

Use of a computer-assisted clinical case (CACC) SOAP note exercise to assess students' application of osteopathic principles and practice

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Osteopathic medical students are future osteopathic physicians, and how they view the manipulative aspect of patient care will have an effect on the distinctiveness of osteopathic medicine. To encourage students' application of osteopathic principles and practice, a Web-based computer-assisted clinical case (CACC) was designed, for which students were required to submit a SOAP (Subjective, Objective, Assessment, Plan) note. Results from the CACC-SOAP note exercise indicate that the experience engages medical students and can determine the students' abilities to recognize osteopathic principles in patient care.

(Key words: computer-assisted clinical case, SOAP note, osteopathic manipulative treatment, pneumonia)

Osteopathic medical students are the osteopathic physicians of tomorrow, and how they view the manipulative aspect of patient care will have an effect on the distinctiveness of osteopathic medicine. To encourage and assess students' application of osteopathic principles, a Web-based computer-assisted clinical case (CACC) was designed. Ninety-four percent of the students who participated included a structural examination in their SOAP (Subjective, Objective, Analysis, Plan) notes. However, only 49% of the students placed osteopathic manipulative treatment (OMT) in their treatment plans. Most students scored

at the expected level of student experience (average score, 2.65 ± 0.113 ; Likert scale of 1 to 5; 1 = excellent, 5 = poor) when treatment plans were evaluated by a clinician from the osteopathic manipulative medicine department. Students' attitudes toward the CACC-SOAP note exercise were positive. When asked which courses the CACC integrated, 61% indicated the case required knowledge of osteopathic theory and methods. The CACC-SOAP note exercise appeared to be useful in determining which students are ready to apply their OMT knowledge and what types of OMT the students are able to identify in caring for a patient.

Background

The osteopathic philosophy is a distinctive healthcare philosophy, and one of the most obvious expressions of this philosophy is the use of OMT. Gevitz¹ stated that the application of OMT is still the most identifiable feature that distinguishes osteopathic medicine from allopathic medicine.

Findings of a recent study on the use of OMT by osteopathic family physi-

cians indicated that few of the 1055 respondents routinely used OMT when treating their patients.² Only 6% of the respondents treated more than 50% of their patients with OMT, while approximately 71% of the respondents treated less than 25% of their patients with OMT. This study also revealed that recent graduates (1985 to 1996) of osteopathic medical schools are much less likely to use OMT. An earlier preliminary study by Fry³ produced similar findings.

Factors that may contribute to the de-emphasis of OMT in clinical practice have been suggested. Eckberg stated that there is a growing number of students who are applying to osteopathic medical schools after being denied admission to allopathic medical schools.⁴ These students may lack the commitment to the osteopathic philosophy and as a result be less likely to use OMT in their practices. Another study indicated that time constraints limit the amount of OMT in their practices.² Others have indicated that osteopathic medical students and physicians have become sensitized to the perceived unorthodox nature of OMT and are less likely to use OMT.⁵ Gevitz¹ attributes the decline of OMT in hospitals and office-based practices to the deleterious impact of the controversies associated with the use of OMT.¹

One way of assessing students' application of OMT is to place them in a clinical situation to see if they choose to apply OMT in treating a patient. A Web-based computer-assisted clinical case (CACC) was used to simulate a clinical situation to assess students' application of osteopathic principles and practice.⁶ If a population of students who are not applying their OMT knowledge can be identified, then further evaluation of this population may help to determine why recent osteopathic medical school graduates are not using OMT in their practices. This type of assessment tool may also help to determine the progress of students in applying OMT.

Methods

The CACC-SOAP note exercise was conducted during the infectious diseases course at Kirksville College of Osteo-

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pathic Medicine (KCOM). The course is offered during the first quarter of the students' second year in medical school. All basic science courses except pharmacology have been completed by this time in the curriculum. During the first quarter of the second year, the students were taking infectious diseases (65 hours), their fourth course in osteopathic theory and methods (30 hours), their second course in pathology (100 hours), their first course in pharmacology (60 hours), and medical ethics and jurisprudence (10 hours). The CACC-SOAP note exercise was a small portion of the total points students needed to successfully complete the infectious diseases course (10 of 610).

Choice of technology

The CACC was written as a collection of linked HTML documents that were created using Netscape Communicator. One clinician, one basic scientist, and a person from Educational Development and Services served as consultants. A Windows NT server running IIS was used to share the case with consultants during development and to disseminate the CACC to the students. Students used personal laptop computers, various Macintosh desktop computers, and IBM-compatible desktop computers available in the KCOM library to view the CACC.

General design

A single, patient-encounter CACC exercise (<http://www.kcom.edu/faculty/chamberlain/Website/Sparks/default.htm>) was developed to emphasize data collection and encourage integration of basic science principles with osteopathic principles. Further details on the design of a CACC have been described previously.² The CACC "patient" presented to the students with signs and symptoms consistent with chronic pneumonia.

Students were required to submit a SOAP note. The SOAP notes were to include the CACC patient's history, physical examination, chest radiograph (posteroanterior view), and arterial blood gas results.

Certain infectious disease principles were taught exclusively using this tech-

nique in the infectious diseases course. Osteopathic treatments, including treatment of the lymphatics, somatic dysfunctions, and autonomic nervous system (sympathetic and parasympathetic nerves), had been discussed in a previous OMT course, though application of these techniques to specific diseases had not been thoroughly discussed.

Logistics

Students were given 2 weeks to complete the CACC-SOAP note assignment. No instructions were given on how to complete a SOAP note during the infectious diseases course, as the students had received those instructions 6 months previously. Instruction culminated with recording SOAP notes on two different simulated patients. When students asked about SOAP note preparation, they were told to go to their notes or to consult with a faculty physician. After 2 weeks, students were required to hand in their SOAP notes. All students met this deadline.

Students' attitudes and assessment of the CACC-SOAP note exercise

A questionnaire was given to the students. One hundred thirty-seven (97.2%) students turned in the questionnaire, which included several statements and a numeric measure of agreement with each statement. A Likert scale of 1 to 5 was chosen (1 = strongly disagree, 5 = strongly agree). The statements sought to determine the students' attitudes toward the exercise and whether the exercise integrated osteopathic and basic science principles. Mean values and standard errors of the mean were obtained for these statements.

The assignment also required students' completion of a short essay. The essay question sought to determine if the case led the students to integrate basic science knowledge with osteopathic principles.

Students' ability to record the CACC patient's structural examination and OMT plan

The objective portions and the management plans in the SOAP notes were used

to assess the students' ability to record the patient's structural examination findings and their OMT plan. The CACC patient's structural examination findings were given to the students and were as follows: "Cervical, thoracic, and lumbar curvatures are normal; no scoliosis noted. Palpation of the thoracic region revealed tissue texture changes bilaterally at T2-T5 that were cold, dry, andropy. The red reflex test demonstrated rapid left-sided blanching of T3-T5 and right-sided rapid flare followed by pronounced blanching at T4-T5. Further palpation revealed dry and cool skin texture at T2-T5. Motion testing revealed resistance to right rotation T1-T5 as well."

The objective portion of the students' SOAP notes was examined to see if the structural examination findings were present. The management plans of the students' SOAP notes were then examined to determine if OMT was included. A clinician from the OMM department (H.Y.) then analyzed the students' OMT plans using a Likert scale of 1 to 5. A score of 1 indicated the student's plan was excellent (well above the student's level of experience), and a score of 5 indicated the student's OMT plan was poor (well below the student's expected level of experience). The scores of the students that included an OMT plan were then averaged. Scoring criteria were based in part on whether the student for their level of expertise suggested treatment of the following: specific somatic dysfunctions, the lymphatics, and the autonomic nervous system.

Results

Students' attitudes toward the CACC-SOAP note exercise

A considerable amount of time (2 to 4 hours) was required of students to complete the CACC-SOAP note exercise. Few points (10) were given for this exercise when compared with the total number of points in the infectious diseases course (610). Of the 141 students who submitted SOAP notes, 137 also turned in the questionnaire.

The students agreed (4.05 ± 0.081) that the exercise was useful to them as

future physicians. The students also agreed with the statement that this exercise integrated different classes they had taken in medical school (3.84 ± 0.082).

When asked which classes they thought the CACC integrated, 96 (70%) of the 137 students listed various courses. Nine different discipline-based medical school courses were mentioned: pathology (62 responses; 65%); osteopathic theory and methods (59 responses; 61%); microbiology (45 responses; 47%); infectious diseases (31 responses; 32%); physiology (25 responses; 26%); pharmacology (19 responses; 20%); physical examination skills (17 responses; 18%); histology (8 responses; 8.3%); and anatomy (2 responses; 2.1%). An average of 2.81 ± 0.11 courses were mentioned per responding student.

Assessment of students' performance recording the patient's structural examination

The objective portion of the students' SOAP notes was examined for the presence of structural examination findings. Only 9 (6.4%) students omitted the findings of the structural examination in their SOAP note. Of those 9 students, 5 also omitted an OMT plan. One of the 9 students wanted an OMM consult, and 3 developed an OMT plan.

Assessment of students' performance in recording an OMT plan

The OMT plans of the students were assessed. Seventy-two (51%) students did not include an OMT plan in their SOAP note. Sixty-three (88%) of these 72 students made no mention of an OMT plan for the patient. Eight (11%) of these 72 students asked for an OMM consult. One of these 72 students was unsure if OMT was needed. These students were not given a score.

The 69 (49%) remaining students developed an OMT plan. A faculty member from the OMM department scored the 69 treatment plans. The average score obtained by the students was 2.65 ± 0.113 (Likert scale from 1 to 5: 1 = excellent, 5 = poor).

To determine which aspects of OMT

students were most likely to omit, student plans were examined further. The following areas of the CACC patient were considered important: treatment of specific somatic dysfunctions; treatment of the lymphatics; and treatment of the autonomic nervous system.

Of the 69 students who developed OMT plans, 7 (10%) mentioned treatments for all three areas. Thirty-one (45%) students included treating 2 of the 3 areas, and 31 (45%) students mentioned treating 1 of the 3 areas.

Of the students who suggested treating 1 of 3 of the CACC patient's structural problems, 24 (77.4%) suggested treatment of the lymphatics, 6 (19.6%) suggested treating the somatic dysfunctions, and 1 (3%) suggested treating the autonomic nervous system. Of the students who suggested treating 2 of 3 of the CACC patient's structural problems, 29 (93%) suggested treating the somatic dysfunctions and the lymphatics, 1 (3%) suggested treating the somatic dysfunctions and the autonomic nervous system, and 1 (3%) suggested treating the lymphatics and the autonomic nervous system.

The most frequently stated aspect of OMT involved opening of the CACC patient's lymphatics (60 students; 87%). Forty-two (61%) students suggested treatments for the somatic dysfunctions, and 11 students (16%) suggested treatments for the autonomic nervous system.

Discussion

Incorporation of palpatory assessment and manipulative treatment of structural problems in patient care is an important distinction of the osteopathic philosophy. Unfortunately, studies indicate that recent graduates are less likely to apply OMT in caring for patients.^{2,3} The osteopathic medical students of today are the osteopathic physicians of tomorrow, and how medical students view and apply the manipulative aspect of patient care will have an effect on the distinctiveness of osteopathic medicine.

Surveys used to determine students' attitudes toward osteopathic theory and methods are one way of assessing stu-

dents' application of manipulative management with their patients. Miller⁷ determined that faculty role models were important in the development of students' attitudes and intentions regarding OMT and that students depend on informal sources of OMT information (other students) more than formal sources of OMT information (American Osteopathic Association). Although useful in determining reasons for applying or not applying OMT in patient care, surveys cannot determine if medical students are actually applying OMT in clinical situations.

One way to assess students' application of OMT in clinical situations is to place them in the clinical environment and evaluate the treatment plans the student physicians formulate. Unfortunately, this can be time-consuming and expensive, especially if the students are located in many different regions of the country during their clerkships.

CACC-SOAP note exercises do not appear to be as costly or time-consuming. The total faculty time needed to complete the CACC-SOAP note exercise was about 69 hours. One faculty member designed, disseminated, and graded the exercise. Evaluation of the CACC, creation of an expert SOAP note, and generation of a questionnaire involved four other faculty members. In most cases, the other faculty members spent about 2 hours on the exercise. The average SOAP note required 15 minutes to grade (35 total hours). Design and revision of the CACC required about 25 hours. Only 1 hour was required to assist students who had difficulty during the assignment. Potentially, students in clerkships anywhere in the world could be asked to complete a Web-based CACC exercise and submit their SOAP notes to the appropriate faculty member(s) for assessment.

The aim of this study was to provide students with an active learning experience that would allow us to evaluate students' application of OMT in the treatment of a CACC patient. This particular patient's illness was chosen because several manipulative methods are available to treat chronic pneumonia. By placing

the CACC-SOAP note exercise in the infectious diseases course, students would be less likely to "perform" for the OMM faculty and we could better assess students' application of OMT in treating a patient.

If, however, the students regard the CACC-SOAP note exercise as another boring task to complete, then analysis of the CACC-SOAP note exercise would be useless. Therefore, a questionnaire was used to determine the students' attitudes toward the exercise. This analysis revealed positive student attitudes toward the exercise. The students also believed that the CACC-SOAP note exercise helped them to better integrate their spheres of knowledge.

During the exercise, students were encouraged by the microbiology/immunology faculty member (N.C.) to include osteopathic approaches to care of the CACC patient. A faculty member from the OMM department (H.Y.) incorporated somatic dysfunctions in the structural examination findings (refer to methods section) to encourage use of osteopathic assessment and OMT. Including these elements in the CACC-SOAP exercise encouraged students to begin applying their knowledge of OMT. When asked which courses the CACC integrated, 61% of those that responded indicated that the case required knowledge of osteopathic theory and methods even though the case was administered during the infectious disease course. Another indication that the students were beginning to apply their osteopathic knowledge was the fact that 94% of the students included the findings of the structural examination in the objective portion of their SOAP notes.

We then assessed our students' application of osteopathic knowledge by identifying how many students included OMT in their treatment plans. Unfortunately, a significant number of the students (72; 51%) omitted OMT in their treatment plans. This may indicate that the students are willing to acknowledge the structural examination findings but have yet to realize the utility of applying these findings to patient care.

A significant number of the students

(69; 49%) placed OMT in their treatment plans. These students performed at the expected level of student experience (average score, 2.65 ± 0.113) when scored by a faculty member in the OMM department. Several students (9; 13%) performed well above expected levels of performance for students in the first quarter of their second year. Further analysis of their treatment plans indicates that the students were more likely to suggest treatments involving the lymphatics (87%) and somatic dysfunctions (61%) but were less likely to suggest treatments for the autonomic nervous system (16%).

The students believed that the CACC-SOAP note exercise was engaging and required them to integrate their osteopathic knowledge. Unfortunately, 51% of the students omitted OMT in their treatment plans, even though 94% included structural findings in the objective section of their SOAP notes. The CACC-SOAP note exercise seems to be useful in determining which students are ready to apply their OMT knowledge and in determining what types of OMT the students are able to identify in caring for a patient.

These data may indicate the present willingness of students to apply osteopathic concepts in patient care. If students less likely to apply OMT during the CACC-SOAP note exercise are also less likely to use OMT during their clinical years, then CACC-SOAP note exercises could be useful in predicting the potential of osteopathic students to administer OMT during their clinical years. To better assess this, prospective studies can be designed, using CACC-SOAP note exercises to identify students who do and do not apply OMT in treating the CACC patient. The students could then be followed up during their clerkships, internships, residencies, and when they begin their own practice to see if results from the CACC-SOAP note exercises correlate with their use of OMT in clinical practice.

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