Transformation of a Dental School’s Clinical Assessment System Through Kotter’s Eight-Step Change Process


Abstract: A revision of the clinical assessment system of the University of Puerto Rico School of Dental Medicine was initiated in 2007, with the goal of achieving a system that would be fully understood and used by both faculty and students to improve student performance throughout the curriculum. The transformation process was organized according to Kotter’s Eight-Step Change Model. Some of the initial findings in 2007 were as follows: 87 percent of current daily clinical evaluations were scored at the scale’s highest level, 33 percent of faculty members lacked knowledge of the evaluation system, and 60 percent of students reported that faculty members were not well calibrated. As a result of the transformation process, a pilot project has been implemented in the comprehensive clinical course for senior students. The revised assessment methods utilized are verbal daily feedback, clinical evaluations once every three months, a digital portfolio, and competency exams. There is also a productivity component included in the course grade. We conclude that adapting Kotter’s model for use in the transformation process has been very useful; gaining support from both the administration and faculty has been essential; and the provision of continuous faculty development activities has been empowering. The American Dental Education Association Commission on Change and Innovation in Dental Education (ADEA CCI) Liaisons at the University of Puerto Rico School of Dental Medicine have been effective in producing a greater awareness among the faculty about the value of the competency-based curriculum and the need for change.

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The University of Puerto Rico (UPR) School of Dental Medicine is part of the Medical Sciences Campus, located in the metropolitan San Juan area of Puerto Rico. This is one of the main campuses of the only public university, also the largest and most prestigious, on the island. Invariably, the institution is affected by the island’s political and economical situation, aside from its cultural heritage. The school, which recently celebrated its fiftieth anniversary, is the only dental school on the island. It is fully accredited by the American Dental Association (ADA) and is a member of the American Dental Education Association (ADEA).

Like many other higher education institutions, the UPR School of Dental Medicine has been resistant to change.1 Although periodic curricular revisions have been undertaken, there has been reluctance to modify the assessment systems, especially those related to clinical assessment. The clinical assessment system, since the opening of the school, had been based on daily evaluations and numeric procedural requirements, but the school implemented a curriculum organized around thirty-two competencies in the 1986–87 academic year. Then, in 1990, a new student clinical assessment system was implemented that introduced the use of rubrics (scoring guides to evaluate a student’s performance). Rubrics were prepared for each clinical procedure based on a 0–3 scale, in which levels 0 and 1 represented nonacceptable performance and 2 and 3 represented acceptable performance. In this system, grades were determined according to the patterns of scores obtained by the students. The patterns were determined for each clinical area.

On April 17, 1996, the faculty approved a motion to revise the Doctor of Dental Medicine program curriculum. For the new curriculum, a document of thirteen competencies was developed, describing the knowledge, skills, and values a graduate must possess to be able to practice general dentistry. For
this curriculum, comprehensive patient care was adopted as a philosophy. The new curriculum was initiated in the 2003–04 academic year. The clinical assessment system did not vary significantly in this revision although competency exams were introduced in various clinical areas and a few years ago a computer program was established for faculty members to enter student evaluations daily that the program then translates into a grade.

In 2006, the curriculum committee of the school identified the clinical assessment system as an area in the curriculum needing revision. The general perception among both faculty and students was that the system was not being used optimally: the assessment methods were not truly competency-based; the faculty resisted use of the computer program and rubrics; and the majority of the daily evaluations consisted indiscriminately of the highest available number on the scale. The task of initiating this revision was assigned to the school’s ADEA Commission on Change and Innovation in Dental Education (ADEA CCI) Liaisons.

The ADEA CCI was created in 2005, & and liaisons in dental schools were later identified to provide a network for information about new educational developments and assessment strategies in dental education.3,4 In 2007, the liaisons began meeting formally and were encouraged by the ADEA CCI to develop curriculum enhancement projects at their schools.

The liaisons at the University of Puerto Rico School of Dental Medicine were appointed in 2007. This group, with the help of the assistant dean for academic affairs, selected the transformation of the clinical assessment system as its curricular project. The change desired was the following: to achieve truly competency-based assessment, to improve the faculty’s understanding and use of assessment strategies and instruments, and to develop assessment instruments that discriminate a student’s level of performance. The purpose was to align the assessment strategies with the school’s competency-based curriculum.

Methodology

Creating change and organizing the project presented a challenging task for the ADEA CCI Liaisons at the UPR. Kotter’s Eight-Step Change Model was selected to help in developing and organizing the project. The model consists of these steps: establishing a sense of urgency, forming a powerful coalition, creating a vision, communicating the vision, empowering others to act on the vision, planning for and creating short-term wins, consolidating improvements and producing still more change, and institutionalizing new approaches.5,6 After reading Kotter’s analysis of why transformation efforts had failed in various companies, the liaisons found similarities in the dental school environment. The group decided to adapt the eight-step model for use in the transformation of the clinical assessment system. For each step, a plan of specific activities was outlined and then carried out (Table 1).

The transformation process was designed to include the entire faculty as stakeholders in the process. The intention was to be certain that faculty members understood and saw the revised system as their own, one in which they have full access and participation. This stakeholder vision might result in an improved effectiveness, appropriate and increased use by the faculty, and an increased satisfaction of the students.

Establishing a Sense of Urgency

The first step in Kotter’s model is establishing a sense of urgency. It was crucial that the school’s administration and faculty understood that a real change was necessary in the way students were being evaluated in the clinic. It was also important that everyone knew that dental education was undergoing needed changes across the nation. For this first step, information was gathered from various sources. This included articles dealing with change in dental education,7-12 a faculty survey regarding the current clinical assessment system, a student survey, all clinical course syllabi, and an analysis of all the assessment system’s components. As the liaisons began collecting information related to the project, they became aware of developments at the national level, further urging that the matter be addressed. These developments included an updated set of ADEA’s Competencies for the New General Dentist,13 a revision of the accreditation standards, and an increased emphasis on cultivating students’ capacity for critical thinking and self-assessment.

The liaisons’ purpose, role, and project for the school were presented to the dean, staff, and faculty in small and large meetings. Two Lunch and Learn activities were offered for the faculty in which articles recommended by the ADEA CCI were discussed. These were “The Case for Change in Dental Education,”7 “Dealing with the Future Now,”12 “The Dental Education Environment,”18 and “Educational Strate-
gies Associated with the Development of Problem-Solving, Critical Thinking, and Self-Directed Learning.” A fruitful discussion of these articles ensued, exposing the urgent need for change.

An online questionnaire regarding the clinical assessment system was prepared and sent by e-mail to all faculty members involved in the clinical evaluation of students. Five areas of interest were included in the survey: rubrics for clinical evaluation, performance patterns, the computerized clinical system (ACO), competency examinations, and portfolio (Figure 1). Faculty participation in the survey was 72 percent. Survey results indicated a lack of knowledge and confusion among the faculty in all five areas addressed. Faculty members also found the computerized system too time-consuming.

An analysis of the previous year’s evaluations for third- and fourth-year students revealed that 87 percent of the scores were at the highest level on the scale and 12 percent were at the second highest (Figure 2). A 2005–06 student satisfaction survey was also analyzed, in which the students reported some dissatisfaction with faculty feedback (Figure 3) and calibration (Figure 4). As part of the project, the liaisons conducted an analysis of the clinical course syllabi that revealed a need to integrate critical thinking, evidence-based dentistry, and multiple assessments methods, as well as the need to focus student learning on the development of competencies. In general, the results indicated a lack of knowledge about the components of the clinical assessment system, a lack of motivation, a resistance to use the system correctly, a need for some documents and examinations to focus on competencies, and a need for inclusion of critical thinking, evidence-based dentistry, adequate student feedback, and multiple assessment methods focusing on student learning.

The results of the analysis were presented to and discussed with the dean and academic administrators, as well as with the faculty in various meetings. To generate the greatest participation in these meetings, continuing education credits and meals were given to faculty members. A lively discussion was generated in these meetings, revealing an awareness of the need for change.

**Forming a Powerful Coalition**

The purpose of the second step of Kotter’s model is to create a group with enough power to lead the change effort who will work together as a team. The dean had already charged four faculty members (the ADEA CCI Liaisons) as the group in charge of the transformation process. However, it was necessary to have the support of the dean’s staff and the liaisons’ department chairs.

The liaisons made a presentation to the dean and her staff regarding the goals and purpose of the project in order to gain the support of the school’s administration. Being able to present a solid plan for the project, organized according to the Kotter model, helped the liaisons gain credibility and the needed support. Protected time (one weekly period) was negotiated with the department chairs for faculty time to work on the project. Throughout the process, the administration supported the liaisons’ efforts.

**Creating a Vision**

The third step is creating a vision of change. The vision of the clinical assessment system incorporated the various aspects of the system that had been identified as critical and requiring change. The vision statement was the following:

The clinical assessment system of the UPR School of Dental Medicine will be fully understood and thoroughly used by both faculty and students to improve student performance throughout the curriculum. The system will utilize well-defined criteria and instruments, be based on the school’s competencies, promote critical thinking, self-assessment, and self-directed learning, be used in the clinical and preclinical dental classes of the undergraduate curriculum, and facilitate faculty calibration.

The liaisons found it helpful to create a logo with a slogan to be used in all communications with faculty. The logo had change as its main message: “It’s time to rethink and change” (Figure 5).

**Communicating the Vision**

The fourth step is communicating the vision. One important goal of the project was to have faculty exposed to the transformation and understand it as much as possible. Communication of all aspects was critical. An intensive use of the vision and logo was begun, as well as the coordination of many faculty meetings. The idea was to immerse the faculty in the project. Both the vision and logo were used during all the presentations and messages to faculty members. A webpage (http://dental.rcm.upr.edu/adea-cci.html) was created with a link from the main
<table>
<thead>
<tr>
<th>Kotter's Eight Steps</th>
<th>Transformation Activities</th>
<th>Outcomes</th>
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| Establishing a Sense of Urgency | • Lunch and Learns with faculty to discuss ADEA CCI white papers  
• Faculty needs assessment survey about clinical assessment system  
• Collection of data from computer program (ACO) about use of system by faculty  
• Analysis of data from survey of students about their perceptions of clinical evaluations  
• Analysis of clinical course syllabi  
• Presentation of findings to dean and staff and to the faculty | • Awareness by the faculty of changes in dental education and need for change in the school's clinical assessment system  
• Data revealed justification for changes in clinical assessment system:  
  ◦ Lack of knowledge of different components of system  
  ◦ Lack of motivation  
  ◦ Resistance to use the system  
  ◦ Need to focus assessment on competencies  
  ◦ Need for inclusion of critical thinking and evidence-based dentistry  
  ◦ Some syllabi lacked adequate documentation of assessment methods | |
| Forming a Powerful Coalition | • ADEA CCI Liaisons: 4 faculty members and 1 assistant dean  
• Weekly meetings  
• Gaining dean and staff support  
• Gaining faculty support | • Support of the school’s administration  
• Support of supervisors  
• Gaining of credibility through development of solid plan for the project | |
| Creating a Vision | • Creation of vision  
• Creation of logo | • Clear goal for understanding the transformation process | |
| Communicating the Vision | • Logo and vision in all communications and presentations  
• Faculty meetings  
• E-mail reminders  
• Creation of UPR ADEA CCI webpage  
• Role modeling | • Promotion of transformation among peers  
• Create awareness of the goal  
• Participation of faculty in the transformation process | |
| Empowering Others to Act on the Vision | • Annual Faculty Workshop 2008 based on transformation  
• Selection of group of faculty members as leaders for pilot project  
• Training to prepare the faculty and students  
• Strategies for eliminating obstacles | • Improvement of understanding by faculty of assessment methods  
• Creation of new leaders  
• Elimination of obstacles  
• Reorganization of competency examinations  
• Transformation of methods used for evaluation of the competencies | |
Role modeling was another important element of communicating the vision. The liaisons were committed to role model the attitude towards the assessment system that was desired from the rest of the faculty. The liaisons took the initiative by revising the assessment components of their own clinical courses, actively participating in the various phases of the project, and promoting the transformation among their peers. They were also available to answer questions and speak to doubts about the assessment methods and the transformation process.

Empowering Others to Act on the Vision

The fifth step is empowering others to act on the vision. Kotter advocates getting rid of obstacles, changing structures that undermine the vision, and encouraging risk-taking and nontraditional activities. A lot of time and effort was put into faculty empowerment. The activities included training during Lunch and Learns, workshops, and faculty meetings and the selection of a group of faculty leaders to work on the reorganization of the competency examinations. For the training sessions, continuing education credits and meals were again offered as incentives to participation.

At this time of the process, the liaisons participated in the 2008 ADEA CCI Liaisons’ Summer Meeting in Chicago, where assessment methods and assessment of competencies were emphasized. The school’s Office of Academic Affairs organized a faculty workshop at the beginning of the academic year, using information presented at the Chicago meeting. The topics and exercises included review of the concepts of competencies and rubrics, presentation of different methods of assessments, and the pilot project for the senior students’ clinical assessment. Group exercises were done with the faculty to begin a transformation in the methods used for the evaluation of competencies, specifically those related to the examinations, and to develop adequate rubrics for this purpose. Creative new ideas for harmonizing the assessment methods with the competency-based curriculum were suggested by the faculty groups participating in the workshop. The ideas were prepared in writing in the form of tables, and rubrics were drafted according to the proposed tests.
After this workshop, faculty leaders from each department were selected to continue the work begun in the faculty workshop. This group was charged with the reorganization of the competency examinations. For each competency, a leader was chosen. It was recommended that each meet with representatives from other departments to revise the methods. Their work was presented and additional input from faculty members was received at a workshop in March 2009.

**Rubrics for Clinical Assessment**

- Have you had any training in the use of the rubrics for clinical assessment?
  - Yes (63.3%), No (36.7%)

- When evaluating a student, I mainly use:
  - The rubrics developed for each procedure (14.3%)
  - My experience of what is correct in a procedure (12.2%)
  - A combination of the rubrics and my experience (69.4%)
  - Scientific evidence of what is correct in a procedure (4.1%)

- Do you understand the rubrics?
  - Completely (42.9%), To some extent (51.0%), Poorly (6.1%), Not at all (0)

- How frequently do you use the rubrics when evaluating or giving feedback to students about their work?
  - Always (46.9%), Occasionally (36.7%), Rarely (16.3%), Never (0)

- When evaluating the steps and components of any given procedure, what is your most common evaluation?
  - 3 (38.8%), 2 (61.2%), 1 (0), 0 (0)

**Evaluation Patterns**

- Have you had any training in the use of the 3, 2, 1, 0 evaluation patterns to assign a grade?
  - Yes (67.3%), No (32.7%)

- Do you understand the use of the evaluation patterns using 3, 2, 1, 0 to assign a grade?
  - Completely (38.8%), To some extent (53.1%), Poorly (2.0%), Not at all (6.1%)

**ACO Program**

- Have you had any training in the use of the ACO program?
  - Yes (63.3%), No (36.7%)

- Do you understand the ACO program?
  - Completely (10.2%), To some extent (63.3%), Poorly (12.2%), Not at all (14.3%)

- Do you use the ACO program when evaluating students?
  - Always (59.2%), Occasionally (12.2%), Rarely (10.2%), Never (18.4%)

- If the ACO system was paperless, would you enter your evaluations directly into the program?
  - Yes (81.6%), No (18.4%)

**Competency Examination**

- Have you had any training in competency evaluations?
  - Yes (61.2%), No (38.8%)

- How well do you understand the purpose of the competency examinations?
  - Completely (63.3%), To some extent (28.6%), Poorly (2.0%), Not at all (6.1%)

**Portfolio**

- Have you had any training in the use of portfolios?
  - Yes (42.9%), No (57.1%)

- Do you understand the purpose of the portfolio?
  - Completely (26.5%), To some extent (40.8%), Poorly (18.4%), Not at all (14.3%)

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Figure 1. Selected questions from survey of the perceptions of faculty members about the clinical evaluation system, academic year 2007–08, with responses by percentage of total respondents

*Note: Percentages may not total 100% because of rounding.*
Figure 2. Frequency of scores given by faculty members to third- and fourth-year students after evaluating clinical procedures, academic year 2006–07

Source: University of Puerto Rico School of Dental Medicine’s clinical evaluation computer program.

The faculty was informed during the summer workshop that a pilot assessment project would be implemented in two phases in the comprehensive care clinic fourth-year course. The pilot project was designed by the liaisons and the assistant dean for academic affairs. It was presented to both faculty and students in large and small group meetings. The initial phase of the pilot project would take place during the 2008–09 academic year and involve use of evaluations once every three months, while the second phase, during the 2009–10 academic year, would involve integrating a revised digital portfolio (which included documentation and self-assessment of three cases, literature review to support treatment decision, and a personal reflection on the development of competencies) and reorganizing competency examinations. Details of these transformations are explained in the subsequent section of this article.

An important issue in empowering faculty to act on the vision was eliminating obstacles. Many faculty members had identified the complexity of the computer program and assessment system as a major obstacle to its use. The pilot project included changes designed to eliminate these and other obstacles.

Additional workshops were held during the 2008–09 academic year as part of the process of empowering the faculty; these included the topics of library resources, evidence-based dentistry (EBD), using PowerPoints, critical thinking, and competency examinations. In 2009–10, the topics for workshops included objective structured clinical examinations (OSCEs), systematic literature review, standardization of clinical assessment criteria, and portfolios.

Planning for and Creating Short-Term Wins

The sixth step is planning for and creating short-term wins, such as planning for visible performance improvements, creating them, and rewarding those involved. The liaisons had made a list of faculty needs and prepared a faculty development plan for the year. It was carried out, and additional activities were penciled in for the following year. There was good faculty participation in all the faculty development activities mentioned above.

Changes to the computer program made it more user-friendly. Also, assessment forms and rubrics were simplified. The responsibility for student assessment was made collective by consensus of the faculty assigned to the clinical teams. A less tense environment for giving feedback was created, without
Figure 3. Students’ responses to question about how often dialogue with faculty members stimulates feedback about student performance on clinical procedures, by percentage and number of total respondents (N=31)

Source: Senior dental student survey at University of Puerto Rico, academic year 2005–06.

Figure 4. Students’ responses to question about whether the faculty is calibrated in the clinical evaluation process, by percentage and number of total respondents (N=31)

Source: Senior dental student survey at University of Puerto Rico, academic year 2005–06.
the pressure of a grade. As the project was communicated, understood, and put into practice by involved faculty members, resistance decreased.

The comprehensive care clinic course consists of 1,000 hours distributed among clinical work, skills development seminars, and community rotations. The course is taken by fourth-year students during the entire year. The students are divided into five clinical teams, with a coordinator, assigned faculty members, and two dental assistants per team. This course was chosen for the pilot project because it required fewer modifications than the other clinical courses in order to accommodate the desired assessment elements.

Before beginning the transformation, the types of assessments for this course included daily clinical evaluations that had to be entered into a computer system, completion of a portfolio of patient cases, and approval of discipline-based competency tests. A percentage of students’ final grade also included a productivity component. In the pilot project, the assessment strategies were revised to include competency-based trimester evaluations of clinical work, daily verbal feedback, completion of patient cases, a digital portfolio, productivity, and competency tests.

By dividing the pilot project into two phases, immediate results were obtained. The trimester clinical evaluations (once every three months), along with daily oral feedback, were substituted for the daily clinical evaluations that were found to be ineffective. The trimester evaluations were based on the thirteen competencies of the curriculum. The change to trimester evaluations, initiated in academic year 2008–09, was well received by most faculty members.

The trimester evaluations were done in October 2008, January 2009, and April 2009. Each evaluation was carried out by the clinical team faculty during a group meeting. After reaching consensus, each clinical team member signed the student’s evaluation. After each evaluation, the student received the evaluation both verbally and in writing, along with a written work plan to correct and/or improve the clinical work where specific deficiencies were identified. This was done with the purpose of helping students achieve all competencies.

Instruments were developed for the trimester clinical evaluations. An evaluation form was designed to measure the development of each competency, based on how the students met the expectations of each. Prior to each evaluation, the student performed a self-assessment of his or her progress towards the development of each competency. The suggestions...
and experiences of both the faculty and students were used to modify and fine-tune the instruments. In addition, the group meetings were excellent calibration activities for the faculty.

Each day, faculty members provided meaningful verbal feedback to students. The pressure and tension associated with grading on a daily basis were eliminated. The faculty did not have to enter a paid status or a grade into the computer system, but only a completed status to the clinical procedure done by the student. This decreased the time a faculty member was required to spend on the computer.

The reorganization of the competency tests initiated in the 2008 Summer Faculty Workshop was completed during academic year 2008–09, incorporating new assessment methods. The competency examinations included an OSCE, clinical examinations with patients, laboratory examinations on mannequins and models, case presentations, the student’s self-assessment of performance, and a portfolio. Group leaders responsible for completing this work received recognition by the dean and the liaisons for their excellent participation in the project. They were also able to present their work in faculty workshops.

A manual was prepared to formally guide both faculty and students in the competency examination process. It included a description of each examination, the coordinators and faculty involved, examination dates, rubrics, and evaluation forms. The manual was a huge achievement, since previously there were no formal guidelines for the discipline-based tests. This document was presented to the faculty in a meeting and incorporated into the comprehensive care clinic course for seniors. There is an acknowledgment within it, thanking all the faculty members and group leaders who helped develop the manual.

The digital portfolio was revised to incorporate critical thinking and EBD. It includes a personal reflection by the student on his or her development in the thirteen competencies; three patient cases documented from diagnosis to completion, with a self-assessment of each case based on a standards of care document; and a special report about a treatment decision based on scientific evidence. Each student has to make an oral presentation of one of the portfolio’s components. The implementation during academic year 2009–10 of the new and revised competency tests and portfolio completed the pilot project.

Students are responsible for the comprehensive treatment of their patients and not the completion of a checklist of numbers of clinical requirements. It is the responsibility of students and clinical team coordinators to be certain that the students work on every competency during each trimester. An adequate pool of patients is recruited at the beginning of the year. Additional patients are recruited later to meet areas of deficiencies.

Aside from the wins achieved with the implementation of the pilot project, other wins include a decrease in the “no, no” faculty (faculty members who oppose everything proposed) and consideration of the pilot project model for use in the third-year clinical courses. An ad hoc committee has been formed to coordinate this curricular revision. Also, faculty members are more aware of the need to assess students’ development of competencies. There has been significant communication with and participation of the faculty during the whole transformation process.

Another achievement has been the communication of our experience in forums outside of the school. Presentations have been made in various meetings: at the 2009 ADEA Annual Session & Exhibition, 2009 ADEA CCI Liaisons Summer Meeting, 2009 UPR Medical Sciences Campus Education and Research Forum, and the 2009 Harvard Macy Institute Program for Health Educators. An Educator Spotlight also appeared in the ADEA CCI Online Newsletter. All these wins have been motivators to complete this project and to initiate others.

Consolidating Improvements and Institutionalizing New Approaches

The ad hoc committee formed to coordinate the integration of the third-year students into a comprehensive care clinic model continues its work. The third-year clinical courses are currently organized according to assigned rotations, and students are evaluated based on numbers of clinical procedures (requirements). Aside from embracing the comprehensive care patient-centered model, a revision of the third-year clinical assessment system will be undertaken to emphasize the assessment of competencies. The fourth-year pilot project model is being used in the planning of this additional curricular change.

Although the culmination of the pilot project is still in progress, there have already been many positive results, beginning with the increase in communication among faculty, students, and administration. What began as a revision of the clinical assessment system is continuing as a larger curricular revision. To ensure the institutionalization of the new ap-
approaches, a method to train new faculty members and periodically calibrate them in use of the system is to be designed.

**Conclusion**

In 2006, the University of Puerto Rico School of Dental Medicine identified the need for a revision of its clinical assessment system. Change here, as elsewhere, has been received with resistance. There is no doubt of the many challenges, uncertainties, and anxieties involved in creating and sustaining change. All the stakeholders involved in the process of curricular change affect it one way or the other.

For curricular change to be successful and effective, it must be systemic. After a review of the literature, a known theoretical change model was selected to help guide the transformation. Kotter's model proved useful in reducing the chaos factor of the process. The faculty recognized that the process had a structure behind it, with scientific evidence to back it up. They saw that the transformation of the clinical assessment system was conducted in an organized manner, in which improvisation did not guide the goal. In fact, the more they understood the project, the more supportive they became.

These factors have made the transformation successful thus far. But this success has not come easy. Small steps were taken so that everyone would be involved in improving clinical teaching at our institution. Ultimately, it will help develop our students into lifelong learners. Change, then, as painful as it might be, is possible if done properly and is ultimately quite rewarding.

**Acknowledgments**

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