A Case Completion Curriculum for Clinical Dental Education: Replacing Numerical Requirements with Patient-Based Comprehensive Care


Abstract: The aim of this article is to describe the development and implementation of a case completion curriculum as a new clinical education model for the predoctoral program at Harvard School of Dental Medicine. In this innovative model, students conduct patient-based comprehensive care and complete assigned patient cases on which their performance is assessed, in contrast with a traditional model based on procedural numerical requirements. In our new model, senior tutors, who are full-time faculty members, act as group leaders responsible for patient assignment, treatment planning, monitoring of student performance, and verification of patient care. The number of completed patient cases in this new comprehensive care system increased from a previous average of 12.8 cases per student prior to graduation to 22.8 cases. Additionally, the number of patients who had to be transferred due to outstanding or pending treatment when their student provider graduated or because of students’ need to fulfill discipline requirements has decreased from an average of 16.4 to 4.6.

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In 2002, the Harvard Medical School (HMS) and the Harvard School of Dental Medicine (HSDM) began a comprehensive review of the New Pathway hybrid problem-based learning curriculum implemented at HMS in 1986 and at HSDM in 1994. As a result, HMS and HSDM introduced a new curriculum in 2006, and as part of its review, the clinical threshold or numerical-based assessment system at HSDM was found to have problems. Subsequently, a case completion curriculum (CCC) was developed in the summer of 2009 as a component of the reformed predoctoral curriculum for fourth-year dental students. The purpose of redesigning the clinical component of the curriculum was to achieve a patient-based comprehensive care environment in the student teaching practice.

The benefits of a comprehensive care patient delivery system have been widely acknowledged and are being implemented in a number of dental schools. More than half of the dental schools in North America claimed to be using a “Primarily Comprehensive Care” model even back in 1997; however, there is wide variation regarding the definition and application of comprehensive care. While students in many schools are expected to perform treatment in a comprehensive care clinic, only a few have students completing comprehensive treatment plans.

Concerns at HSDM surfaced upon a closer look at the traditional numerical procedural requirement system, even though responsibility for patient care had been emphasized for at least the past couple of decades. The traditional form of the clinical curriculum has insisted that students meet procedural requirements for discipline-specific guidelines as part of dental schools’ assessment of students’ competence and their ability to meet criteria for graduation. However, this teaching model has consequently encouraged student- and faculty-driven patient care rather than patient-centered care, thus posing a chal-
The previous clinical curriculum at HSDM required students to meet numerical procedural thresholds assigned for each discipline as part of the competency assessment required for graduation. Issues that arose from this system centered on its inability to motivate students to provide comprehensive patient care and the likelihood that care of a patient would be discontinued once a student’s minimum numerical thresholds were met. These issues resulted in underutilization of the clinic sessions, reduced student productivity, loss of learning opportunities, frequent transfer of patients among students seeking to satisfy discipline-specific procedural requirements, and incomplete cases when students graduated.

To address these problems, the new objectives developed for the CCC were driven by an emphasis on treatment planning and the delivery of comprehensive care. To meet these objectives, the student teaching practice became committed to the comprehensive care model, in which students were encouraged to perform quality patient care and to learn the importance of patient management. Another important driver of this change was the desire to refocus learning on meeting the treatment needs of patients rather than the requirements of students.

### The New Clinical Model

To support the new model, a case classification system and case selection criteria were developed for use as tools to emphasize multidisciplinary learning. Cases are now assigned and planned by the difficulty and duration of treatment required according to the Case Classification System (see Table 1), and students are expected to complete all of the sequential treatment plans in their patient lists. The Case Selection Criteria define the required number of completed cases and composition of cases in a student’s patient caseload (see Table 2).

When HSDM introduced problem-based learning (PBL) into the D.M.D. curriculum in 1994, treatment teams were developed as small practice groups with senior tutors as team leaders or managers in team operations. Since then, students have been

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### Table 1. The new Harvard School of Dental Medicine clinical Case Classification System, by case type and typical procedures for each

<table>
<thead>
<tr>
<th>Case Type</th>
<th>Procedures</th>
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<tbody>
<tr>
<td>1</td>
<td>Preventive therapies, simple operative procedures, prophylaxis, and scaling and root planing</td>
</tr>
<tr>
<td>2</td>
<td>Interdisciplinary management (endodontics, periodontal surgery, oral surgery, etc.) and complex restorative procedures, not including prosthodontic treatment</td>
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<tr>
<td>3</td>
<td>Interdisciplinary management and restorative procedures, including prosthodontic treatment (fewer than three fixed prosthodontic units)</td>
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<tr>
<td>4</td>
<td>Complex interdisciplinary management (four or more disciplines) and restorative procedures including prosthodontic treatment (three or more fixed prosthodontic units) or difficult patient management</td>
</tr>
<tr>
<td>5</td>
<td>Removable partial dentures (metal and resin)</td>
</tr>
<tr>
<td>6</td>
<td>Complete dentures, immediate complete dentures, overdentures, and implant supported overdentures</td>
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### Table 2. Case Selection Criteria for composition of a student’s caseload and minimum requirements for passing and honors levels

<table>
<thead>
<tr>
<th>Minimum Requirements</th>
<th>Case Composition</th>
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<tbody>
<tr>
<td>Pass: 15 cases</td>
<td>Maximum of seven cases consisting of Type 1 and 2 cases</td>
</tr>
<tr>
<td></td>
<td>Minimum of four Type 3 and 4 cases (one of which must be Type 4)</td>
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<tr>
<td></td>
<td>Minimum of four Type 5 and 6 cases (must consist of both types)</td>
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<tr>
<td>Honors: 20 cases</td>
<td>Maximum of nine cases consisting of Type 1 and 2 cases</td>
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<td></td>
<td>Minimum of six Type 3 and 4 cases (two of which must be Type 4)</td>
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<tr>
<td></td>
<td>Minimum of five Type 5 and 6 cases (must consist of both types)</td>
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assigned to a Society (with the names of Cannon, Castle, Holmes, and Peabody) when they enter dental school in a generally random process. The society structure was adapted from that of Harvard Medical School, where dental students experience most of their education during their first two years, so the society names parallel those at the medical school to allow for easier transition to students’ third and fourth years in the dental school. The society approach is designed to support small-group learning in tutorials and to promote faculty mentoring of students regarding academic, professional, and personal issues. The four senior tutors for the four teams (Cannon, Castle, Holmes, and Peabody Societies) therefore became responsible for overseeing student progress and patient care in the new model. During the baseline year of 2008–09, the senior tutors were two general dentists and two prosthodontists. In 2009–10, when the new system was fully implemented, the senior tutors were two general dentists, one prosthodontist, and one pediatric dentist.

At HSDM, the senior tutors are full-time faculty members whose responsibilities include managing the clinical education of predoctoral dental students, monitoring student progress through all phases of the clinical years of the program, and ensuring the delivery of comprehensive dental care to patients in the student teaching practice. Each of the four senior tutors heads a treatment team consisting of eighteen to twenty third- and fourth-year predoctoral students and serves as mentor, facilitator, coach, and teacher in the multidisciplinary clinical teaching program. In conjunction with core clinical faculty members from the various clinical disciplines, the senior tutors balance case loads among students to ensure they have a multidisciplinary experience, provide formal approval of treatment plans, track the status of treatment plans, follow the clinical progress of students, and supervise students on the clinic floor.

Treatment planning is probably the most complex and important part of overall patient care. Under the new model at HSDM, a strong emphasis is placed on treatment planning in the third- and fourth-year clinical curriculum. Students are responsible for treatment planning and exhibiting thoroughness and understanding in documenting and presenting a case based on both clinical and radiographic findings that are confirmed by the clinical faculty. The treatment plan includes a comprehensive, sequential listing of all treatment to be performed and correlates all phases of dental treatment with factors regarding the patient’s medical and socioeconomic status. All students’ treatment plans (ideal and alternative plans) are reviewed and approved by a senior tutor prior to seeking patient acceptance. Treatment plans that require referrals for advanced care are also reviewed and approved by a senior tutor prior to referring the patient to such specialty programs as endodontics, periodontics, and oral surgery. Prior to initiation of any procedure on the clinic floor, the student’s approved and accepted treatment plan is checked by the supervising faculty member to ensure that the treatment plan is being followed.

The senior tutors review students’ cases from their third year prior to their promotion to the fourth year and determine the cases that require case completion. Each third-year student has approximately twenty to thirty patients on his or her list. In addition to their existing patient pool, transfer patients from the previous graduating class are assigned to third-year students depending on their individual needs and progress. Students continue to receive additional patients during their fourth year through new patient intake, recall rotations, emergency rotations, and personal referrals. Assignments through new patient intake are made randomly although senior tutors can use their discretion in assigning transfer patient cases in order to expose individual students to various disciplines, procedures, and experiences.

Cases requiring completion involve those patients who have received treatment during students’ third and fourth years. However, more complex patient treatment may require longer periods to complete, especially when unforeseen circumstances arise due to poor patient compliance or patients’ financial constraints. Patients who become inactive for any reason must receive written notification, and the senior tutors and the Office of Clinical Affairs must be notified so that these cases are documented appropriately. Transfer of cases to other students in the Student Teaching Practice is allowed only upon the senior tutors’ approval.

In summer 2009, at the same time the new comprehensive care model was being introduced, the school adopted a new clinic information system, axiUm (Exan Enterprise Inc., Las Vegas, NV), which enabled the creation of electronic health records (EHRs). This EHR system facilitated record-keeping for patients’ comprehensive examination, history, diagnosis, treatment planning, and other records; scheduling of appointments; laboratory tracking; and a myriad of student productivity and patient progress.
report capabilities. These functions allowed the senior tutors to incorporate an increased emphasis on practice management into student team operations. In addition to monitoring patient care and the academic progress of each student, senior tutors now also discuss practice management issues in meetings with students. These include patient management, production goals, collection issues, dealing with noncompliant patients, and other business matters. The senior tutors also work with the teaching practice clinic manager and patient care representative to ensure the smooth operation of the clinic; monitor productivity, income, and expenditures; and produce quarterly and annual reports.

**Initial Outcomes and Lessons Learned**

The results and feedback from the first full year of the new clinical curriculum have been positive and encouraging. The role of the senior tutors has been pivotal in mentoring students and monitoring their progress as well as overseeing the daily operations of comprehensive patient care, facilitated by the new EHR system’s organization of information on patient care activities and student performance.

Comprehensive care case management has improved as a result. The total number of patient cases in which students provided complete comprehensive care prior to graduation increased considerably from an average of 12.8 cases per student for the Class of 2009 to 22.8 cases per student for the Class of 2010. In addition, the number of cases that required transfer to a classmate or to the third-year class due to scheduling or graduation has decreased from 16.4 cases to 4.6 cases per student per year (Table 3). Table 4 shows the number of cases students completed as defined by the case classification system for 2009–10. A reduction in instances of shared patient cases and of patients who were in between treatments due to neglect has also been observed since the implementation of the new model. Eventually, this could translate into a decrease in the number of remakes in the dental school clinic.

Careful monitoring of patient cases has been essential to the success of the new curriculum. The senior tutors monitor the students closely and continue to meet with them individually and in teams during the fourth year to discuss patient care and prognosis. A Final Case Review is performed for each patient case prior to students’ graduation to verify that all care has been completed as described in the treatment plan; acceptability is determined using the Case Selection Criteria. Each student meets with his or her senior tutor to confirm completion of cases and to evaluate the need for patient transfer, inactivation, or placement on the recall system. This is a time-consuming process intended as a final check as part of an exit interview for graduating students.

During these sessions, any outstanding or pending treatment needs are further discussed. The EHR has facilitated this case review process overall by enhancing the participants’ ability to monitor case progress and completion. Once all the components of the treatment plan are completed, a case completion note is added to the EHR by the senior tutor, and the patient is placed on recall for routine hygiene visits.

It should be noted that the class size at HSDM is small compared to other dental schools in the United States and we believe this may have had an impact...
on the overall success of this new curriculum. As a result, the application of such a model in a larger institution may require modifications since the need for mentoring and management of both students and patients is significantly greater with this curriculum than that under the procedural requirements system.

The fourth-year case presentations have been very useful in providing a forum for students to confirm and demonstrate their completion of cases as they present cases to faculty members and students. Also, this forum is another means by which the faculty evaluate students’ comprehensive treatment planning skills. For their presentations, students select a case of a patient who had treatment needs involving more than one area of dentistry. Students are evaluated on whether the patient’s treatment needs were satisfied within the scope of comprehensive treatment planning and care. Each student presents a patient on whom all or the majority of treatment has been completed as these exercises have taken place throughout the fourth year. It is an opportunity for sharing their learning experiences in clinical dentistry and discussing the problems they have encountered in patient care. It also provides students with additional experience in presenting cases, with emphasis on comprehensive examination, history, diagnosis, and treatment planning, while demonstrating an understanding of the ramifications of systemic illness on oral health. Classmates, full-time faculty members from each specialty field, and the senior tutors attend the presentations. The students are expected to obtain a grade of pass as part of their criteria for graduation. In addition, the successful completion of summative evaluations of prostodontic cases under the supervision of the discipline director and of the comprehensive clinical exam (which evaluates students’ clinical competence in the areas of operative dentistry, endodontics, and periodontics) serves as an assessment of competence.

Faculty members in the past had observed that fourth-year students sometimes became disengaged in clinical activities after meeting their discipline-specific requirements and tended to transfer their simple cases to third-year students. Through this new clinical curriculum, students are made aware at the beginning that they must complete a specified caseload that includes more simple (Type 1, 2, and 3) cases as well as more complex (Type 4, 5, and 6) cases with the goal of increasing clinical production and attendance. Assessing our success in this area will be a research topic for the future.

Overall, shifting the focus from numerical procedural requirements to case completions of assigned cases has increased the number of completed cases and ensured continuity of care. The average number of case completions for the Class of 2010 was twenty-two even though the guideline was fifteen. Although modifications will continue to be made to strengthen student education and patient care, we believe reaching an even higher level may be feasible. Generally, students have been able to perform treatment on patients in their assigned patient pools for discipline-specific summative exams; when this has not been possible, the senior tutors have intervened to assign a transfer case to meet the student’s specific situation. In some instances, the senior tutors have allowed sharing of patients to help students fulfill certain procedures; however, in those cases, students could not receive case completion credit. Perhaps a constructive model for these experiences could be formulated to help students meet summative requirements when necessary since patient assignments still remain largely random.

Conclusions

The new case completion curriculum for clinical education at HSDM has encouraged students to perform comprehensive care and instilled in them a greater level of commitment to and responsibility for completing treatment plans. There has been less need for patient transfers among students, as well as smoother transitions when student providers graduate. This clinical education model also helps students both learn the importance of and gain hands-on experience in patient management that will serve them well when they enter professional practice.

REFERENCES