stimulation</li> </ul>	+	<ul style="list-style-type: none"> <li>• Response to thermal and electrical tests</li> <li>• Normal to percussion</li> <li>• Normal radiographic findings</li> <li>• Carious lesion and/or restoration</li> </ul>	-	Reversible Pulpitis
<ul style="list-style-type: none"> <li>• History of prior pain episodes</li> <li>• Pain is moderate to severe</li> <li>• Pain of prolonged duration from thermal stimulation</li> <li>• Pain on mastication</li> </ul>	+	<ul style="list-style-type: none"> <li>• Response to thermal and electrical tests</li> <li>• Sensitivity to percussion</li> <li>• May or may not have : <ul style="list-style-type: none"> <li>• abnormal radiographic findings</li> <li>• large carious lesion</li> <li>• large restoration</li> </ul> </li> </ul>	-	Irreversible Pulpitis
<ul style="list-style-type: none"> <li>• Pain may be absent, mild, moderate or severe</li> <li>• May or may not have: <ul style="list-style-type: none"> <li>• history of prior pain episodes</li> <li>• spontaneous pain</li> <li>• pain on mastication</li> </ul> </li> </ul>	+	<ul style="list-style-type: none"> <li>• No response to thermal and electrical tests</li> <li>• May or may not have: <ul style="list-style-type: none"> <li>• sensitivity to percussion</li> <li>• abnormal radiographic findings</li> <li>• large carious lesion</li> <li>• large restoration</li> </ul> </li> </ul>	-	Pulpal Necrosis

w:\harrison\table

Diagnosis of the Status of the Dental Pulp

**Diagnosis.** There is no single clinical test that can accurately assess the true status of the dental pulp. Diagnosis is based on determining related subjective findings (symptoms) and objective findings (signs). Appropriate interpretation of all associated symptoms and signs provide an accurate pulpal diagnosis.

Subjective Findings (Symptoms)

Interrogatory  
Examination

Objective Findings (Signs)

Clinical/Radiographic  
Examination

Pulpal  
Diagnosis

**Interrogatory Examination**

Subjective information obtained by questioning the patient to determine the presence or absence of pain, history of prior pain episodes, severity and spontaneity of pain, and the source and stimulus of pain. [Note: prior pain episodes, moderate/severe pain and spontaneous pain indicate a highly inflamed pulp.]

**Clinical/Radiographic Examination**

Objective findings from examination of the patient to determine the presence and extent of carious lesions, restorations, fractures, periodontal disease, resorptions, calcifications, etc. [Note: presence of above signs may indicate injury to the pulp]. Record results of thermal and electrical pulp tests, and responses to percussion and palpation. [Note: thermal and electrical pulp tests produce a high incidence of false responses ( $\pm 25\%$ ).]

**Pulpal Diagnosis**

Analysis and interpretation of the associated symptoms and signs will indicate that the true pulpal status falls into one of the following four diagnostic categories:

- Normal Pulp**      Pulp is intact and uninfamed
- Reversible Pulpitis**      Pulp is inflamed but capable of recovery
- Irreversible Pulpitis**      Pulp is highly inflamed and incapable of recovery
- Pulpal Necrosis**      Pulp is partially or totally necrotic and incapable of recovery



*Please cite the scientific evidence. Additional comments welcome.*

References:

Cvek M: Treatment of non-vital permanent incisors with calcium hydroxide, *Odontol Rev* 23:27, 1972

Cvek M: A clinical report on partial pulpotomy and capping with calcium hydroxide in permanent incisors with complicated crown fractures, *J Endod* 4:232, 1978

Cvek M: Endodontic treatment of traumatized teeth. In Adreanon. JO: Traumatic injuries of the teeth, ed 2, Philadelphia, 1981. WB Saunders Co.

Dimaggio JJ, and Hawes RR: Evaluation of direct and indirect pulp capping, *J Dent Res* 40:24, 1962 (abstract)

Dimaggio JJ and Hawes RR: Continued evaluation of direct and indirect pulp capping, *J Dent Res* 41:38, 1963 (abstract)

Heys DR, et al: Histological considerations of direct pulp capping agents, *J Dent Res* 60:1371, 1981

Hirschfeld Z, Sela J, and Ulmansky M: Hydrex and its effect on the pulp, *Oral Surg* 34:364, 1972

Holland R, et al: Histochemical analysis of the dogs' dental pulp after pulp capping with calcium, barium and strontium hydroxides, *J Endod* 8:444, 1982

Horsted P, El Attar K, and Langeland K: Capping of monkey pulps with Dycal and a Ca-eugenol cement, *Oral Surg* 52:531, 1981

Paterson RC, and Watts A: Further studies on the exposed germ-free dental pulp, *Int J Endod* 20:112, 1987

Pereira JC, and Stanley HR: Pulp capping: influence of the exposure site on pulp healing --- histologic and radiographic study in dogs' pulp, *J Endod* 7:213, 1981

Phaneuf RA, Frankl SN, and Ruben M: A comparative histological evaluation of three calcium hydroxide preparations on the human primary dental pulp, *J Dent Child* 35:61, 1968.

Pisanti S, and Sciaky I: Origin of calcium in the repair wall after pulp exposure in the dog, *J Dent Res* 43:641, 1964

Pitt Ford TR: Pulpal response MPC for capping exposures, *Oral Surg* 50:81, 1980 Pitt Ford TR, and Roberts GJ: Immediate and delayed direct pulp capping with the use of a new visible-light cured calcium hydroxide preparation, *Oral Surg Oral Med Oral Pathol* 71:338, 1991.

Jaber L, Mascres C, and Donohue WB: Electron microscope characteristics of dentin repair after hydroxylapatite direct pulp capping in rats, *J Oral Pathol Med* 20:502, 1991

Jean A, et al: Effects of various calcium phosphate biomaterials on reparative dentin bridge formation, *J Endod* 14:83, 1988

Kerkhove BC, et al: A clinical and television densitometric evaluation of the indirect pulp capping technique, *J Dent Child* 34:192, 1967

King JB, Crawford JJ, and Lindahl RL: Indirect pulp capping: a bacteriologic study of deep carious dentine in human teeth, *Oral Surg* 20:663, 1965

2. *List five of the most important Operative Dentistry topics which need to be studied via clinical trials.*

My opinion and the opinions of other of our faculty:

- a. The success of bonding vs. cementing all-porcelain restorations
- b. The effectiveness of conventional cement (zinc phosphate) vs. resin modified cement vs. resin cement for sealing restoration margins



- c. Evaluation of condensable (packable) composites (material specific)
- d. Fracture rate of porcelain onlays (material specific)
- e. Comparing the effect on the pulp of direct capping with calcium hydroxide vs. glass ionomer or resin modified glass ionomer vs. etch and bonding agent

3. ***Calibration of faculty***

- a. **What is the protocol for calibrating and standardizing your Operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**
- b. ***How often is calibration/recalibration done?***
  - i. Two annual events help with calibration of both new and current pre-clinical and clinical third year Operative and fourth year General Dentistry faculty:
    - (1) Our annual calibration workshops for all faculty which includes Operative dentistry (Class II amalgam, Class II gold inlay, and MOD gold onlay) and other disciplines
    - (2) Annual Western Regional Examining Board Operative (WREB) calibration workshops for all faculty  
Unfortunately, only a limited number of full-time faculty attend this although all full-time and part time faculty are invited.
  - ii. New faculty are calibrated one-on-one: first by the Operative Dentistry Division director and then by current faculty (in the clinical setting). New faculty are at first assigned to shadow current faculty.  
As a reminder to all, we've published the description of "ideal" preparations for the Class II amalgam preparation, the Class III composite preparation, the Class II inlay preparation and the MOD onlay preparation. Those descriptions follow in Addendum 2.
  - iii. Current Operative faculty are encouraged to go to the annual calibration sessions mentioned above. Because so few attend, periodic review of expectations occurs, usually one-on-one.
- c. ***What evidence supports your protocol for calibration and recalibration? (Please cite.)***
  - i. The textbooks:  
Fundamentals of Operative Dentistry, A Contemporary Approach, Schwartz RS, Summitt JB, Robbins JW., Quintessence, 1996  
  
The Art and Science of Operative Dentistry, 3rd Edition, Sturdevant CM, Roberson TM, Heymann HO, Sturdevant, JR. Mosby, 1995
  - ii. 95% or better passing rate of our students of the WREB licensing examinations

OPERATIVE DENTISTRY GRADING CALIBRATION

ADDENDUM #2 - PAGE 1

- 4 - Outstanding (Far above acceptable level; need not be improved.)
- 3 - Good (Above acceptable level; minor improvements indicated.)
- 2 - Acceptable (Performance at acceptable level but improvable.)
- 1 - Poor (Below acceptable level; major improvements are both required and possible.)

Examples:

- ...student does not demonstrate basic and/or sound knowledge re: procedure.
- ...instructor has to do an inordinate (more than just a little) amount of work on the preparation or insertion.
- ...undercut in onlay or crown preparation.
- ...overcut but salvageable (this could also rate a 0).
- ...nicks the adjacent tooth (can be smoothed without requiring restoration).
- ...unwarranted trauma to supporting tissues (this could also rate a 0).
- ...poor clinical judgment (failure to seek help when needed).
- ...does not follow instructions (this could rate a 0).

- 0 - Unacceptable (Far below acceptable; uncorrectable and/or unrecognized deficiencies.)

Examples:

- ...irreversible damage (such as performing enameloplasty on an opposing tooth to correct occlusion without first getting permission)
- ...grossly overcut preparation.
- ...mechanical pulp exposure.
- ...cutting the wrong tooth.
- ...damaging the adjacent tooth (requiring restoration).
- ...unrecognized deficiencies
  - ...caries.
  - ...pulp exposure.
  - ...open margins.
- ...unacceptable non-technical performance
  - ...rude or inconsiderate behavior to patient or instructor.

This serial listing does not in any way imply limitations. Some procedures may be classified unsatisfactory for other reasons.

It is the process that is graded, thus, it is possible to have an acceptable outcome and a failing grade.

Additional notes on grading:

- 1. Only procedures with a final grade of 2 or higher will be counted toward qualifying criteria or progress examinations. RV points will be awarded for all procedures regardless of grade.
- 2. If the restoration step grade is below 2, the restoration must be redone.
- 3. The final grade may be an average of the step grades at the discretion of the instructor.
- 4. A step grade of less than 2 may result in remediation of the step if possible
- 5. All final grades (including those less than 2) will be averaged into the clinical course grade..
- 6. Teeth or restorations damaged in a procedure (example: while treating an adjacent tooth) will be restored with no credit" and "no grade".

## THE IDEAL CLASS II AMALGAM PREPARATION

ADDENDUM #2 - PAGE 2

Remember: *the ideal is seldom found in the mouth.*

In the clinic we are dealing with real teeth, not typodont teeth. Therefore, the preparation described below may differ somewhat from that taught in the preclinical course.

1. Armamentarium of rotary instruments
  - a. #330 bur (to initially establish the 1.5 mm depth of the pulpal floor on the occlusal surface)
  - b. #1556 bur (to slightly deepen and smooth the pulpal floor)
  - c. #4 round bur (for caries removal)
  
2. The preparation
  - a. Pulpal floor = slightly more than the depth of the #330 bur (approximately 2 mm) and slightly past the dentinoenamel junction (DEJ) and into the dentin
  - b. Facial and lingual walls, slightly convergent (same as a #330 bur)
  - c. Extension in facial and lingual grooves (molars), slightly divergent
  - d. Mesial or distal wall (next to the marginal ridge), slightly divergent
  - e. Proximal box, facial and lingual walls slightly convergent and break contact with the adjacent tooth
  - f. It is critical that the facial and lingual box walls be located so there is a 90° angle at the cavosurface margin (may require reverse curves). It is equally important that neither the mesiofacial, mesiolingual, distofacial or distolingual cusps be obliterated in the process.
  - g. Retention grooves (optional) in proximal box in dentin at axiofacial and axiolingual line angles, cut facially and lingually (**not towards the pulp**)
  - h. Gingival floor of the box, below the contact area, flat, approximately 1.5 mm. wide mesiodistally with two-thirds of the width in the dentin parallel to the occlusal plane and the gingival margin breaks contact with the adjacent tooth
  - i. Axial wall of the box, parallel to the external surface of the tooth
  - j. Axio-pulpal line angle, rounded or beveled
  - k. Preparation should be free of unsupported enamel and irregularities

For illustrations of the above, see your operative preclinical laboratory manual and your textbooks: Fundamentals of Operative Dentistry, A Contemporary Approach, Schwartz, et al and The Art and Science of Operative Dentistry, Sturdevant, et al, 3rd edition.

THE IDEAL CLASS III COMPOSITE PREPARATION

ADDENDUM #2 - PAGE 3

Remember: *the ideal is seldom found in the mouth.*

1. Armamentarium of rotary instruments
  - a. #1/2 or #1 bur
  - b. #2 or #4 bur
  - c. #330 bur
  - d. Course flame-shaped diamond
2. Prophylax the tooth to be restored using a flour of pumice slurry.
3. Make shade selection using shade guide. An alternative method is to place a small amount of the composite material directly on the tooth and light cure it to see if the shade is compatible with the tooth. This can easily be removed with a hand instrument.
4. The preparation (be as conservative as possible)
  - a. Establish the outline form of the preparation using a lingual approach if possible. Use the high speed handpiece with a #1/2, #1 bur or #330 bur to obtain access and accomplish most of the gross cutting of the preparation.
  - b. The axial wall is placed approximately 0.2 mm into the dentin or 1.25 mm in depth.
  - c. The incisal corner of the tooth should not be weakened by the placement of the incisal wall. The incisal wall will usually be located in the contact area.
  - d. If possible, the outline form should not extend onto the facial surface. The preparation will extend facially just into the labial embrasure. The outline form will be barely visible from a facial-proximal view.
  - e. The gingival wall is placed only as far gingivally as necessary to include decayed and decalcified enamel and dentin.
  - f. The lingual margin is placed so that as much of the lingual surface of the tooth as possible is preserved while allowing for adequate access and convenience form for preparing, restoring and finishing the Class III cavity.
  - g. Any remaining caries is removed with a low speed handpiece using a round bur (#1, #2, or #4) or hand excavator, depending on the amount of caries remaining and the proximity to the pulp.
  - h. A 0.5 mm wide enamel bevel is placed on all accessible cavosurface margins using the coarse flame-shaped diamond oriented 45° to the external tooth surface.

For illustrations of the above, see your textbooks: Fundamentals of Operative Dentistry, A Contemporary Approach, Schwartz, et al and The Art and Science of Operative Dentistry, Sturdevant, et al, 3rd edition.

Remember, you are not treating a typodont tooth so be as conservative as possible, generally allowing the caries present to dictate the shape of the cavity preparation. The ideal preparation form is the most conservative treatment to solve the problem.

### THE IDEAL CLASS II INLAY PREPARATION

ADDENDUM #2 - PAGE 4

Remember: *the ideal is seldom found in the mouth.*

1. Armamentarium of rotary instruments
  - a. #169L bur (to prepare the facial and lingual extensions of boxes including secondary flares)
  - b. #170L bur (to prepare occlusal and boxes)
  - c. Flame-shaped or thin tapered diamond instrument (to bevel occlusal and gingival margins and the axiopulpal line angle)
  - d. Paper disk and mandrel (if desired to prepare secondary flares instead of using the #169L bur)
2. Occlusal aspect
  - a. Facial and lingual occlusal walls, 2 to 5 degrees divergence
  - b. Isthmus width (facio-lingually), 1 mm. or no greater than 1/3 to 1/2 the faciolingual intercusp distance before beveling when there is minimal or no caries (if it is wider, convert the preparation to one for a cast gold onlay.)
  - c. Pulpal floor, 2 mm deep
3. Proximal boxes
  - a. Gingival floor, flat
    - i. molars, 1.25 mm. wide (mesio-distally)
    - ii. premolars, 1.0 mm. wide (mesio-distally)
  - b. Walls flared 30 to 40 degrees to the facial and lingual with 2 to 5 degrees occlusal divergence
  - c. Retention grooves at the facio-axial and linguo-axial line angles are optional and may not be necessary at all (use a 169L bur to create the retention grooves if they are desired)
  - d. No reverse curve
  - e. Place secondary flares on the facial and lingual extensions of the box(es) (optional)  
(For both description and drawings, see pages 397 through 400 in Fundamentals of Operative Dentistry by Schwartz, et al and see pages 702 through 706 in The Art and Science of Operative Dentistry, 3rd Edition by Sturdevant, et al)
  - f. The preparation should not be in contact with the adjacent teeth
  - g. Axio-pulpal line angles beveled or rounded
  - h. Axial wall convex, following external contour of the tooth and slightly convergent pulpally
  - i. Short 30-degree gingival marginal bevel
  - j. Short (0.5 mm.) 30-degree occlusal marginal bevel

### THE IDEAL M.O.D. ONLAY PREPARATION

Remember: *the ideal is seldom found in the mouth.*

1. **Armamentarium of rotary instruments**
  - a. #169L bur (to prepare the facial and lingual extensions of boxes including secondary flares)
  - b. #170 bur (to prepare occlusal and boxes)
  - c. Flame shaped diamond instrument (to bevel gingival margins, and the P.K.T. shoulder, bevel or round the axio-pulpal line angle, blunt any sharp internal line angles) and reduce cusps for occlusal clearance
  - d. Paper disk and mandrel (to prepare secondary flares instead of using the #169L bur, if desired)
2. **Occlusal aspect before reduction of cusps**
  - a. Facial and lingual occlusal walls, 2 to 5 degrees divergence
  - b. Initial isthmus width, 1 mm. (facio-lingually)
  - c. Pulpal floor, 2 mm. deep (before reduction of cusps)
3. **Proximal boxes**
  - a. Gingival floor, flat
    - i. molars, 1.25 mm. wide (mesio-distally)
    - ii. premolars, 1.0 mm. wide (mesio-distally)

ADDENDUM #2 - PAGE 5

- b. Walls flared 30 to 40 degrees to facial and lingual with 2 to 5 degrees occlusal divergence
  - c. No reverse curve
  - d. Place secondary flares on the facial and lingual extensions of the box(es) and facial and lingual extensions into grooves of the preparation, if used. (For both description and drawings, see pages 702 through 706 in Sturdevant's 3rd edition or pages 420 through 424 in Sturdevant's 2nd edition.)
  - e. The preparation should not be in contact with adjacent teeth
  - f. Axio-pulpal line angles beveled or rounded
  - g. Axial wall convex, following external contour of tooth and slightly convergent pulpally
  - h. 30-degree gingival bevel
  - i. After blending isthmus with proximal boxes, the isthmus width (facio-lingually) may be 1.5 mm.
4. **Reduction of cusps**
- a. The cusps are reduced to obtain 1.5 to 2.0 mm. occlusal clearance on working cusps and 1.0 to 1.5 mm. on non-working cusps
  - b. The angles of the lingual incline of the facial cusps and the facial incline of the lingual cusps are maintained
  - c. 40 degree counter-bevel on the facial aspect of the facial cusps of mandibular teeth and lingual aspect of the lingual cusps of both mandibular and maxillary teeth
  - d. An esthetic preparation is used on the facial of maxillary teeth: the facial cusp(s) are hollow ground with no counter-bevel
  - e. After cuspal reduction is complete, the pulpal floor should be 0.5 to 1.0 mm. deep
5. Round the internal line angles formed by the cuspal reduction and the lingual and facial walls; also round the corner formed by the proximal flares and the external facial and lingual cuspal bevels
6. A P.K.T. shoulder (.75 mm wide) may be used on the working cusp with a 0.5 mm., 30 degree bevel
7. Margins on the working cusp(s) clear of occlusal contact so occlusal contact is on cast metal

For illustrations of the above, see your operative preclinical laboratory manual and your textbooks: pages 400 through 403 of Fundamentals of Operative Dentistry, A Contemporary Approach, Schwartz, et al and pages 715 through 725 of The Art and Science of Operative Dentistry, Sturdevant, et al, 3rd edition.

4. *Competency education*

a. *How is competency based Operative education determined?*

Department Chairs, Division Directors, and course directors were contacted. Expected competencies were requested. A committee reviewed these stated competencies. Based on these expected competencies, the first competency documents was started in 1993 and completed in 1994. The document was reviewed two years later and the current document was adopted in the Spring of 1997.

b. *How is the weak student identified?*

All students are observed in their daily work to help identify the weak ones. However, when Progress Examinations are given (either in the laboratory or in the clinic) these weak students become much easier to identify since they do not receive aid from a faculty member during these examinations.

c. *What measures are taken to upgrade competency of the weak student?*

If a student consistently fails to successfully complete Progress Examinations, a remediation program is set up and the student is tutored by a selected Operative faculty member. During the time that the student is remediating, Operative Clinic privileges are withdrawn. When that faculty member is satisfied that the student is ready, the student is permitted to retake the Progress Examination. If a student still cannot satisfactorily complete the Progress Examination, a recommendation to dismiss or to repeat the year may be made or additional remediation may be prescribed immediately.

5. *Computer based interactive education*

a. *What interactive computer-based teaching tools are you using to teach Operative Dentistry?*

None

b. *Who developed them?* n/a

c. *Would your school/region participate in development and in what manner?*

We would like to think that our school would be willing to participate, however, essential to making a final decision would be the time and the funds which must be allocated to such a project. The interest is there and we hope we are kept apprised of any such project.

6. *Posterior esthetic restorations - report on direct and indirect.*

a. *Are they included in the curriculum?*

b. *Where (pre-clinic and clinic)*

In the second year pre-clinical Operative course, the students are taught how to do a Class II, Class III, and a Class V direct composite restoration

In the third year didactic Operative course, we discuss only the direct composite restorations. In the Operative clinic, we do only direct composite restorations.

In the fourth year the students receive a 2-quarter course from the General Dentistry Department, "Advances in Techniques and Materials." With the General Dentistry Department they are permitted to do both direct and indirect restorations. The indirect restorations may be either composite or porcelain.

c. *Required experiences? (We like to call them "essential experiences.")*

In the pre-clinic course, they are required to do one of each of the three classes mentioned above. In the third year Operative clinic they are required to do a minimum of two Class III composite restorations plus a Class III composite clinical Progress Examination. In the fourth year, General Dentistry requires five tooth-colored indirect restorations of either composite or porcelain.

d. ***What materials and/or systems utilized?***

Composites: Prisma TPH, Herculite XRV, Z-100, Heliomolar, Tetric Flow, SureFil with Composit-Tight rings and matrices for Class II

Resin Modified Glass Ionomer: Dyract (for Class V)

Porcelains: (1) conventional stacked and (2) pressable

e. ***What are the results? Also cite the evidence for the reported results.***

Are clinical results during the third year appear to be very good overall. The Chair of General Dentistry reports that they are having good results also. Proximal contacts are excellent using the Composit-Tight system for Class II restorations.

These results are determined by observable clinical means. At this time we have no other evidence.

### Regional Agenda Items

1. ***Do you teach and/or are you using air abrasion or laser technology?***

We are using air abrasion in the post-graduate A.E.G.D. program. Occasionally the fourth year undergraduate students are permitted to use the air abrasion technology in the A.E.G.D. clinic.

Laser technology is used in the Graduate Periodontal Clinic. The undergraduate fourth year students are introduced to laser technology in a didactic course and they get to do a brief practice on an orange.

2. ***What is your diagnostic criteria and teaching for fissure caries. What is your criteria for evaluating conservative pit and fissure preparations and restorations?***

Most of our faculty are using the explorer and the criteria of "sticks" to "determine" whether or not pit and fissure caries exists. They also look at radiographs to see if anything can be seen at or beyond the dentino-enamel junction.

If the caries is felt to be within the enamel only, a preventive resin restoration (PRR) may be ordered using one of the available composites.

Sealants are also done with Ultraseal XT when it is deemed appropriate, that is, caries is absent or the caries is extremely superficial.

Students are taught that an amalgam preparation should be as conservative as possible as long as the smallest condenser fits into the preparation. Composite preparations are the same, as long as we can get the composite into the preparation. They are taught to remove all the caries and if a groove is not carious, to seal the groove rather than to prepare and restore it.

3. ***How do you prepare your students for the National Board Examination?***

In my third year didactic Operative course, I incorporate as many of the old National Board questions as possible into my examinations. Most of the topics are adequately covered in the lectures and assignments.

When these students become fourth year students, I usually will spend one to two hours in review, especially discussing old National Board questions.

The second and third year Operative syllabi and textbooks and the fourth year course are excellent vehicles for review.



CODE Questions

1. *What is CODE doing well?*

The annual regional meetings and the post-meeting handout of collated answers to all the questions as well as what is published by the National organization are most helpful.

The most helpful of all are the reports given and the exchange of information and discussion which occurs around the table at our regional meeting. Many times we've made changes based on what was revealed at our annual meeting and for which we are most thankful.

2. *Where do you desire improvement?*

I'm all right with the way it is right now.

3. *Is \$25 US/\$30 Canadian school dues adequate. Comments are expected.*

Is that enough to do all that CODE wants to do? If so, then the dues is adequate. If CODE has more it wants to do and the dues are not adequate as is, then consideration should be given for a modest raise. All schools are hard pressed for funds now-a-days, so let's not raise the dues unless there's a good reason for a raise.

4. *How can participation by faculty in CODE regional meetings be encouraged/improved?*

I wish I knew. We had funding allocated for two representatives to participate in this year's regional meeting and I could not get any other Operative faculty member to attend with me because everyone either has a conflict or other duties which require their attention.

Perhaps explaining to the Chairman of the department both how important and how beneficial these conferences are and urging the Chair persons to encourage or even mandate attendance.

5. *Please indicate the office/position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc. are to be mailed.*

Our mailing address is:

Baylor College of Dentistry  
Texas A & M University Health Science Center  
P.O. Box 660677  
Dallas, TX 75266-0677

Dues statements:

Dr. Amp Miller  
Interim Chair  
Department of Restorative Sciences

All other mentioned above:

Dr. Marvin Hirsh  
Director of Clinical Operative Dentistry  
Department of Restorative Sciences

## 1999 National CODE Agenda

### 1. Vital pulp treatment

- a. 1<sup>st</sup> year students are taught about pulp capping by operative faculty and by endodontic faculty. Also Endodontic course in Sophomore year, pulp capping is re-emphasized.
- b. Yes; Pulp capping is utilized by students for patient care in the operative clinics and endodontic clinics.
- c. Criteria for successful pulp capping:
  - i. Asymptomatic tooth with normal response to thermal testing
  - ii. Small exposure site (.5mm or less) in a relatively caries-free area.
  - iii. Hemorrhage from exposure site is easily controlled by sterile cotton pellet (within a minute).
  - iv. Exposure occurred in a clean, uncontaminated field (Rubber dam must be utilized)
  - v. Atraumatic exposure

Pulpcap with a layer of CaOH<sub>2</sub> (life) followed by a temporary restoration (IRM) or a resin modified glass ionomer followed by a permanent restoration.

Evidence:

- (1) Harold Stanley symposium article in American Journal of Dentistry Vol 121, Jan 1998.
- (2) Vital Pulp Capping: a worth while procedure by Lawrence Stockton in the Journal of the Canadian Dental Association June 1999 Vol 65.
- (3) Sturdevant text – The Art and Science of Operative Dentistry.

### 2. List five of the most important Operative Dentistry topics which need to be studied via clinical trials

- a. Post and Core Systems
- b. Tooth preparation desensitizing agents for pulpal sensitivity
- c. Long term effects of BIS GMA on the pulp
- d. A five year study comparing Compomers in Class V restorations
- e. Wear characteristics of resin modified glass ionomers and Fuji IX

### 3. Calibration of faculty

- a. Preclinical  
Faculty are calibrated and standardized during practical examinations at the mid-term practical and final practical. Two faculty grade each practical after written criteria for each exercise are reviewed and agreed upon. If the two faculty are 10 or more points apart, a third faculty member determines which of the two grades are closer to matching the written criteria or if an average of the two grades is acceptable. The reasons for this final grade are then explained to the two faculty by the third arbitrating faculty member who has also been familiarized with the criteria.

#### Clinical

All operative faculty are standardized and calibrated during the senior clinical comprehensive examination. Written criteria similar to state board exam criteria are reviewed with the faculty before the examination. Two faculty grade each procedure and if they are ten or more points 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 and Class III situations. Two clinical faculty grade each competency exam and have to agree on the final grade within a ten-point range.

- b. Calibration/re-calibration is done twice a year during pre-clinical courses, at the mid-term practical and final practical examinations. Clinically, calibration is done officially once a year during the senior comprehensive examination. Unstructured calibration is an ongoing process during clinical competency examination as described in questions 4.
- c. Evidence:  
Knight G W. Toward faculty Calibration. Journal of Dental Education 61 (12) 941-6. 1997 Dec. Hoelscher DC, Knight GW Journal of Dental Education 1996; 60:221 Assessing criteria formats as part of a faculty development program.

### 4. Competency education

- a. Clinical competency based Operative education is determined at University of Mississippi by Class I, Class II, class III competency exams during the junior and senior years on clinically acceptable patients. Before these competency exams are attempted, a certain number of points or procedures must be completed before the student can apply for the competency. Two faculty evaluate each competency exam. Minimal input is given by the faculty therefore the student must make decisions independently. Failure of the exam may result in remedial dentofom exercises before re-examination on patients. Also clinical competency is determined by a senior clinical comprehensive exam where dentofom exercises are also required.
- b. Weak students  
-identified by daily grade sheets, end-of-quarter progress grades, tardiness or failure in taking competency exams.
- c. Upgrade weak students?  
Slight failure may only necessitate re-taking another competency on a patient or remedial project in the dentofom or more patient experiences before re-examination. We are looking into using the DentSim for students requiring remedial work before competency re-examination.

**5. Computer based interactive education**

- a. Dent Sim-virtual reality; information management systems
- b. Denx America Inc. – DenX Advanced Dental Systems
- c. Yes. Need more specifics

**6. Posterior esthetic restorations**

- a. Operative – Caries courses during 2<sup>nd</sup> year. Fixed Prosthodontics courses during 2<sup>nd</sup> and 3<sup>rd</sup> year.
- b. Pre-clinic
  - i. Operative –
    - (1) Direct posterior composite, Class I and Class II situation.
    - (2) Indirect
      - (a) Cerec II porcelain inlay-onlay (elective course)
      - (b) Indirect composite inlay/onlay will be introduced in 2<sup>nd</sup> year operative course (Belleglass system)
  - ii. Fixed Prosthodontics –
    - (1) 2<sup>nd</sup> and 3<sup>rd</sup> year –
      - (a) Porcelain/metal posterior crown preparation
      - (b) All porcelain posterior crown preparation (premolar only)
  - iii. Clinic-
    - (1) Operative (direct) Class I and Class II posterior composite
    - (2) Indirect – Cerec II (in special situation with faculty input)
      - (a) Starting to teach: posterior Belleglass indirect composite
  - iv. Fixed Prosthodontics –
    - (1) Posterior porcelain/metal crowns with porcelain occlusal
- c. Required experiences?
  - i. Operative-
    - (1) 4<sup>th</sup> Year students are required to do four posterior composite restorations
    - (2) 4<sup>th</sup> year students can substitute Cerec II inlay/onlays for gold onlays (3)

*Fixed Prosthodontics – Minimally, 2 PFM crowns and one posterior esthetic bridge. Students do more posterior PFM's than full gold to obtain a total of 23 to 26 total units.*

- d. Materials:  
Composite: Herculite XRV, Prisma APH, Prisma TPH, expected to begin use of the Belleglass system  
Porcelain: CerecII system and PFMs (Finesse porcelain with Argen 57 SF metal)

- e. Results: When properly placed posterior composites are doing well especially with rubber dam isolation. Case selection most important in determining success. We do not do large intercuspal isthmus width posterior composite restorations (usually 1/4 or less) Problems with porcelain occlusals include wearing opposing dentition and adhesive failure of the porcelain to metal. Cerec I had a few problems with restoration fracture in heavy occlusion areas especially in bruxism cases.

### Regional Agenda Items

1. We do not teach or use air abrasion or laser technology at this time.
2. Part (A) For diagnosis of caries, in general, we do not use caries disclosing solutions routinely, but rather diagnose pit and fissure caries by visual, tactile and radiographic examination methods. We use an explorer to check the fissure or pit for softness or any other break in continuity of the area. A "stick" with an explorer is not by itself an absolute diagnosis of caries but must be used with the other two methods to obtain a final diagnosis.

Ref: Sturdevant, The Art and Science of Operative Dentistry

Part (B) How are you teaching the restoration of pit and fissure carious lesions?

If pit and fissure caries is obvious clinically and /or radiographically, it is not considered minimal and a typical Class I preparation for amalgam or composite is performed. If the fissure caries is very minimal or questionable clinically we attempt to excavate with a small round bur (1/4 ) in a slow speed handpiece. Carious fissures not penetrating 1/3 to 1/2 the depth of the enamel after removal with a round bur are etched and sealed. Minimal carious lesions penetrating to or slightly beyond the DEJ are conservatively restored with a posterior hybrid composite followed by a sealant if other questionable fissures are present in the area. Pit and fissure caries undermining enamel in heavy centric occlusion areas are excavated and a typical Class I amalgam preparation and restoration is performed. If the clinical faculty determines that the occlusion is not heavy in this area of undermined enamel, a posterior hybrid composite may be utilized. We are looking into using a resin surface sealant over posterior composites that are in occlusal contact.

Part (C) "Conservative" preparations are considered adequate if they are free of remaining caries and not overextended. Conservative restorations or sealants are adequate if free of voids or other defects, finished to the cavo surface margin, and out of occlusion. NOTE: The teaching of pit and fissure sealant application is currently being re-assigned to the Department of Diagnostic sciences.

3. National Board Preparation:  
As a school, we have a board pre-test to make specific recommendations to each student regarding weak areas. Also reviews are done by the individual departments (need more time allotted for this). Students are given a week off prior to exam for study and review. Materials to check out: dental decks, released board exams (also in computer laboratory).

Passing of Part II is a requirement for completing Mississippi licensure. In the restorative department we try to include items on our exams that have been frequently asked on previously released national board examinations. Also passing Part I is a requirement for promotion to the next academic year.

### CODE Questions

1. CODE enables scheduling of regional meetings annually where operative faculty can interact on a very challenging time consuming agenda that creates much discussion and controversy.
2. No suggestions
3. Yes. This seems adequate.
4. Schools should provide more travel money for more faculty representation at the regional meetings.
5. Dr. Gary W. Reeves, Chairman, Restorative Department, University of Mississippi, School of Dentistry, 2500 North State Street, Jackson, MS 39216-4505, Phone: 601-984-6030, Fax: 601-984-6039, e-mail: greeves.PO2.D1@umsmed.edu



## 1999 National CODE Agenda

### 1. Vital pulp treatment

- a. When, where, and who teaches this topic in your curriculum?
  - Restorative Dentistry and Biomaterials (Operative I, first year, and Operative II, second year)
  - Endodontics (second year)
  - Pediatric Dentistry teaches indirect pulp capping procedures for permanent teeth and leaves the direct pulp capping procedures to the Endo and Operative courses. They do not teach direct pulp capping procedures for primary teeth due to their observed incidence of internal resorption after this procedure.
- b. Is this treatment utilized in patient care by students?

Yes.
- c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?
  - Depth of the lesion (estimation of the amount of remaining tooth structure over the pulpal tissue – approximate distance from the pulp)
  - If exposed pulp – the type and size of exposure (carious or mechanical)
  - Symptoms reported by the patient (if any)
  - Results from vitality tests
  - Amount of caries remaining (if any), prior to pulp capping
  - Dental history of the patient
  - Oral condition of the patient including oral hygiene and diet
- d. What concrete evidence supports the concept of vital pulp treatment? Please site the scientific evidence. Additional comments welcome.

We follow the texts listed below which cite numerous references.

The Art and Science of Operative Dentistry, 3rd Edition, Sturdevant CM, Roberson TM, Heymann HO. JR Mosby, 1995.  
Fundamentals of Operative Dentistry, A Contemporary Approach, Schwartz RS, Summitt JB, Robbins JW. Quintessence, 1996.

### 2. List five of the most important Operative Dentistry topics which need to be studied via clinical trials

- a. Continued materials evaluation, especially studies involving the latest generation of composite resins and bonding systems.
- b. Evaluation of the clinical soundness and long term stability and function of tooth structure restored using conservative and ultra conservative cavity designs.
- c. Continued evaluation of fluoride releasing restorative materials. Evaluate the cariostatic effects of fluoride release and how various materials contribute to the prevention or the reduction in the incidence of recurrent decay.
- d. Incidence of microleakage and recurrent decay with various bonding systems.
- e. Continued evaluation of alternative cavity preparation devices.

### 3. Calibration of faculty

- a. What is the protocol for calibrating and standardizing your Operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.
  - The only calibration occurs with faculty involved with the Senior Mock Board Examination. Calibration here is done using inlay, onlay, and Class II amalgam preparation and restoration clinical slides.

- b. How often is calibration/recalibration done?  
Once per year.
- c. What evidence supports your protocol for calibration and recalibration? (Please cite)  
No evidence based support.

**4. Competency education**

- a. How is competency based Operative education determined?
- Pre-clinically – competency is determined using various bench-top and manikin examinations.
  - Clinically - competency is determined using a clinical and a bench-top examination (Third Year Operative Clinical Competency Examination, Fourth Year Operative Bench Examination).
- b. How is the weak student identified?
- By their inability to successfully complete the competency examinations.
- c. What measures are taken to upgrade competency of the weak student?
- Pre-clinically – no substantive measures are utilized.
  - Clinically - additional experiences are assigned to address perceived weaknesses. These may include requiring additional work utilizing a pre-clinical manikin head or by assigning additional clinical experiences.

**5. Computer based interactive education**

Region VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for educational purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.

- a. What interactive computer-based teaching tools are you using to teach Operative Dentistry?
- None at this time
- b. Who developed them?
- N/A
- c. Would your school/region participate in development and in what manner?
- Yes, in a manner to be determined after a review and analysis of the program. At this point, without an understanding of the program and the needs of the program, it is difficult to envision how our knowledge and resources could fit into or even benefit the program.

**6. Posterior esthetic restorations – report on direct and indirect**

- a. Are they included in the curriculum? What discipline?
- Yes
  - Restorative Dentistry and Biomaterials
- b. Where (pre-clinic and clinic)
- Clinic : Patient treatment
  - Pre-clinic: Operative I, first year, and Operative II, second year
- c. Required experiences?

- None specifically.
- d. **What materials and/or systems utilized?**
- Direct: Hellomolar  
SureFil  
Z-100
  - Indirect: Concept system
- e. **What are the results? Also cite the evidence for the reported results.**
- Clinic : Patient treatment utilizing the Concept system. Most of these restorations are not closely followed; however, no significant problems have been realized
  - Pre-clinic: In the Operative II course, second year students produce their own indirect resin inlays using natural teeth utilizing the Concept system and natural teeth. Fabrication, adjustment, cementation, and finishing and polishing procedures usually are very successful for most of the students.

### Regional Agenda Items

1. **Do you teach and/or are you using air abrasion or laser technology?**
  - Yes, air abrasion in the second year Operative II course. Laser technology is mentioned in various courses.
2. **What is your diagnostic criteria and teaching for fissure caries. What is your criteria for evaluating conservative pit and fissure preparations and restorations?**
  - Diagnostic criteria includes the patient's previous dental history, oral hygiene, diet, and current caries activity and status. The texture and appearance of the fissured enamel (dried), an estimation of the presence and extent of caries, the results of a radiographic analysis, and any symptoms reported by the patient are also considered.
  - Clinical evaluation is based on the following criteria: visual inspection for material defects and retention, explorer catches, marginal integrity, evidence of recurrent caries, color stability, anatomic wear.
3. **How do you prepare your students for the National Board Examination?**
  - Preparation involves faculty reviews of restorative information and concepts in a lecture format. The reviews comprise a course with the grade primarily based on attendance.

### CODE Questions

1. **What is CODE doing well?**
  - CODE provides an excellent forum for communication among the Regional schools.
2. **Where do you desire improvement?**
  - Perhaps by considering the implementation of a full, two-day meeting.
3. **Is \$25 US/\$30 Canadian school dues adequate? Comments are expected.**
  - Without understanding how CODE dues are utilized, and the financial responsibilities of the National CODE office, including any financed programs, it is difficult to evaluate the adequacy of CODE dues.
4. **How can participation by faculty in CODE regional meetings be encouraged/improved?**



*University of Texas HSC Houston, Dental Branch*

- Through the years, Region III has enjoyed good response and participation from its member schools. Travel money for faculty to attend meetings, in addition to the regular allotted departmental travel money, could help to increase individual participation.
5. Please indicate the office/position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc., are to be mailed. **NOTE: *Regional Director – this information from each school is to be transmitted to the National Director.***

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CODE Region III Attendees

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David Low, DDS	Western Regional Examining Board	(801) 278-2637		
Larry D. Haisch, DDS	National Director of CODE	(402) 472-1290	(402) 472-5290	<a href="mailto:lhaisch@UNMC.EDU">lhaisch@UNMC.EDU</a>

**Enclosure #1**  
**CODE REGIONAL MEETINGS REPORT FORM**

**REGION:** IV (Great Lakes)

**LOCATION/DATE OF MEETING:**

The Ohio State University  
November 4, 5, 1999

**CHAIRPERSON:**

**Name:** Rob Rashid **Phone #:** (614) 292-3071  
**Address:** 305 W. 12<sup>th</sup> Avenue **Fax #:** (614) 292-9422  
Ohio State University **E-mail address:** rashid.1@osu.edu  
Columbus, OH 43210-1241

**LIST OF ATTENDEES: (including Phone #, Fax #, E-mail address - sample format attached)**

Please attach

**SUGGESTED AGENDA ITEMS FOR NEXT YEAR:**

**LOCATION/DATE OF NEXT YEAR'S MEETING:**

**Name:** Ron House **Phone #:** (304) 293-1142  
**Mailing Address:** W. Virginia School of Dentistry **Fax #:** (304) 293-2859  
Medical Center Drive **E-mail address:** rhouse@wvu.edu  
Morgantown, WV 26506-9400

*Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;  
40<sup>th</sup> 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 or via e-mail with an attachment,  
indicating the software program and version utilized.*

1999 National CODE Agenda

1. Vital pulp treatment

General discussion: Need to bring this topic up to boards – discrepancy between what is taught and what is required by board exams.

a. When, where, and who teaches this topic in your curriculum?

OSU

The subject is taught by the Section of Restorative Dentistry, Prosthodontics, and Endodontics. The dental students get information on vital pulp treatment over the entire four years they are in dental school. In their first quarter, they are exposed to vital pulp therapy with the overview course about restorative dentistry. They get more of it in the conservative dental amalgam course and composite resin course. In the second year, the students are exposed again to the topic in their course covering large amalgam restorations and restoration of extensively damaged teeth and a laboratory exercise reinforces what was taught in previous courses and lectures. They are again exposed to this topic in the third and fourth year "co-clinical" and board review courses. These are lecture format and the "mock board" course. The course directors involved are: Robert Seghi, Robert Rashid, Peter Monaghan, Janet Bolina, Stephen Rosenstiel, Harris Bowman, and Al Reader.

Indiana

Pulp protection and treatment are introduced in the first year in Single Tooth Indirect Restorations. In depth pulp treatment is covered in the second year Endodontics course. The Restorative department is responsible for all lectures and laboratories.

Detroit

Endo does most of the teaching. No strong indications for IPC in vital teeth.

Illinois

Restorative and Endo teach.

Western Ontario

Taught in the 2<sup>nd</sup> year operative dentistry program and repeated in the 3<sup>rd</sup> year lecture series.

Northwestern

Similar to most others.

Case Western

Preclinical Courses

2<sup>nd</sup> year courses:

Basic Procedures in Restorative Dentistry - (Restorative Dept. Faculty)

Preclinical Endodontics (Dept of Endodontics Faculty)

3<sup>rd</sup> year courses:

Operative Dentistry (Restorative Dept. Faculty)

Esthetic Dentistry (Restorative Dept. Faculty)

4<sup>th</sup> year courses:

Clinical Dentistry (Dept of General Practice Faculty)

Board Review Course (Faculty from Endodontics, Restorative, and General Dentistry departments)

West Virginia

Similar to OSU.

## Region IV (Great Lakes)

### b. Is this treatment utilized in patient care by students?

#### OSU

The treatment which is taught is used by the students. All vital teeth get some form of vital pulp therapy even if only copal varnish (Copaliner) is the only material used prior to restoration placement.

#### Indiana

Yes

#### Detroit

Illinois

#### Northwestern

#### Western Ontario

Yes

#### Case Western

Yes

#### West Virginia

### c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?

#### OSU

Conservative amalgam restorations receive a copal varnish liner applied in 3 coats. Conservative composite resin restorations are bonded to enamel and dentin using Kerr Optibond Solo according to manufacturer's directions. Glass ionomer cement liners can also be used under composite resins. When caries goes beyond minimum extension depth (½ mm pulpally to the DEJ to within ½ mm of the dental pulp) two modes of therapy are presented.

Mode 1: Minimum Base Technique, preferred.

Base materials up to 1 mm thick are placed when the operator believes there is less than ½ mm of dentin overlying the pulp. These include calcium hydroxide (Dycal) covered with a cement, glass ionomer cement being the preferred, but not only choice, or only glass ionomer cement without calcium hydroxide. Copal varnish is also used with this technique.

Mode 2: Board Examination Technique, practiced for board examination competency.

Base materials replace dentin to ½ mm pulpally to the DEJ. Materials used in the Mod 1 technique are used here as well.

The mode of vital pulp therapy is decided upon by the faculty and the student. Students are encouraged to practice for the board examinations and the Mode 2 technique is required for the mock board examination.

## Pulp Capping

### Direct Pulp Cap

#### Indications

1. Small exposure (0.5 mm, maximum)
2. Bleeding subsides quickly
3. No prior sensitivity in tooth
4. Excellent isolation with rubber dam
5. Younger patients
6. Tooth can be restored with a direct restoration in one appointment
7. Tooth is not a partial denture abutment
8. Caries completely removed

## Region IV (Great Lakes)

Contraindications – opposites of indications.

### Technique

1. Bleeding has stopped
2. “Cap” exposure with calcium hydroxide paste
3. Cover cap with glass ionomer cement
4. Apply copal varnish
5. Restore with chosen direct material (amalgam, composite resin, glass ionomer cement) in same appointment

### Indirect Pulp Cap

#### Indications

1. Pulpally deep caries which, if removed completely, probably will expose the pulp
2. No bleeding and no patent communication to the pulp
3. No prior sensitivity in tooth
4. Excellent isolation with rubber dam

Contraindications – opposites of indications

### Technique

#### Appointment 1

1. Remove peripheral caries completely
2. Remove most of pulpally deep caries but do not expose the pulp
3. Place calcium hydroxide paste
4. Restore temporarily with zinc oxide eugenol cement

#### Appointment 2 – 100 days later

1. Remove all restorative materials
2. Remove previously remaining caries
3. Exposure – yes. Do RCT
4. Exposure – no. Restore as planned.

### Indiana

Traumatic exposures with open apex and less than 1 hr. old receive CaOH. Otherwise the treatment of choice for exposures is root canal therapy. Internal resorption and calcification of canals are avoided. Also, if the tooth is to be used as an abutment, the endo result is much more predictable. Copal varnish is used routinely under amalgam. AllBond is an available option when extra retention is needed. However, bonding systems are not a replacement for other retentive methods – prep design, pins, slots, etc.

### Detroit

Standard techniques as discussed. See attached document.

### Illinois

Indirect PC without re-entry. AllBond used.

### Northwestern

Not using copal varnish. Use Amalgabond and other liners. Less sensitivity complications. Other techniques similar to other schools.

### Western Ontario

If caries is deep a pulp exposure is likely, an indirect pulp capping is done utilizing either ZOE or VC glass ionomer (or both) and after 3-4 months, if recalcification has occurred, the tooth is restored. If during the normal preparation of the tooth a pulp born is exposed, and it is 0.5 mm or less in diameter, Ca(OH) is placed, covered with glass ionomer, then the restoration is placed the same day. Larger exposures result in endo being done. Sterile cotton with light pressure to control bleeding.

### Case Western

Direct Pulp Cap (traditional approach)

#### Indications:

- Small exposure (all caries has been removed)
- Asymptomatic, no history of pain

## Region IV (Great Lakes)

Rubber dam isolation  
Little or no bleeding (controlled quickly)

### Procedures:

Calcium hydroxide  
Copal varnish  
Base with Zinc Phosphate (base to ideal)\*  
Amalgam  
Alternative  
    Calcium hydroxide  
    Glass Ionomer / Adhesive Liner  
    Composite (Amalgam)

\*(Zinc Phosphate base to ideal - mainly for Boards. The students are instructed in use of traditional materials, as well as, GI base/liners and resin adhesives for pulpal protection. Since those What is used often dependent on philosophy of clinical faculty.)

### West Virginia

Stain with caries dies; usual materials (CaOH,...). No rule on castings under pulp caps. Do not reopen indirect pulp caps.

- d. **What concrete evidence supports the concept of vital pulp treatment? Please site the scientific evidence. Additional comments welcome.**

### OSU

Hilton TJ: Cavity sealers, liners, and bases: current philosophies and indications for use. **Oper Dent** 1996 Jul-Aug;21(4):134-46. This manuscript summarizes vital pulp therapy to the general satisfaction of the Section of Restorative Dentistry, Prosthodontics, and Endodontics faculty. It contains specific references to scientific evidence for vital pulp therapy which we recommend at OSU. The Mode 2 technique has no scientific evidence but is presented so OSU students can perform an expected technique to pass a board examination, particularly the NERB.

### Indiana

"Pathways to the Pulp"

### Detroit

Literature in handout.

### Illinois

A lot of evidence in lit for the effectiveness of resin bonding as a liner. Discrepancy with board exams exists.

### Northwestern

Follow-up care.

### Western Ontario

No good answer from literature. Doing it because it seems to work.

### Case Western

As a result of discussions with faculty members from Ohio State at a previous CODE meeting (1997), the article by Hilton TJ: Cavity sealers, liners, and bases: current philosophies and indications for use, (**Operative Dentistry** 1996) is required reading for 3<sup>rd</sup> year Operative Dentistry Course.

### West Virginia

This is an area for further study.

Region IV (Great Lakes)

2. List five of the most important operative dentistry topics which need to be studied via clinical trials

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

**OSU**

Failure mode of posterior composites and how to better predict early failure.  
History of pulp capped teeth, 2 ways, prospectively and retrospectively. A carefully controlled clinical study, probably over several schools should undertake a long-term study to watch capped teeth. Using chart review methodology, pulp capped teeth can be surveyed for outcomes and patients may be contacted for examination of previously pulp capped teeth to determine history.  
A clinical study to assess the relative value of multi-step composite resin bonding systems, vs one-step composite resin bonding systems, vs glass ionomer cement veneered with composite resin may shed some light on which method(s) result in best longevity for different classes of restorations.  
Clinical studies to evaluate pulpal response and tooth vitality over time to various pulp capping rationales including CAOH, GI cement, dentin bonding agents might help determine the best technique for general use.  
Clinical studies to determine the effects of the "soft-start," laser, plasma, and other curing lamps on composite resin restoration longevity could lead to possible justification of their extreme expense.  
As expected, clinical studies to determine whether amalgam restorations pose any health threats to humans MUST be conducted in several populations where the participants can be carefully selected and monitored.  
Inlet, operatory delivery, and outlet waterline surveys of a substantial number of dental practices in the USA could identify whether the problems are indeed real problems or non-problems.  
A study to assess the quality of air with respect to mercury content in dental practices for sale should be conducted. The greatest danger from mercury is thought to be to dental personnel and such data might raise questions on the part of prospective buyers!

**Indiana**

Most already mentioned.  
Longevity of restorative materials at least 3-5 years, over ten better.  
Secondary caries in proximal areas – can we see, what are we seeing, does the restoration need replaced?  
Controls for clinical trials are not amalgam now. Compare back with amalgam.

**Detroit**

Course in a school for the dental materials to help students understand the (marketing techniques used and how to assess clinical significance.)  
5<sup>th</sup> generation bonding for desensitization.  
Non-shrinking direct tooth-colored material research.  
Microleakage studies of materials that have historically lasted (40 yr. old onlays, for example). What is under them. Why do they work so well?  
Wear studies comparing tooth-colored vs. metals  
Pulpal biology – pulpal reaction to liners and bases.

**Illinois**

Effect of FI releasing materials on recurrent caries  
Studies to indicate best use for flowable resins...  
Studies on posts, especially non-metallic  
Caries risk assessment – does it benefit the patient? What is the effectiveness of the risk assessment program

**Northwestern**



## Region IV (Great Lakes)

Long-term clinical comparisons of traditional and resin posterior restorations.  
Bonding agents under amalgam and resins - long term studies  
Post and core systems – integrity, fracture of tooth/root. Long term studies to support

### Western Ontario

Effect on acid etching on dental pulps  
Toxicity of dental resins  
Longevity of Class II composite resin restorations  
Effects on dental pulp with the use of laser/plasma arch curing  
Long term effects of bleaching on enamel plus toxic side effects of H<sub>2</sub>O<sub>2</sub> in this process.  
Do one-step bonding procedures give as good a bond as separate primer/resin systems.

### Case Western

Most topics well covered by others here.  
Posterior composite recurrent caries.  
Sealants long term effects.

### West Virginia

When to place the initial restoration – caries diagnosis. Better evidence based detection  
Means to strengthen teeth. Long-term clinical trials.  
Look for tooth-colored material that does not have polymerization shrinkage  
Other modalities for caries detection – induction,..  
Early remineralization systems.  
Recall frequency – evidence based using caries risk assessment.

## 3. Calibration of faculty

- a. **What is the protocol for calibrating and standardizing your operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.**

### OSU

New faculty are usually placed in the preclinical courses to familiarize them with the procedures which are taught at OSU. This does take several years to accomplish. The course directors are responsible for the course content at the discretion of the section chair. The course directors calibrate their faculty as to preparation design, restoration quality, etc. Teaching in the clinic is expected to follow what is presented in preclinical settings. On entry to the clinic, experienced faculty mentor new faculty with respect to policy, paperwork, evaluation, and other aspects of clinical teaching. There is no formal calibration here. Same forms used pre-clinically and clinically.

### Indiana

All new and bench instructors attend lectures and have pre-lab meetings to cover criteria for the lab session. Grading done by a small number (3) of faculty. Biggest problem is with part-time clinical faculty. Pre-clinically, students self-evaluate, but that doesn't carry over to the clinic where there are a number of 1 day/week faculty. We are beginning a formal faculty calibration program that will include all full-time and part-time faculty.

### Detroit

Pre-clinical course directors calibrate faculty. Clinically there are faculty in-services in am. Little clinical grading at satellite clinic at Detroit Receiving hospital which accounts for almost 50% of clinical training.

### Illinois

Similar to W. Va. Full scale documentation of methods.

Phase one of calibration. Standardized philosophy by procedure to establish continuity from pre-clinic to clinic. Finished last December

Phase 2 to establish consistency in grading. One procedure per month. Done by the pre-clinic course directors. 3-5 cases randomly selected and graded without no communication. Then discussion and numerical values assigned. Goal to have one standard of care and evaluation criteria for pre-clinic and clinic.

### Northwestern

## Region IV (Great Lakes)

No formal program. Closure does not give impetus to do at this time. No separate operative faculty now.

### Western Ontario

All faculty meet at beginning of fall term and are briefed on changes to curriculum, grading system is reviewed and protocols. New faculty must serve in the preclinical laboratories to become familiar with the current programs before teaching at the clinical level. All preclinical grading is done as a group with interaction between instructors in determining grades.

### Case Western

No formal calibration program.

Preclinical courses:

The course directors for two courses do all of their own grading so that evaluations are consistent.

While other courses have several faculty grading the same criteria for all projects.

For two courses: faculty evaluate (grade) the one set of criteria for projects for the entire class, and also be responsible for evaluating the same criteria for competency examinations.

For these courses, new faculty work with course director to review criteria during evaluation sessions.

Clinic Evaluations:

No formal calibration program for day to day evaluations.

Previous director of clinical faculty had monthly in-service training sessions. Presently searching for new director.

Prior to Mock Boards, and Scheduled Mid-year Competency Exams, the Restorative Department meets to review the criteria, grading scale etc.

Evaluation forms for these exams based on NERB criteria and forms.

### West Virginia

Calibration varies – USPHS based criteria used by all faculty. Same forms used pre-clinically and clinically. Biggest problem is when sending students on externships – reinforcing criteria is difficult. Have to go through the three operative pre-clinical courses before going onto the clinic floor.

#### **b. How often is calibration/recalibration done?**

### OSU

Calibration is done as necessary to standardize course faculty appropriately. When new procedures are introduced, it is invaluable. If evaluation of projects becomes inconsistent, recalibration is done at the course directors' discretion.

### Indiana

At the preclinical level, calibration is accomplished prior to each new laboratory project or practical exam. This includes lectures, models, and meetings prior to student contract. We are working on a clinical calibration program at this time.

### Detroit

Difficult task. Turnover of clinical faculty means it needs to be done frequently.

### Illinois

Required to go through exercises monthly.

### Northwestern

Mock board every year to standardize or agree on how to look at the preparations/restorations

### Western Ontario

Overall once a year but usually 3-4 times at the preclinical level (every time there is a practical examination).

### Case Western

Departmental meetings a few times a year.

Re: Clinical Evaluations

The Restorative Department meets several weeks prior to Mock Boards, and Scheduled Mid-year Competency Exams to review criteria and evaluation sheets. Also a quick review is held the morning of the Exams.

### West Virginia

## Region IV (Great Lakes)

Students grade along with faculty. Continuous re-evaluation of criteria between the two. If large discrepancy exists, then the student grade is lowered (promotes effective evaluation).

### c. What evidence supports your protocol for calibration and recalibration? (Please site)

#### OSU

We do not have published data to support our calibration methods. We use the students' performance on NERB and national boards to assess, in part, how our teaching program is working. We have a mock board in which faculty from other dental schools act as examiners. Their feedback is quite important.

#### Indiana

A long list of cites are available from the school upon request.

#### Detroit

#### Illinois

Try to be within 1/2 grade in the exercises. Also mock board and board exams

#### Northwestern

#### Western Ontario

All clinical instructors evaluate with a full time faculty member for a period of time then do it on their own. During practical clinical exams two (2) instructors grade - usually there is no more than a spread of 5% in the grades given.

#### Case Western

#### West Virginia

## 4. Competency education

### a. How is competency based operative evaluation determined?

#### OSU

Competency exams at the end of the second, third and fourth year over material taught pre-clinically in the first two years, and NERB based for the fourth year. The third year is a typodont amalgam/rubber dam and FPD provisional competency exam. The D2 competency is 14 procedures (8 preparations, 6 restorations or provisionals) and is graded by selected faculty. The D3 competency is graded by 4 faculty and the D4 (mock NERB) competency exam is graded by many faculty in a fashion similar to the way the NERB exam is graded.

#### Indiana

Practicals (competencies) pre-clinically. Clinical operative competencies required. Graded by instructor and clinic director. Must be passed to clear for graduation. Mock boards required for graduation

#### Detroit

Pre-clinical competencies. Standardized exams in simulation lab being started this year.

#### Illinois

Similar to the other schools. Performance exams are one means used to measure competency. Senior clinic exam required for graduation. Includes 'scripted' patients. They must pass every station in the exam. If not they go to each department of failed stations to remediate.

#### Northwestern

## Region IV (Great Lakes)

Daily graded procedures pre-clinically. Weight is on practical – graded double-blind. Reference scale distribution of class grades (mean is between B and C). Teaching assistants work with weaker students. Clinically, there is a two-year requirement. Mock boards patterned after NERB and CREDITS. Must be passed for graduation. Informal remediation for failures (on typodont). Written competency exams in the senior year. Required to pass for graduation. Looks to minimal competency to pass.

### Western Ontario

Students are given practicals on manikins in the preclinical lab. In the final clinical year all have to pass two (2) practicals, one amalgam, one composite (Pass = 60% by 2 graders). Students are given only two chances to pass.

### Case Western

#### Preclinical

Several competency examinations throughout the two semester course.

For students entering the 3<sup>rd</sup> year, prior to treating patients in the clinic, a one week series of operative and crown and bridge procedures must be successfully completed. Evaluation is Pass/Fail by clinical preceptor.

#### Clinical Competencies

3<sup>rd</sup> and 4<sup>th</sup> year students must Pass (NERB criteria) several typodont and patient competencies each year. Evaluation of 3<sup>rd</sup> year competencies by two instructors: their own preceptor and an instructor from Restorative Dept. These procedures include: Class II amalgam restorations, Class II composite restorations, Class III composite restorations.

These are timed examinations.

#### Mid-year Competency Exams

4<sup>th</sup> year students: One day exam during finals week (or week prior to finals week) which includes A.M.: typodont Class II Amalgam and Class III Composite (extracted tooth in typodont)

P.M.: 3 unit bridge preparation and provisional

3<sup>rd</sup> year students: Half day exam

A.M.: typodont Class II Amalgam and Class III Composite (extracted tooth in typodont)

### West Virginia

Criteria based competency program. Work of students reviewed prior to externship assignment. Also, current and overall grades compared to check that students are improving. Procedures complete versus hours in clinic identify the inefficient student. Competency prior to entry into clinic – done on manikins with natural teeth in some areas.

#### b. How is the weak student identified?

### OSU

Weak students are initially identified during preclinical courses by report of individual faculty members to the course directors. Course directors then must determine to magnitude of the problem and can take steps to reduce this problem. Weak students also tend to receive failing grades in preclinical courses. Prior to entry into the clinic, as described above, the second year students must demonstrate competency with a survey of restorative procedures, previously taught to them. Failing a specific number of these procedures prevents clinic certification. Weak students who do achieve clinic privileges are identified by clinic director based on objective feedback from clinical instructors.

### Indiana

Weak students are identified as soon as possible by early evaluation through pre-clinical practical exams and clinical competencies. In the clinics, clinical directors must constantly follow the progress of their assigned students by the monitoring the students clinical achievement, competencies and mock boards.

### Detroit

Through the competency exams and clinic performance.

### Illinois

Faculty judgements and performance exam work. Also meet with clinic patient assignment director and clinic director. Also, clinical exam as described above. Also a promotional committee works with instructor evaluation to determine student progress to the next year. Mock board also given.

## Region IV (Great Lakes)

### Northwestern

Teams of students evaluated from day to day contact with team leaders.

### Western Ontario

Usually through his/her daily performance. Every procedure is marked and all marks are reviewed by the Division Chairman. Instructors also indicate potential weak students to the chair.

### Case Western

Competency exam results and clinical evaluations by preceptors.

### West Virginia

Work of students reviewed prior to externship assignment. Also, current and overall grades compared to check that students are improving. Procedures complete versus hours in clinic identify the inefficient student

## c. What measures are taken to upgrade competency of the weak student?

### OSU

In individual courses, weak students often receive extra time from course directors ranging from individual to group efforts, designed at improving these students. Students who fail courses are invited to a required remediation program in the summer quarter after both first and second years. These programs begin generalized in scope and end as customized programs. Several students who have achieved clinical competency status but have been identified as less than competent have been actively remediated during their third and fourth years. Such students have had their clinic privileges temporarily suspended and/or been assigned a mentor to assist in their improvement. These efforts are extremely manpower consumptive.

### Indiana

Remediation can be difficult in our curriculum if the weak student is not identified early in the course. Once a weak student is identified, intervention is accomplished "on the run", i.e. while the course and curriculum continues for the student. Since the next school year begins within two weeks of the previous year's completion, we do not have a summer session to make a "formal" remediation effort. Each remediation is individual and on a case by case basis. This is critical since a failed course requires the repeat of the year. Clinical remediation is accomplished through the student's clinic director and the promotion committee.

### Detroit

Variety of means used. Simulation lab open in the evenings for students. Some personal remediation done.

### Illinois

#### Northwestern

Teaching assistants work with weaker students. Remedial programs for written and practical mock boards.

#### Western Ontario

One-on-one supervision with demonstrations by supervisors. Extra work in the simulation clinic. Clinically, some students only schedule patients under a single faculty to evaluate their performance over time.

#### Case Western

The Remediation Program varies, it depends on the needs of the student. Generally a one-to-one supervision. Depending on severity, students may be asked to not treat patients, until they have improved performance to acceptable level, through intensive series of projects and evaluated typodont procedures.

#### West Virginia

Weak students are assigned restorative advisors. In some cases, the students are restricted to working under only special faculty who can discuss the student's performance.

## Region IV (Great Lakes)

### 5. Computer based interactive education

*Regional VI (South) is developing two comprehensive restorative treatment planning cases to be used as problem based learning exercises. It is hoped these cases can be used to develop authoring software that could be used for educational purposes. A joint venture with Dental Interactive Simulation Corporation (DISC) warrants consideration.*

#### a. What interactive computer-based teaching tools are you using to teach operative dentistry?

##### OSU

Anatomy and Histology have courses with interactive computer content. In Restorative Dentistry, Dr. Rosenstiel has developed an interactive Authorware program that evaluates single tooth restoration using three scenarios (occlusal surface involvement, proximal involvement and fractured tooth). The program is an evidenced-based discussion of the different restorative options

##### Indiana

All entering students have computers. Heavily involved in web-based education. Tooth morphology (Dr. Ed DeSchepper) is all computer; no lecture. Drs. Willis and Reifeis have a single tooth restoration course (made with Astound at <http://www.astound.com>). Used as an adjunct to the lecture course material.

##### Detroit

Hope to have Dental Anatomy on web or CD. Nothing interactive in restorative at this time.

##### Illinois

Cariology is on a computer program (used to be in perio. area). Plans to expand on that course and add other courses. Wildfire simulations is available on CD but has not been evaluated.

##### Northwestern

Nothing at this time for instruction

##### Western Ontario

None at present although at least two (2) disciplines (Perio and Gross Anatomy) have computer programs and web sites.

##### Case Western

Nothing interactive at this time. School has university commitment and is being wired for fiber-optics and the dental school is starting to put courses online (Med school currently has all courses online).

##### West Virginia

Looked at some work done at U. Mich. Some done by Oral Pathology

#### b. Who developed them?

##### OSU

See above

##### Indiana

See above. Gross Anatomy, Dental materials also have presentations on the web

##### Detroit

## Region IV (Great Lakes)

### Illinois

### Northwestern

### Western Ontario

The two disciplines involved (in-house)

### Case Western

### West Virginia

Oral Pathology; Hygiene

- c. Would your school/region participate in development and in what manner?

### OSU

Yes, given faculty time

### Indiana

Yes, in any way possible.

### Detroit

### Illinois

### Northwestern

### Western Ontario

Yes, if we had more faculty, money and time.

### Case Western

### West Virginia

6. Posterior esthetic restorations – report on direct and indirect

- a. Are they included in the curriculum? What discipline?

### OSU

Posterior esthetic restorations are taught in the preclinical courses. Direct composite resin restorations are taught in the first year, and include Class I and Class II restorations. In the second year, ceramic inlay and onlay restorations as well as composite resin inlay and onlay restorations are taught. An elective course in fiber reinforced composite resin restorations is offered to 4<sup>th</sup> and 3<sup>rd</sup> year students. These are operative dentistry or restorative dentistry courses. There are no competencies that evaluate indirect tooth-colored restorations.

### Indiana

## Region IV (Great Lakes)

Posterior esthetic direct restorations are taught in the pre-clinical Single Tooth Direct Restorations in first year. Laboratory projects are completed on extracted and mounted teeth. Emphasis is on small occlusals in molars and small Class II in premolars. Indirect esthetic restorations are introduced in the Single Tooth Indirect Restorations course in first year. An indirect composite resin laboratory project is completed on an artificial tooth. All phases are included in the second year Dental Sciences II. All posterior esthetic restoration teaching is the responsibility of the Restorative Dentistry department.

### Detroit

Anterior resin course teaches posterior composites, also.

### Illinois

Direct and indirect taught in restorative 2<sup>nd</sup> and 4<sup>th</sup> year. Use natural teeth in typodont and also resin typodont teeth. Fixed pros teaches the indirect techniques (inlay/onlay and veneers)

### Northwestern

Operative pre-clinical taught direct resins using the resin teeth form Kilgore. Some done in the clinic.

### Western Ontario

Yes, operative dentistry and fixed prosthodontics

### Case Western

Similar to others. Direct taught pre-clinical and 3<sup>rd</sup> year esthetics course. Indirect used to be lab exercise in 3<sup>rd</sup> year. (Will be again).

### West Virginia

Introduced early in the tooth colored restorative course (direct and indirect). No competencies evaluate these. Esthetics need to be primary reason for replacement. Rubber dam required. Need enamel walls.

## b. Where (pre-clinical and clinical)

### OSU

They are taught preclinically and permitted or even encouraged clinically. They are routinely done in the clinic as planned.

### Indiana

See above. Clinical experiences are varied and depend upon treatment planning options. However, when indicated, direct and indirect esthetic restorations are generally encouraged.

### Detroit

PRR's done, but very few interproximal composites done in the clinic.

### Illinois

Clinically, it is up to the instructor to 'promote.' Pre-clinical 2<sup>nd</sup> year course.

### Northwestern

See above. Small lesions (molars and premolars) under rubber dam

### Western Ontario

2<sup>nd</sup> year preclinical and both clinical years. Operative dentistry and fixed teach (operative teaches the pre-clinical course)

### Case Western

Clinic has typodont competency for direct, but no requirements. Done with conservative preps.

### West Virginia

Both pre-clinic and clinic

## c. Required experiences?

OSU



## Region IV (Great Lakes)

There are no individual requirements. However, any student whose treatment plan includes them can place them. Our clinic is supposed to be comprehensive in scope so patients requiring these and who should receive these as indicated, will have them done by their assigned students. However, it is possible for students to graduate without doing these restorations in patients.

### Indiana

No clinical requirements. However, every student has some experiences.

### Detroit

None

### Illinois

None

### Northwestern

None

### Western Ontario

No, we cannot provide enough suitable patients who will pay for indirect esthetic restorations. There is a single crown requirement in fixed but not in operative.

### Case Western

### West Virginia

Not examined with competencies – no requirements clinically, only pre-clinically.

## d. What materials and/or systems utilized?

### OSU

Kerr Prodigy and Optibond Solo are the materials used at OSU. Porcelain inlays and onlays and composite resin inlays and onlays are cemented with Kerr Nexus.

### Indiana

Direct - Herculite, OptiBond

Indirect - All materials and techniques that are available through outside laboratories.

### Detroit

TPH and Prodigy with OptiBond Solo

### Illinois

Pretty much use 'everything.' (All types of composites). Empress, Concept, InCeram, ProCera. (Concept machine in house for students to use).

### Northwestern

Uses many systems.

### Western Ontario

Concept, Targis, Empress, various other porcelain systems.

### Case Western

TPH and OptiBond Solo

### West Virginia

Jeneric Pentron, hybrid composite materials but not compomers.

## e. What are the results? Also site the evidence for the reported results.

## Region IV (Great Lakes)

### OSU

These restorations restore occlusal functions with tooth colored esthetics. We have not operated a clinical study to assess how these restorations fare.

### Indiana

Not enough to follow up with any results. Very conservative on requirements, so can predict pretty good results.

### Detroit

### Illinois

Not many (any) remakes

### Northwestern

### Western Ontario

As far as indirect inlays/onlays are concerned the results are not great. Technician sensitivity and breakage on composite/porcelain restorations can be a problem in students hands. -30% redo's

### Case Western

### West Virginia

Difficult to assess complete removal when replacing posterior composites  
Regional Agenda Items (Please Report on Them)

## Region IV (Great Lakes)

### CODE Questions

#### 1. What is CODE doing well?

##### OSU

CODE brings together operative dentistry faculty who want to improve their respective teaching programs. CODE allows open discussions on a variety of subjects as well as the national agenda. CODE allows for a free exchange of ideas to help improve respective programs.

##### Indiana

Every time attending Academy of Op. Dent and CODE, there are a number of very useful 'tidbits' that can be taken away

##### Detroit

Good opportunity to work on projects together. Much of the subject matter is universal and CODE could be a good way to get together and work on some items.

##### Illinois

Allows us to know what the other schools are doing. Good way to find out where we stand.

##### Northwestern

Been great, especially now that many schools have "restorative dentistry" depts., this allows a smaller focus

##### Western Ontario

I believe CODE is doing very well in providing a forum for discussion on what all schools are teaching, why and how each does it.

##### Case Western

All been said – CODE regional meetings have been very helpful.

##### West Virginia

Good opportunity to get together.

#### 2. Where do you desire improvement?

##### OSU

Improvements in CODE would include the development of a web presence with easier access and higher visibility. Since CODE is under the umbrella of the AADS, this would be the route of such management and the current people who are managing CODE should be given resources by AADS to allow for this. Better information dissemination through electronic means would also improve the CODE program.

##### Indiana

Deans need to be convinced of the usefulness of the group.

##### Detroit

##### Illinois

Reports don't come to the attendees.

##### Northwestern

##### Western Ontario

##### Case Western

##### West Virginia

## Region IV (Great Lakes)

Would be nice to know a little more about CODE before the history is lost. Would be good to have support of the deans in the deans conferences.

Firm up schedule so the report is in a timely manner (before the Feb. Operative meeting).

### 3. Is \$24 US/\$30 Canadian school dues adequate? Comments are expected.

#### OSU

The amount of \$24 is virtually nothing and any institution should have no problem affording it. A 4-fold increase (\$100) would still be worthwhile if improvements to CODE can be realized. Possibly get a sponsor for the schools hosting the regional meetings to cover costs.

#### Indiana

Yes. Some increase in dues will be tolerated as needed to maintain the organization.

#### Detroit

#### Illinois

#### Northwestern

#### Western Ontario

I believe so – although I have no idea what the expenses are. Dues should cover expenses. Overall fee is low for those coming to the meeting.

#### Case Western

#### West Virginia

Very fair fee. (Been same since '86?).

### 4. How can participation by faculty in CODE regional meetings be encouraged/improved?

#### OSU

Participation in CODE must begin with the member schools providing faculty time and funding. The regional format of the CODE program does allow for driving to most meetings in our region. Without such encouragement, CODE will not get better, and, in fact, may become less desirable over time

#### Indiana

Nothing to add to what others have said.

#### Detroit

Agree with what has been said.

#### Illinois

Benefit should be realized in terms of improvement in level of operative dentistry education. As a group, we can make recommendations to schools through the meetings.

#### Northwestern

## Region IV (Great Lakes)

Regional meetings really nice. Effort to get ALL schools to attend. Have other regions send representatives to alternate regions meetings.

### Western Ontario

I think participation in the Great Lakes Region is good. Several schools do not attend but I think with some more effort and reminders they might be persuaded.

### Case Western

Include information in web format to share with other schools.

### West Virginia

Opportunity to develop pride in Operative Dentistry through CODE. With loss of curriculum time, this allows schools to keep in touch with what is being taught and bring back to their school. Operative is becoming diluted. CODE should be a more important player in the Academy of Operative Dentistry.

5. Please indicate the office/position with complete mailing address at your school to which regional reports, dues statements, roster requests, etc. are to be mailed. NOTE: Regional Director - this information from each school is to be transmitted to the National Director.

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## Region IV (Great Lakes)

### Regional Questions (as submitted at the Region IV 1998 C.O.D.E.)

1. What constitutes a basic operative curriculum:
  - a. What do we want our students to know when they graduate?

#### OSU

As far as operative dentistry is concerned, we want our students to know the indications and contraindications for dental amalgam, including pin retention, composite resin (direct and indirect,) glass ionomer cement, single tooth cast metal restoratives, dentin and enamel bonding, and vital pulp therapy. We want the students to recognize caries and other defects (including esthetic defects) and properly develop treatment plans to address them. We want the students to be proficient in the restoration of all restorable vital teeth and some endodontically treated teeth with these materials. We also want the students to recognize direct gold restorations from a historical aspect.

#### Indiana

Like everyone else – morphology, cariology (somewhat), single tooth restorations diagnosis and treatment planning, life-long learning

#### Detroit

Echo what others have said. Partial tooth restoration of any kind should be in bailiwick of operative dentistry. Basic knowledge and skills of laboratory techniques is appropriate in operative dentistry along with knowledge of occlusion.

#### Illinois

Prevention, diagnosis and removal of caries – need to understand cariology. Direct restorative procedures and the science of dental materials.

#### Northwestern

Major goals:

How to do a thorough diagnosis and treatment plan

Manage pts.

Deliver sound operative dentistry

Interact with dental labs and assess work returned

Evaluate literature and include in practice

#### Western Ontario

Amalgam, direct and indirect composite resins, direct and indirect veneers, indirect and direct pulp capping, tooth bleaching.

#### Case Western

All has been said by others here.

#### West Virginia

Prevention, treatment planning and restorations (largely single tooth). Ability to make an 'educated guess' in a world of non-evidence based research..

- b. What should be included in the discipline?

#### OSU

Included in the clinical discipline should be the integration of basic science which makes the foundation of what we clinically provide. Also, any evidence for what we teach should be provided as well

#### Indiana

## Region IV (Great Lakes)

Tooth Morphology, Occlusion, Direct and Indirect Single Tooth Restorations, Dental Materials, Cariology, Preventive Dentistry, Basis Science integration as needed.

### Detroit

### Illinois

Anything that helps develop competencies in defined operative fields. Any single tooth restoration, cariology and occlusion.

### Northwestern

### Western Ontario

All single tooth, none-cast, restorations

### Case Western

### West Virginia

Should include cariology.

c. Should we develop a "Standard of Care" document?

### OSU

A "Standard of Care" document is a good thing in principle. To make it consistent across all dental schools will necessarily make it very general. Individual schools can attach specifics to such a document. Rubber dam techniques should be included in the standards of care.

### Indiana

Probably not. This perhaps means a 'legal' standard of care. This may limit some specific statements due to the liability of practitioners.

### Detroit

### Illinois

Standards should be developed for certain procedures

### Northwestern

### Western Ontario

I am not sure if this would not be just more "paperwork". At present we have one "Standard of Care" – the standard we would accept in our own mouths!!

### Case Western

### West Virginia

Not easily done, but could be done. Should be a long-term goal. If we don't develop one, who will? (Third party carriers?)

2. How are dental materials courses handled in the curriculum?

## Region IV (Great Lakes)

### OSU

At OSU, we have made a conscious effort to integrate dental materials into the individual preclinical courses. Additionally, the third and fourth year students have didactic courses which discuss dental materials including problem solving as related to the materials. The traditional dental materials courses have virtually been eliminated from our teaching program.

### Indiana

Integrated. Basic dental materials lectures in first year. When teaching direct and indirect restorations, materials people guest lecture on the appropriate topics. Third year operative lectures revisit materials with more detail on clinical handling and materials updates.

### Detroit

Had materials scientist who retired. Then individual courses assumed the role of teaching materials. Now have a materials person who teaches materials in a lecture setting.

### Illinois

Basic freshman course. Also incorporated into each operative course as appropriate.

### Northwestern

Had a division of biologic materials in a larger department. Handled lecture/lab course for materials. Pre-clinical courses reviewed materials. Lab dropped a number of years ago, impacting the pre-clinical courses (the students were less prepared coming in). Now freshman intro lecture, individual courses and then a junior theory course.

### Western Ontario

In the past as a separate discipline with individual disciplines reviewing and emphasizing the clinical application. Hoping to get a biomaterials engineer to coordinate courses on materials, again. Currently, materials are handled by each course as appropriate.

### Case Western

Had a first-year materials course, discontinued when PhD left. Now the materials are in separate courses. Some impact with faculty changes; hard to determine who teaches what.

### West Virginia

One of the 5 restorative divisions is Dental Materials (chaired by PhD, DDS). Use Anusavich Dental Materials text. First year pre-clinical lab course associated. Good introduction – allows later courses to be clinically oriented.

## 3. How are instrument-supplying companies selected for the first-year students?

### OSU

At OSU, we have a person in charge of procuring instruments for preclinical use. Once the preclinical instrument list is determined, this person contacts prospective suppliers and negotiates prices. Often if alternative instruments or supplies are located at better prices, the course directors are contacted and discussed. If appropriate, changes are made to the issue. The preclinical instruments are determined for each course by course directors. Instruments used in multiple courses (e.g. explorers, etc) are generally accepted without justification. Unique instruments to a particular course require some justification, depending on how esoteric they are. Substitution is possible if one instrument is removed for each one substituted. Disposable supplies are usually permitted if the cost is justified.

### Indiana

Had rented laboratory issue until a few years ago. Now is total purchase. Clinic has rental issue from central sterilization. Go by service, quality and cost. Companies who were deemed good in service and quality had bids requested. Went with Suter.

### Detroit

Pre-clinical course directors define the instruments. Instrument supply companies chosen partly because of ability to assist in financing.



## Region IV (Great Lakes)

### Illinois

Instruments recommendations made by course directors to the pre-doctoral director. Schein is set up in the school to supply materials. Not working out too well.

### Northwestern

Instrument/materials/equipment committee. Full time clinic manager tracks inventory and orders. First and second year students get expendable and transfer issue. Transfer kits are used year-year. In clinics use cassettes with new instruments that are just a few years old now. All sections represented on the instrument committee.

### Western Ontario

They are selected by Division Chairmen after reviewing the quality of the company product. We attempt to agree on one supplier where possible (more committee work!) One person is in charge of ordering.

### Case Western

Kit committee (dept. chairs with student representation) and separate materials committee (separate). Changes need rationale. Students buy everything.

### West Virginia

Instrument and materials committee. Pre-clinical kits purchased and used throughout the 4-year curriculum. Cassette manager for each of the seven cassettes. Meet quarterly to discuss any changes. Costs challenged on everything. Dental store individual is on the committee as non-voting member. Chair of committee is not affiliated with the dental store.

#### 4. How is operative configured in the AADS and how should it be?

This question was not addressed due to time constraints.

Region IV (Great Lakes)

CODE  
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November 4-5, 1999

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Bob Rashid	The Ohio State University	614-292-3071	614-292-9422	<a href="mailto:rashid.1@osu.edu">rashid.1@osu.edu</a>
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Pete Monaghan	The Ohio State University	614-292-0921	614-292-9422	<a href="mailto:monaghan.15@osu.edu">monaghan.15@osu.edu</a>
Larry Haber	University of Detroit Mercy	248-669-8877		<a href="mailto:lhabe@aol.com">lhabe@aol.com</a>

**Enclosure #1**  
**CODE REGIONAL MEETINGS REPORT FORM**

**REGION:** V (Northeast)

**LOCATION/DATE OF MEETING:**

Columbia University School of Dental and Oral Surgery  
October 21, 22, 1999

**CHAIRPERSON:**

**Name:** Dr. Richard Lichtenthal **Phone #:** (212) 305-7069

**Address:** 630 W. 168<sup>th</sup> St. **Fax #:** (212) 305-8493

Columbia University **E-mail address:** rm11@columbia.edu

New York, NY 10032

**LIST OF ATTENDEES: (including Phone #, Fax #, E-mail address - sample format attached)**

Please attach

**SUGGESTED AGENDA ITEMS FOR NEXT YEAR:**

**LOCATION/DATE OF NEXT YEAR'S MEETING:**

**Name:** Dr. Richard Lichtenthal **Phone #:** (212) 305-7069

**Address:** 630 W. 168<sup>th</sup> St. **Fax #:** (212) 305-8493

Columbia University **E-mail address:** rm11@columbia.edu

New York, NY 10032 **Date:** TBA

*Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;  
40<sup>th</sup> 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 or via e-mail with an attachment,  
indicating the software program and version utilized.*

## Region V (Northeast)

### Code Meeting - Region V (Northeast) – October 21-22, 1999

The Region V meeting was hosted by Columbia University School of Dental and Oral Surgery, Dr. Richard Lichtenthal, Chair, on October 21-22, 1999.

#### Schools in Attendance

Columbia University School of Dental and Oral Surgery  
McGill University Faculty of Dentistry  
University of Connecticut  
Howard University  
Tufts University School of Dental Medicine  
Boston University, Goldman School of Dental Medicine  
University of Maryland Baltimore College of Dentistry  
UMDNJ New Jersey Dental School  
New York University College of Dentistry  
SUNY at Stony Brook School of Dental Medicine  
University of Pennsylvania School of Dental Medicine  
Temple University School of Dentistry

### Agenda – National CODE Topics

#### **Vital pulp treatment**

*When, where, and who teaches this topic in your curriculum?*

Most of the schools taught this topic in the first two years of their curriculums. This topic is also taught by the Departments of Endodontics at New York University, Boston University, University of Connecticut, Tufts University, and Temple University.

*Is this treatment utilized in patient care by students?*

Boston University and New York University refer all cases of vital exposures to their respective Department of Endodontics. The Restorative or Operative Departments of all of the other schools provide patient care.

*What criteria/protocol are followed in deciding to do or not do vital pulp treatment?*

In general, pulp exposures on permanent fully developed teeth are treated with pulpectomy and root canal obturation. Pulp capping/pulpotomy is used in teeth with incomplete root formation and for socio-economic reasons. Additional determinants include symptomatology, location of the tooth, vitality of the tooth, size of the exposure, radiographic depth, and the number of times the tooth has been restored. All of the schools use a rubber dam and most schools use calcium hydroxide and glass ionomer to treat vital exposures.

What concrete evidence supports the concept of vital pulp treatment? Please cite the scientific evidence. Additional comments welcome.

Just about all of the schools present felt that it is difficult to extrapolate evidence-based information. The University of Connecticut, after consultation with their Department of Endodontics, reported that "Successful treatment outcome for properly performed pulpectomy with root canal filling is cited in most publications to exceed 90%. Pulp capping/pulpotomy are normally found to have a successful outcome <75%.

**List the most important operative dentistry topics which need to be studied via clinical trials.**

## Region V (Northeast)

5. Question of caries/risk assessments – what is caries and when to treat?
6. Biocompatibility of dental materials to pulp, osseous and gingival tissues.
7. Restoration of cervical lesions.
8. Efficacy of fluoride release and significance to caries.
9. Longevity of “tooth colored” restorative materials placed in less than ideal situations.
10. Sealing or not sealing/arresting caries.
11. Evidence of the use of lasers in cutting hard tissues.
12. Comparison of the physical properties of “packable” composites to traditional composites in terms of depth of cure.
13. Leakage and sensitivity in posterior composite restorations
14. Criteria for the placement or non-placement of restorations.

### Calibration of faculty

*What is the protocol for calibrating and standardizing your operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.*

Most schools utilize manual guides (especially in the pre-clinic) for all faculty especially new faculty. A number of schools hold in-service and internal calibration workshops a number of times a year on typodonts for their faculty. Several schools use two or more faculty as graders in the pre-clinic area and use the Course Director as a “tie breaker”. Additionally, three schools place new faculty in the pre-clinic course first, before allowing them to teach in the clinical areas. Most schools use a mentoring system or “shadowing” system in the clinic and use more than one faculty to grade competency examinations. Several schools reported that it is possible to calibrate faculty when using typodonts, but difficulties arise when students and patients are thrown into the mix. The schools also reported that it is easier to differentiate pass and fail procedures; calibration is much more difficult to discern when plus or minus grades are used.

*How often is calibration/recalibration done?*

Most schools use a random or minimal approach. One or two schools calibrate at scheduled intervals.

*What evidence supports your protocol for calibration and recalibration? (please cite)*

Scant evidence exists regarding calibration and recalibration. A number of schools have difficulties in this area due to the number of part time faculty in their departments. However, those institutions that maintain a cadre of the same pre-clinical faculty may have an easier time, than clinical faculty where patient interaction plays a role.

### Competency education

*How is competency-based operative evaluation determined?*

Most schools have a minimum number of requirements, but use competency examinations, mock boards, remediation of failures, and daily study performance to determine student competency.

*How is the weak student identified?*

Schools use competency-based examinations, practical examinations, grade sheet evaluations and periodic student profiles.

*What measures are taken to upgrade competency of the weak student?*

Most schools provide remediation sessions for the weak student. This will include the retaking of failed practical or competency examinations. In most cases, students have to redo the failed procedures one or more times before they may retake the failed competency

## Region V (Northeast)

examination. Additionally, student conferences and one-on-one faculty/student workshops may be provided. One school takes weak students out of clinical activities until he/she demonstrates improvement on similar manikin procedures.

### Computer-based interactive education

*What interactive computer-based teaching tools are you using to teach operative dentistry?*

Region V schools are not currently using computer-based teaching tools. It should be noted however that the University of Pennsylvania is using Dent-Sim as part of their teaching curriculum; Columbia has ordered a unit and will be using it shortly. NYU and Boston are involved in the placement of CAD/CAM clinical restorations. Columbia also has a Web site for diagnosis and treatment planning.

*Would your school/region participate in development and in what manner?*

Schools would participate and be interested under the right conditions. Outside conditions such as time, costs, etc. enter the picture. Is Region VI making a proposal to the other Regions?

### Posterior esthetic restorations – report on direct and indirect

*Are they included in the curriculum? What discipline?*

All schools report that posterior esthetic restorations are included in Operative, Restorative, or Fixed Prosthodontic curriculums.

*Where (pre-clinic and clinic)?*

All schools are teaching posterior esthetic restorations in both the pre-clinic and clinic.

*Required experiences?*

All schools have set minimum requirements in the pre-clinic and most have set minimum patient experiences in the clinic.

*What materials and/or systems are utilized?*

On one hand, this question is extremely broad and too wide reaching. On the other, it is safe to say that all Region V schools are using current dental materials ranging from "state of the art" bonding systems to microhybrid and "packable" composites. Additionally, glass ionomers, porcelains (Empress, Cerinate to mention only two) are employed for indirect inlay/onlay and laminate procedures.

*What are the results? Also site the evidence for the reported results?*

The results should be based on outcomes assessments. However, the assessments for esthetic care are not different from the outcomes assessments for other care. As a result, schools have limited outcomes assessments.

### Regional Agenda Items

*Question of simulation laboratories – have schools recently installed new Kavo, Adec, or Nevin units?*

Schools reported that they have not.

*Amalgam repair – can you repair a previously placed amalgam restoration?*

## Region V (Northeast)

Consensus of the schools present is yes.

*How do you temporize a preparation assuming one is going to place a "bonded" amalgam restoration?*

Schools suggest the use of a compomer such as Dyract, or glass ionomer such as Ketac-silver.

*Are schools teaching pins?*

Yes, in lecture.

### CODE Questions

*What is CODE doing well?*

Schools in Region V either do not know or feel that CODE is doing nothing for them except collect dues.

*Where do you desire improvement?*

CODE should establish a Mission statement and a statement of their Goals and Objectives. Additionally, CODE should have a Web site that is AADS based. CODE should have some mechanism to set up a body of evidence-based information.

*Is \$25 US/\$30 Canadian school dues adequate? Comments are expected?*

Yes. However, no one seems to know where the dues go? Is it for mailings, etc.

*How can participation by faculty in CODE regional meetings be encouraged/improved?*

Most school faculty feel they have limited time and are not funded to attend such meetings. In many cases they have to pay for the meetings out of their own pockets. This prevents many who want to attend from attending. Several schools also raised the issue of the type of questions that National CODE put together for discussion. There is a concern that the National questions are not the type of questions that those intimately involved in education want to see either from a clinical or philosophical perspective.

*Faculty in Attendance at 1999 CODE Meeting*

Dr. Richard Lichtenthal  
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Department of Restorative Dentistry  
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College of Dentistry  
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Dr. Robert Miller  
McGill University  
Section of Operative Dentistry  
Faculty of Dentistry  
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Dr. Mark Wolff  
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Dr. Andrea Jackson  
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## Region V (Northeast)

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Dr. James LoPresti  
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Region VI (South)

**Enclosure #1**  
**CODE REGIONAL MEETINGS REPORT FORM**

**REGION:** VI (South)

**LOCATION/DATE OF MEETING:**

Medical University of South Carolina; Charleston, South Carolina  
October 21 and 22, 1999

**CHAIRPERSON:**

**Name:** Dr. James Knight **Phone #:** (843) 792-3763

**Address:** MUSC College of Dental Med. **Fax #:** (843) 792-2847

173 Ashley Ave., BSB 341 **E-mail address:** knightjs@musc.edu

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**LIST OF ATTENDEES:** (including Phone #, Fax #, E-mail address - sample format attached)

Please attach

**SUGGESTED AGENDA ITEMS FOR NEXT YEAR:**

**LOCATION/DATE OF NEXT YEAR'S MEETING:**

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**Mailing Address:** ; University of Washington **Fax #:** (205) 975-5874

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Birmingham, AL 35294-0007 **DATE:** October 26 & 27, 2000

Region VI (South)

*Please return all completed enclosures to Dr. Larry D. Haisch, National Director, UNMC College of Dentistry;  
40<sup>th</sup> 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 or via e-mail with an attachment,  
indicating the software program and version utilized.*

## Region VI (South)

### 1999 National CODE Agenda

Based on (a) review of the 1998 Fall Regional CODE reports by the CODE Advisory Committee. Refer to Conference of Operative Dentistry Educators Regional Reports, Fall 1998- previously sent to each CODE dues paying member school, the CODE Advisory Committee and the Executive Council of the Operative Section, American Association of Dental Schools.

#### 1. Vital pulp treatment

##### a. When, where, and who teaches this topic in your curriculum?

-Alabama	Pre-clinical Program, Operative Clinical Courses & Endodontics
-Florida	Pre-clin. Operative Dent. (Fresh. Spring) & Endo. (Soph. Fall)
-Georgia	Pre-clin. Oper. Dent. (Freshman) & Clinic (Soph.- Senior)
-Kentucky	Freshman Operative Dent. (Spring semester)
-Louisville	Pre-clin. Oper. Dent. (Fresh. Fall), Endo. (Soph. Spring) & Operative Dent. Course in Junior Fall Semester
-Meharry	Pre-clinical (Soph.) Operative Dent. Course (Junior) & Seminars (Oper. & Endo.) in Senior year
-N. Carolina	Endodontics / Operative
-Nova	Operative Dentistry and student seminars
-Puerto Rico	Endo. (Soph.), Oper. Dent. (Fresh. & Soph.), Pedo (Soph.) Dent. Materials (Junior)
-S. Carolina	Oper. Dent. (Soph. & Senior), Endodontics (Junior)
-Virginia	Endodontics (Soph. Spring)

##### b. Is this treatment utilized in patient care by students?

All schools answered YES to this question.

##### c. What criteria/protocol are followed in deciding to do or not do vital pulp treatment?

-Alabama	Pulp status, patient age, lesion (chronic/acute & size/depth), type of restorative material
-Florida	<u>Indirect pulp cap</u> (Calcium Hydroxide)- pulp visible thru dentin <u>Direct pulp cap</u> (Cal. Hyd. covered by Gl. Ionomer Cement followed by permanent restoration for <u>non-carious</u> exposures <u>Direct pulp cap</u> (Cal. Hyd. covered by G.I.C.) or Partial Pulpotomy (Cvek) followed by I.R.M. for carious exposures
-Georgia	see Florida response for Ind. PC & Dir. PC for non-carious Endo. For carious exposure.
-Kentucky	Vitality tests, radiograph (no p.a. pathology), asymptomatic Endo. consult as needed. If patient has symptoms and extensive treatment considered (FPD), root canal therapy usu. accomplished
-Louisville	Pre-treatment factors- asympt, no p.a. path., no spontaneous pain Mech. exposure- pink-colored, vital pulp, hemorrhage controllable Exposure of pulp by caries- contraindication. (See chart next pg.)
-Meharry	Small exposure $\leq$ 0.5mm, asympt. tooth, hemorrhage controlled, exposure is isolated/uncontaminated, no trauma/pressure over exposure site
-N. Carolina	Preoperative sensitivity, isolation of area, type of pulp exudate
-Nova	Treat- pinpoint mechanical or near exposure in non-carious areas Do not treat- carious exposures
-Puerto Rico	Direct pulp capping with calcium hydroxide after considering: dental history, type of pain, restorability of tooth, final restoration, vitality tests, isolation of area, contamination, age of pt., primary vs. permanent tooth, bleeding, exposure size, radiographic findings

## Region VI (South)

- S. Carolina Vital pulp, asymptomatic, bleeding controllable, tooth history, radiographic appearance, exposure size, contamination, patient age  
Ultimate plan for the tooth. Consultations with Endo. & Prostho.
- Virginia Used for non-contaminated pulp exposure in permanent fully fully formed teeth. Apexogenesis cases.

d. **What concrete evidence supports the concept of vital pulp treatment? Please cite the scientific evidence. Additional comments welcome.**

**Articles- Region VI** collective citations, some listed by more than one school

- Stanley Harold R. Human Pulp Response to Operative Dental Procedures, UFCD, Gainesville, FL 1982.
- Mejare I, Cvek M. Partial pulpotomy in young permanent teeth with deep carious lesions. *Endod-Dent-Traumatol.* Dec 1993; 9(6):238-242.
- Proceedings of Symposium. Current Concepts and Controversies in Vital Pulp Capping. *Am. J. Dent.* 1998; 11:S17-34.
- Stockton LW. Vital pulp capping: a worthwhile procedure. *J. Can. Dent. Assoc.* 1999; 65(6):328-31.
- Olmez A, et al. A histopathologic study of direct pulp-capping with adhesive resins. *Oral Surg. Oral Med. Oral Path. Oral Radiol. Endod.* 1998; 86:98-103.
- Kitasako Y et al. Effects of direct pulp capping techniques on short-term response of mechanically exposed pulps. *J Dent.* 1999; 27:257-63.
- Tarim B, et al. Pulp response to a resin-modified glass ionomer material on nonexposed and exposed monkey pulps. *Quintessence Int.* 1998; 29:535-42.
- Tarim B, et al. Biocompatibility or Optibond and XR-Bond adhesive systems in nonhuman primate teeth. *Int J. Periodont. Restor. Dent.* 1998; 1886-99.
- Nakanishi MT, et al. A clinical study of direct pulp capping applied to carious-exposed pulps. *J Endod* 1996; 22:551-6.
- Stark M, Nicholson RJ, Soelberg KB. Direct and indirect pulp capping. *Dental Clinic of North America.* 1976.
- Christensen GJ. Pulp capping 1998. *Sept. 129(9): 1297-9.*

**Textbooks-**

- Cohen, *Pathways of the Pulp*, 7th ed, Chapters 15 and 16.
- Sturdevant, *Art and Science of Operative Dentistry*, 4th ed.
- Weine, *Endodontic Therapy*, 5th ed. Chapter 16.
- Ingle, *Endodontics*, 4th ed. Chapter 19.

2. **List five of the most important operative dentistry topics that need to be studied via clinical trials.**

The following list represents the collective response of Region VI schools: Numbers after responses indicate number of schools with same response.

**Long term information on bonded direct and indirect restorations** including resin inlays, onlays, crowns. Posterior composite (packable) wear and margins. 4

**Dentin Bonding**, Adhesives, Hybridization- longevity of the bond. 3

Vital pulp treatment- organized evaluation of various (new) protocols. 4

**Cariology**- Carious lesions: early (noninvasive) detection, study of factors predisposing to carious (& recurrent) lesions and progression rates.5

**Remineralization** techniques and their efficacy. 3

Principles of cavity preparation design and their relevance vs. standardized preparation design recommendations for all schools or boards. 2

Repair of existing restorations.

Viability of bacteria under sealed restorations.

Amalgam substitutes and alternatives.

Dental applications of new laser/micorabrasion devices.

Demonstrate efficacy of caries risk assessment.

Cement solubility

## Region VI (South)

Sealing ability of flowable composites as a liner in posterior comp. restorations.

**Flowable composites:** wear resist. in Class V restorations, longevity, and clinical effectiveness (also- Res. Modif. GI Ion.) 4

Wear resistance and durability of fixed part. dentures constructed from ceromers.

Retention / fracture resistance of ceramic & carbon fiber post and core systems. 2

Base to ideal depth vs. minimal pulp protection.

Dentin bonding agents as cavity sealers.

Reduction of post-operative sensitivity.

Resin wear vs. enamel wear.

Patient perceptions of quality restorative dentistry.

Color stability of direct composites.

Bleaching of vital tetracycline stained teeth.

Effects of pulp pressure (vitality) in bond strength.

Non rotary instrumentation for tooth repair.

Ways to improve the bonding of composite to porcelain.

Curing lights (lasers, etc.) and resin polymerization variables.

Class V restorations. Mechanical retention? Occlu adjust.- abfraction lesions.

Efficacy of liners and bases under bonded amalgams on vital teeth.

Mercury vapor release from spherical alloys when bleaching with carb. peroxide.

### 3. Calibration of faculty:

#### a. What is the protocol for calibrating and standardizing your operative faculty? Address current faculty and new faculty. Also for pre-clinical and clinical.

- Alabama Two instructors for evaluation of mock board procedures.  
Faculty meetings using clinical photos. Preclinic calibration via prepared/restored artificial teeth and grading discussions.
- Florida Preclinical- course syllabi with detailed grading criteria. All grading done by two faculty per criteria- must reach consensus or get third faculty opinion. Same for clinical comp. exams.
- Georgia Rotating new faculty through all restorative courses to learn teaching philosophy. Assigning new faculty to more experienced faculty for an "apprenticeship" period. Use standardized manuals.  
Technique and material use policies from dept. section meetings.
- Kentucky Preclinical- "grade" standard preps before practicals and compare.  
Clinical- annual RSD off-site to review preclinical curric. All full and part-time faculty attend.
- Louisville Performance criteria for all preps and rest. in preclin. and clinic.  
Same grade scale in preclinic and clinic.  
Two faculty grade each comp. exam in preclin. and clinic and grades are compared for consistency. All operative faculty have taught in preclinic. Each Fall- faculty review/discuss perf. criteria.
- Meharry Using slides, faculty review radiographs, preparations and restor. as a group with discussion of acceptable vs. non-acceptable. Then ea. faculty evaluates procedures independently. All faculty spend a year evaluating students in preclinic before given clinic duties.
- N. Carolina Faculty meetings, classroom assessments, review of faculty grades, and faculty interaction in courses and clinics.
- Nova Faculty attend all lectures. Weekly faculty seminars. Comparison of evaluations within faculty.
- Puerto Rico Faculty participation in preclinical courses. All faculty evaluate comp. exams (2 per student). New faculty in preclinic prior to clinic. Course manuals with explanation of eval. criteria.  
Calibration course off campus, dept./section meetings.
- S. Carolina One on one discussions, clinical consultations, all full time faculty attend preclinical lectures, and department meetings.
- Virginia Preclinic faculty meet with course director prior to each lab so the course director can standardize instruction for that period.  
In-service C.E. Courses held periodically to emphasize teaching protocol for full and part-time employees.

## Region VI (South)

### b. How often is calibration/recalibration done?

- Alabama As often as needed, but routinely done during each quarter.
- Florida No formal procedure. New faculty not allowed to grade until complete initial shadowing period.
- Georgia Before every preclinical/clinical examination grading session:
  - circulate list of student perform. expectations to faculty/students.
  - preclinical through grading and discussion of at least 4 cases.
  - clinical by review of criteria before exam, multiple blind graders.
- Kentucky Preclinical practical- if one faculty fails procedure, second grades, if one pass and one fail, then third grades. Clinical mock boards (competency exams).
- Louisville As a group, once at the beginning of Fall Semester. Preclinic & clinic- each time comp. exam graded.
- Meharry Two times a year.
- N. Carolina Specifically only every two years.
- Nova All preclinical and clinical examinations.
- Puerto Rico Clinical comp. exams- twice per semester. Laboratory comp. exams- various times per year. Distribution of manuals is done annually. Dept. and section meetings various times per year.
- S. Carolina Daily discussions and clinical observation/consultation lead to a unified philosophy among full-time faculty & occas. part-time.
- Virginia Controlled by the individual course directors.

### c. What evidence supports your protocol for calibration and recalibration? (Please cite)

- Alabama No response
- Florida None
- Georgia J. of Dent. Educ. Vol 46(12);, 1982.
- Kentucky Georgia model
- Louisville Grading on Scantron forms, analyzed & validated for consistency.
- Meharry Faculty participation in Western, Southern and Northeast Regional Board calibration sessions and conferences.
- N. Carolina Our own assessment of whether it is successful.
- Nova Currently developing data to support methods.
- Puerto Rico Scores given in exams are usually very similar btwn. evaluators. Discrepancies are discussed btwn. evaluators & consensus reached. Results of clinical comp. exams are comparable to license exam.
- S. Carolina Empirical.
- Virginia No response.

## 4. Competency education.

### a. How is competency-based operative education determined?

- Alabama Competencies are carried out yearly for both pre-clinic and clinic operative programs for all classes via simulation or practical exams; clinic scenarios with mock board cases.
- Florida Routine clinical procedures are not graded. Student semester grade is based on equal combination of quantity (clinic use) and quality (comp. exams) graded by two faculty. Requirements for clinic use and comp. exams varies by semester.

## Region VI (South)

-Georgia	A series of planned mock board examinations.
-Kentucky	Practicals and mock boards. Poor clinic evaluations by staff.
-Louisville	After a minim. no. of clin. experiences students take a comp exam- JR year- 5 clinical competencies: 2-II Ag, 2-III/IV Comp., 1 either SR year- 6 comps: 3-II Ag, 2-III/IV Comp., 1 either & mock board
-Meharry	All Jr. students must pass comp exam for ag. & comp. restoration. All students must pass Final Clinical Comp Exam for graduation.
-N. Carolina	Point system (combines quantity and quality).
-Nova	Competency exam taken after faculty approval of student's ability.
-Puerto Rico	Pre-clinic: daily work evals= formative, comp exam= summative. All summative evals are used for final grade computation. Clinic: student decides what experiences are form or summative. Clinic comp exams required each semester and are part of grade. Clinic: a min. # of consecutive summative evals required for grade along with the competency exams.
-S. Carolina	Competence exams graded by two faculty. Point/grade system.
-Virginia	Pre-clinic: pract exams on mannequins, objective & subject grades Clinic Competencies: Jr- 10, Sr- 4.

### b. How is the weak student identified?

-Alabama	Daily activities, practical exams, clinical exposure, weekly quizzes
-Florida	By semester grades, all comp. exams- failed or not, count.
-Georgia	Daily procedure grading on techniques and management. Subjective faculty feedback and independent performance exams.
-Kentucky	Daily performance in student clinics, practicals and mock boards. Evaluated at Academic Performance Committee (Course directors)
-Louisville	Ongoing competency-if loss of comp is observed by poor daily clinic evals. the student remediates as indicated by course director.
-Meharry	Daily eval of procedures and grades (Departmental meeting).
-N. Carolina	By special notations, grades, and points.
-Nova	Daily faculty evaluations.
-Puerto Rico	Through performance on quizzes, didactic exams, comp exams, daily evaluations, faculty impressions, and progress reports.
-S. Carolina	Grades, faculty consultations concerning student's clinic perform. Competence examinations.
-Virginia	From subjective and objective evals on comp exams by 2 faculty.

### c. What measures are taken to upgrade competency of the weak student?

-Alabama	Individualized teaching in pre-clinical summer remediation; additional prep. of artificial teeth, weekly review in clinical yrs.
-Florida	Failed competency exams must be repeated by following semester.
-Georgia	Customized program with additional procedures on study models and patients. Weak students monitored by specific faculty.
-Kentucky	Retake practicals and mock boards, student tutors, extra projects, and repeating courses as needed.
-Louisville	Student reviews appropriate course material and performs specific procedures on dentofom under supervision. Clinic privileges may be withdrawn until satisfactory improvement is demonstrated.
-Meharry	Manikin remediaton 1:1 with faculty. Review relevant literature.
-N. Carolina	Personal remediation- discussions, model work.
-Nova	One-on-one attention, additional procedures &/or time.
-Puerto Rico	Coordinator feedback to students, repetition of activities under supervision, additional experiences in weak areas. Passing of comp exams is required for promotion.





Region VI (South)

School	Teaching Discipline(s)	Pre-Clinic Clinic	Requirement?	Materials
Alabama	Operative Crown & Bridge	Both	Elective procedure in Clinic	P-50 & SBMP Sure-Fil & PB Empress Belleglass
Florida	Operative-dir. comp resin Fix. Pros-PBM, Veneers	Operative-Both *Cast ceramic course planned	One Class II comp resin in Jr. or Sr. year	Herculite & Solo Z-100 & SBMP
Georgia	Operative-dir. comp resin Esthetics-Veneers, All-Ceram. Crowns	Both Fr. Op. Dent.-then clinic Jr. Esthetics lab then clinic	No	Fuji II LC CI V Herc. Optibond (post comp res) Porc- Veneers Inceram- Crown
Kentucky	Operative-dir. comp resin	Both Fr. Op. Dent. then clinics	No, but majority will get experience	Herculite & Optibond FL
Louisville	Operative	Both pre-clinic & clinic, dir & indir	No	Dir= Herculite or Heliomolar Indir= Concept Fuji II LC base
Meharry	Operative	Both	No	Herculite XRV Optibond FL
N. Carolina	Operative Prosthodontics	Both	Only PFM crowns	Composite Feldspathic porc Empress
Nova	Operative Crown & Bridge Esthetics	Both	YES, 3-6 per year until competent	Caulk & 3M composites Lab produced inlays/onlays
Puerto Rico	Operative Lab and Clinic Dent Materials	2 <sup>nd</sup> yr Oper lab 3 <sup>rd</sup> yr Oper clinic 3 <sup>rd</sup> yr Mater. Lab 4 <sup>th</sup> yr Clinic	YES- 3 <sup>rd</sup> year Class I & II dir comp.& Inlays 4 <sup>th</sup> - requirement varies.	TPH Spectrum Z-100, Solitare SureFil. Inlay material varies with lab avail.
S. Carolina	Operative	Both Soph Oper. Lab then clinic	No formal requirement but one is expected	Prodigy, Prodigy Condensable, Targis, Empress
Virginia	Operative	Both	Optional Jr. competency eval Amal or Comp.	Z-100 & SBMP

e. What are the results? Also cite evidence for the reported results.

Alabama P-50 has been used for the last 8 yrs. In the undergraduate clinic.  
SureFil was introduced in '98 in the Operative Clinic.  
Empress has been used for indirect restorations since '94.  
BelleGlass has been used more recently (last 12-18 months).

## Region VI (South)

Florida	No formal attempt at evaluation yet, although evaluations to begin shortly in newly formed Health Maintenance Clinic.
Georgia	
Kentucky	Evaluated by covering staff on student clinic floor, then at recall.
Louisville	We have not had to replace any posterior composite resins as far as I know. There is no written evidence of their performance.
Meharry	No results at present time; we will recall 3, 6, and 12 months.
N. Carolina	No response
Nova	N/A- too soon to know.
Puerto Rico	Results are acceptable. We are working in the outcome assessment and a recall system to corroborate this statement.
S. Carolina	Variable, depending on student operator, case selection, and quality of lab support. Generally, very good (anecdotal evidence)
Virginia	No long term follow-up. Anecdotal results.

## Region VI (South)

### CODE Questions

The following answers are collective responses from Region VI schools

#### 1. What is CODE doing well?

- Provides friendship-building, hard-working forum for exchange of information, ideas, and results between operative dentistry departments. within/between regions.
- Networking through annual meeting and/or e-mail and phone contacts.
- Sharing of ideas with different schools.
- Regional meetings are important to gain information about what other schools are doing and the materials/techniques that are being used.
- Communication among all member schools. Review of important operative subjects at meetings.
- Keeping schools updated on what everyone is doing.
- Meeting regularly. Discussing pertinent issues matter-of-factly.
- The organization is doing well and is producing thought provoking agendas and hopefully productive meetings.

#### 2. Where do you desire improvement?

- More regionally cooperative education efforts.
- More regionally cooperative research efforts.
- More proactive efforts nationally on clinical research issues.
- More interaction with the Academy of Operative Dentistry and AADS.
- Joint national projects involving different regions.
- Increase communication with other CODE regions.
- More non-operative faculty participation in meetings.
- Active participation in calibration of faculty and curriculum development.
- Interact with other regions.
- Lengthen meeting time.
- Participation at regional meetings needs improvement.

#### 3. Is \$25 US / \$30 Canadian school dues adequate?

- No, will need to be higher to achieve goals like those stated.
- Reasonable. Can be increased if more national projects are planned.
- Yes. Seems adequate given the current agenda.
- Only the secretary knows for sure.
- Yes, until a demonstrated need for increase because of better methods of holding the annual meeting (sites & materials).
- OK
- OK for what we are receiving now, can be changed.
- Increase to \$50 and give some of the money to school hosting regional meeting to allow better support.
- Information regarding expenses is necessary to determine adequacy of fees.

#### 4. How can participation by faculty in CODE regional meetings be encouraged / improved?

- Suggest faculty exchanges (mini-sabbaticals / 4-6 weeks) between Operative Dentistry departments within a region.
- Suggest regional CODE meetings be held on a weekend.
- Departmental support.
- Rotation of attendees from participating schools.

## Region VI (South)

- With the budgets as restricted as they are, at least at our school, sending multiple faculty is not possible. Some schools may not be able to send faculty at all.
- Give CEU credits to all faculty or non-faculty participants.
- Invite members of state / regional boards to participate.
- CODE agenda covering areas of immediate attention such as interactive teaching, competency-based curriculum.
- Ensure relevant issues are discussed. (Make programs interesting and clinically-based.)
- Change agenda to encourage discussion of topics of particular interest to attendees.
- Be more forward looking: "Where are we going?" "What if...?".
- Continuing education credits would be helpful.
- Possibly combining this meeting with another might be beneficial.
- Having presentations corresponding to the agenda would be good as the agendas typically involve areas of Operative Dentistry Education that all schools seem to struggle with.

Region VI (South)

CODE Region VI Attendees  
 October 20-22, 1999  
 Charleston, South Carolina

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