

# Assessment of a model for teaching evidence-based dentistry in a treatment planning course

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## ABSTRACT

A change from "traditional" problem-based learning (PBL) in treatment planning seminars to a "hybrid" seminar format, with an emphasis on searching for the strongest evidence available, was introduced to improve junior students' knowledge, experience and confidence about evidence-based dentistry. In post-seminar evaluations the students ranked, on a scale from 1 (low) to 5 (high), the following items: knowledge, experience and confidence about solving problems in an organized manner, using resource investigation techniques, effectively working in a group, integrating knowledge from the basic sciences into treatment decisions, making treatment decisions based on evidence and utilizing resources. The results showed no significant difference between the students' mean rating for the PBL and hybrid seminars. However, the students' evaluations of the hybrid model were significantly more positive about their knowledge ( $Z=2.47, p=0.014$ ), experience ( $Z=3.01, p=0.003$ ) and confidence ( $Z=2.7, p=0.007$ ) about making treatment decisions based on evidence compared to the PBL model. In an assessment after the hybrid seminars of the students' reported strength of their two sources of evidence used, 87% of the sources used were from systematic reviews, meta-analyses or randomized controlled trials. Eighty-three percent of students reported that the evidence supporting their decisions were from studies that had used procedures and material appropriate for their patient case, 5% did not consider their data relevant to their patient case and 12 % were not sure. The hybrid seminar model, with an emphasis on searching for the strongest evidence available, using this information to prepare the patient's treatment plan, and composing the patient letter, improved students' knowledge, experience and confidence about making treatment decisions based on evidence.

## INTRODUCTION

Dental students need to learn skills for making decisions about diagnostic and treatment choices based on evidence, in order to competently practice evidence-based dentistry after graduation from dental school. Evidence-based health care is defined as the "conscious, explicit and judicious use of the current best evidence in making decisions about individual patients". Principles for evidence-based dentistry include: 1) brainstorming the best evidence for diagnosis, prognosis, etiology and treatment, 2) searching for the strongest available evidence, 3) assessing the evidence, and 4) deciding how to use the evidence in the patient's treatment plan. The goal for this new program was to teach the students these processes.

In 2007, "traditional" PBL small group seminars with faculty facilitators were introduced in the treatment planning course. Only partial information about the patient was given at each session. Each group followed a seven-step approach: explaining unknowns/reading and concepts, defining the problem, brainstorming, making systematic inventory of explanations, formulating their own learning objectives, performing self directed study by individual group members and reporting findings back to the group. Two topics for self study would then be formulated. Students and faculty facilitators' comments about the introduction of PBL seminars were positive. However, comments from both students and faculty revealed dissatisfaction with introducing PBL in only one course for the first time in dental school in the spring semester of the previous year. They found it difficult to learn and benefit from the PBL format for this one course. In addition, it was perceived by seminar facilitators and the course director that more effective methods about teaching evidence-based dentistry were needed and that individual students may have needed stronger motivation to learn more effectively.

In 2008, a hybrid case seminar format was developed. Each small group received the same radiographic, odontogram and patient history with one ill-described group-specific medical, medical or dental history or present concern, which differed from the other groups' concerns. These concerns became topics for student papers. Students were asked to, on a case-item questionnaire, read and assess their top two literature sources used to support evidence for diagnostic and/or treatment decisions according to strength of evidence. Examples of items were: find search terms, number of their references, the two best sources, ranking the level of strength of their sources, roles played by bias, confounding and chance, target population and relevance for the seminar case studied. The student reports were discussed in the seminar group and the evidence was used when the group formulated the treatment plan for and writing a letter to the patient. The letter included problems, diagnosis, treatment needs with suggested treatment options, prognosis for treatment and expected prognosis of treatment was to be given, estimated cost and time needed for the treatment and the patient's home-care responsibilities. In a final class session, each group presented their group's specific case/problem, research completed about this topic and their recommended treatment plan.

## EVALUATION METHOD

After completing each seminar course, students ranked, on a scale from 1 (low) to 5 (high), the following items: knowledge, experience and confidence about solving problems in an organized manner, using resource investigation techniques, effectively working in a group, integrating knowledge from the basic sciences into treatment decisions, making treatment decisions based on evidence and utilizing resources. The students' ranking of strength of the two sources of evidence used was also assessed for the type of evidence used and whether the evidence gathered was from a study that used procedures and materials appropriate for the patient case studied.

## Form used for RANKING OF EVIDENCE

**Guidelines for Assessing the Two Best Sources of Evidence**

In most cases, multiple sources of evidence will be available. The following guidelines focus on what, in your judgment, are the "best" two sources of evidence for your case. If only one source is available then address that source using the guidelines.

- 1) List the final search terms that you used if Published.
- 2) How many "hits" did you get with your final search criteria?
- 3) What other sources of evidence were searched? (Textbooks, Cochrane reviews, Consensus panels, etc)
- 4) Reference your best two sources of evidence.
- 5) Were these two sources peer reviewed?
- 6) Describe the level or strength of evidence of the best two sources available:
  - Meta-analysis or systematic review
  - Randomized controlled trial
  - Prospective cohort study
  - Case-control study
  - Case history/case series (for comparison purposes)
  - Other human studies
  - Animal studies
  - In-vitro studies
  - Expert opinion
- 7) Were the roles played by chance, bias, and confounding addressed?
- 8) Was the evidence gathered from a target population that check the inclusion/exclusion criteria (that is appropriate for your patient's) that fit your concerns?
- 9) Was the evidence gathered from a study that used procedures and materials appropriate for your patient case? If not list your concerns.

## SURVEY

### Problem Based Learning, PBL, Seminars Participant Perception Indicator

This questionnaire has been designed to assess the participants' view of their knowledge, experience, and confidence on various issues related to the new PBL seminars. "Strongest Evidence" refers to the two sources of evidence ranked by the rank of the questions indicate how you rate your knowledge, experience, and confidence. You may rate 0 (no confidence).

Phase	Fill in all boxes of all items below	Low	High
1) Solving problems in an organized manner	Knowledge Experience Confidence	1 1 1	5 5 5
2) Using brainstorming and resource investigation techniques to solve problems	Knowledge Experience Confidence	1 1 1	5 5 5
3) Effectively work as a group by properly managing the group's meetings	Knowledge Experience Confidence	1 1 1	5 5 5
4) Integrate knowledge from basic sciences into clinical treatment decisions	Knowledge Experience Confidence	1 1 1	5 5 5
5) Making treatment decisions based on evidence	Knowledge Experience Confidence	1 1 1	5 5 5
6) Utilize resources like a literature search to acquire evidence and knowledge	Knowledge Experience Confidence	1 1 1	5 5 5

## RESULTS

**RESULTS**  
Student participation in the anonymous surveys was 30% for the PBL and 61% for the hybrid seminars. The difference between the students' mean rating for the PBL and hybrid seminars was not significant. However, the students' evaluations of the hybrid model were significantly more positive about their knowledge ( $Z=2.47, p=0.014$ ), experience ( $Z=3.01, p=0.003$ ) and confidence ( $Z=2.7, p=0.007$ ) about making treatment decisions based on evidence compared to the PBL model. Their understanding about integrating knowledge from basic sciences into clinical treatment decisions was also significantly higher in the hybrid model ( $Z=2.16, p=0.03$ ). In an assessment after the hybrid seminars of the students' reported strength of their two sources of evidence used, 74% of the sources used were from systematic reviews, meta-analyses or randomized controlled trials. Ninety-six percent of the students had found at least one source of the strongest evidence, while 4% of them did not find any strong evidence. Fourteen percent of the searches were related to topics lacking strong research (i.e. herbal medications as related to oral health). Eighty-three percent of students reported that the evidence supporting their decisions were from studies that had used procedures and material appropriate for their patient case, 5% did not consider their data relevant to their patient case and 12 % were not sure.

## EVALUATION OF SEMINARS

D3 students' perception of knowledge, experience and confidence reported post-seminar course on a scale from 1 (lowest) to 5 (high) PBL (2007) and "Hybrid" (2008)

	Knowledge PBL	Knowledge "Hybrid"	Experience PBL	Experience "Hybrid"	Confidence PBL	Confidence "Hybrid"
Solving problems in an organized manner	4.25	4.04	3.76	3.66	3.9	3.82
Using brainstorming and resource investigation techniques to solve problems	4.0	4.17	3.9	3.95	3.64	4.05
Effectively work in a group by properly managing the group's meetings	4.13	4.14	4.0	4.0	3.8	4.13
Integrate knowledge from basic sciences into clinical treatment decisions	3.81	4.14	3.8	3.64	3.8	4.0
Making treatment decisions based on evidence	3.72	4.15	3.38	3.91	3.62	4.06
Utilize resources like literature search to acquire evidence and knowledge	3.87	4.0	3.55	3.71	3.71	3.86

## RANKING OF EVIDENCE USED

Type of Source Used for "Strongest Evidence Found" (n=70 papers)

Type of source used for "strongest evidence found"	Number of papers with this type of source as their "strongest evidence found"
Meta-analysis	23
Systematic review	25
Cochrane review	3
Randomized controlled trial	13
TOTAL	67 (97%)
Retrospective study	1
Case study	2
Prospective cohort study	5
Expert opinion	1

## DISCUSSION

The D3 treatment planning seminars were altered into a hybrid format to improve students' skill and experience with evidence-based dentistry. A graded individual paper was one source of evaluation which included a literature search, ranking of the strength of evidence and assessment of its relevance in relation to the patient case. The hybrid seminar model, with an emphasis on searching for the strongest evidence available, using this information to prepare the patient's treatment plan, and composing the patient letter, improved students' knowledge, experience and confidence about making treatment decisions based on evidence. To improve continuity between didactic and pre-doctoral clinical teaching and further prepare students for evidence-based dentistry after graduation, the authors support including evidence-based decisions about diagnosis and treatment options as a part of the students' clinical treatment planning competencies. This spring semester the group facilitators' assessments of the junior students' treatment planning seminars will also be evaluated in order to further improve these seminars. The authors believe that the smaller number of participating students in the PBL group is a potential weakness when comparing the PBL and hybrid seminar models.

## CONCLUSION

The change from "traditional" problem-based learning (PBL) in D3 students' treatment planning seminars to a "hybrid" seminar format improved junior students' knowledge, experience and confidence about making treatment decisions based on evidence.

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