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Integrating Case Topics in Medical School Curriculum to Enhance Multiple Skill Learning: Using Fetal Alcohol Spectrum Disorders as an Exemplary Case

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Abstract

Objectives—This article describes the use of fetal alcohol spectrum disorders (FASDs) as a theme to connect the learning of basic neurosciences with clinical applications across the age span within a systems-based, integrated curricular structure that emphasizes problem-based learning.

Methods—In collaboration with the Centers for Disease Control and Prevention (CDC) and the National Organization on Fetal Alcohol Syndrome, the Western Regional Training Center for Fetal Alcohol Exposure at UCLA developed and integrated educational materials on FASDs into the curriculum for first-year medical students.

Results—Quantitative and qualitative evaluations suggested materials were effective in enhancing student knowledge and skills related to FASDs, as well as embryology, brain development, substance abuse, developmental psychopathology, and medical ethics.

Conclusion—The use of a unifying theme integrating basic science and clinical information and skills is effective for medical student training in the prevention and treatment of common medical problems.

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Structuring curriculum to address multiple learning objectives, both basic and clinical, has become a theme in contemporary medical education, as the curriculum has increasingly shifted from the paradigm of 2 years of basic science and 2 years of clinical experience to an integration of basic science and clinical education. Learning appears to be optimized when students can see the potential transfer of their learning to clinical applications, especially when material is taught in multiple contexts (1). Exemplary cases can provide a venue for different types of learning (skills, attitudes, factual knowledge) within a clinical context. Such cases are used frequently to assist medical students to practice brief behavioral interventions and doctor-patient communication, while providing instruction on common, important, or undertreated problems. This article describes the use of an important clinical problem, prenatal alcohol exposure, as an integrating theme for teaching across disciplines. In addition to important psychiatric issues of developmental psychopathology, addiction, and psychopharmacology, this topic can be used to teach the basic sciences of embryology, neuroanatomy, and brain development. It can also be used to integrate the basic sciences with important behavioral and social sciences topics such as epidemiology, ethics, the law, brief intervention, and preventive behavior.

Prenatal alcohol exposure is considered to be the leading cause of developmental disabilities of known etiology. Fetal alcohol syndrome, the most severe consequence of such exposure, is defined by a characteristic pattern of facial anomalies, growth retardation, and CNS dysfunction (2). However, many exposed individuals may not exhibit all the features of fetal alcohol syndrome, and instead meet criteria for a related disorder, such as alcohol related neurodevelopmental disorder. The entire continuum of effects, referred to under the rubric of fetal alcohol spectrum disorders (FASDs) (3), is estimated to represent at least 1% of all live births (4). Individuals with FASDs commonly present with comorbid psychiatric conditions and are at a greatly increased risk for psychiatric hospitalization and/or incarceration (5).

Although the majority of physicians report that they assess for prenatal alcohol exposure, many do not use standardized screening tools, and a significant number do not routinely inquire about alcohol use at all (6–7). Many physicians report feeling inadequately prepared to deal with prenatal alcohol use and FASDs (8). Especially concerning is research showing that women from vulnerable populations (e.g., those from lower socioeconomic status or educational backgrounds) are less likely to receive appropriate education and counseling regarding alcohol use during pregnancy (9).

Clearly, there remains a significant need for improving education and training related to FASDs for medical students and professionals. Fetal alcohol exposure thus represents an important clinical issue to be used as a theme for integrating clinical and basic science topics. This article describes the initial efforts of the Western Regional Training Center for Fetal Alcohol Exposure to show how exemplary cases can improve multiple skill learning by integrating education and training on FASDs into the curriculum for medical students.

Methods

The David Geffen School of Medicine at the University of California, Los Angeles (UCLA), implemented a new, integrated systems-based approach to teaching the clinical and basic sciences curriculum in the first 2 years of the 4-year curriculum in 2003. While revising the curriculum, a needs assessment was conducted to determine current education and training in FASDs in the existing curriculum. A brief survey was administered to a sample of 24 third-year students in a psychiatry clerkship at UCLA to assess their knowledge, attitudes, and perceived need for further education regarding prenatal alcohol use and FASDs. Although most students indicated that they would recommend complete abstinence during pregnancy, relatively few were aware that heavy alcohol consumption by pregnant women had increased over the previous decade, and only a minority of students was able to correctly identify the diagnostic criteria for fetal alcohol syndrome or the facial features associated with fetal alcohol syndrome. Most students rated their training as either poor or fair in multiple areas related to the assessment and treatment of prenatal alcohol use and FASDs, and the majority expressed a desire to receive improved training in these areas.

These data, while preliminary, suggested that the students perceived a need for more education in the topic area, and were receptive to such education. Prior to the revised curriculum, materials related to FASDs and prenatal alcohol exposure were in the curriculum, but were not linked in any meaningful way. The revised curriculum provided an opportunity to integrate these materials across multiple topic areas and in multiple modalities (e.g., lectures, skill-building exercises, small group discussions) to optimize learning.

Development of Competencies in FASDs

In collaboration, the Centers for Disease Control and Prevention (CDC), the National Organization on Fetal Alcohol Syndrome (NOFAS), and five fetal alcohol syndrome regional training centers identified seven major areas of competency to target for education and training (10). These competencies included: historical, biomedical, and clinical knowledge about FASDs; screening and brief interventions for pregnant women and women of child-bearing age; models of addiction; effects of alcohol on the embryo and fetus; screening, diagnosis, and assessment of individuals with FASDs; long-term case management for individuals with FASDs; and legal and ethical issues related to FASDs. For each area of competency, it was expected that the curriculum would increase knowledge, change attitudes, and improve skills in evaluating and intervening with prenatal alcohol use and FASDs.

Development of Instructional Modules

Meetings with faculty were arranged to discuss the proposed materials and how they could be structured to best support the existing curriculum. These meetings allowed faculty to join as important collaborators in the curricular process. Following these meetings, training modules addressing one or more of the seven competencies were developed according to three general guidelines. First, materials were developed that could be easily incorporated into existing required components of the curriculum and could be adapted into teaching

formats that integrate basic sciences and clinical applications. Second, materials addressed both learning objectives specifically related to FASDs and those related to more general subject areas introduced in the first year (e.g., embryology, neuroanatomy). Third, faculty tutors were provided with detailed teaching guides so that they would feel comfortable providing instruction in the new materials. Training materials were introduced into the revised curriculum for the 150 first-year medical students within the context of required courses so all students were exposed to the materials. Table 1 provides an overview of all training materials developed.

Results

Quantitative assessments included online exams to evaluate student knowledge, ratings of student skills by standardized patients, and student ratings of the materials. Results of the quantitative assessments are displayed in Table 1. All instructional modules were rated as effective by the students (mean = 3.5; range = 3.4–3.6). Students also demonstrated good mastery of the knowledge and skills that were taught across a multitude of instructional formats, including lectures, problem-based learning cases, standardized patient cases, and interactive labs and workshops. Qualitative assessments of student attitudes were based on observations of student discussions during classes and review of student responses to learning issues generated during small group discussions. Qualitative evaluations suggested that students were able to effectively apply their knowledge to relevant case materials. Furthermore, qualitative feedback from faculty indicated that the materials were effective in teaching the stated learning objectives and that the instructional guides were useful.

Discussion

The current study describes the use of a common and serious medical problem, fetal alcohol spectrum disorders (FASDs), as an exemplary case to provide integrated training of medical students in embryology, brain development, dysmorphology, medical ethics and law, and brief intervention for alcohol use. Results suggest that the training materials were well received by the students, and were effective in providing students with basic knowledge and skills in the seven specified areas of competency. The effectiveness of these materials was supported by students' own ratings, ratings by independent evaluators of student behavior, results of exam questions, and faculty feedback.

Three key strategies were employed that allowed for the successful integration of the materials into the curriculum. First, a collaborative partnership with course directors and other key faculty members was established prior to attempting to integrate new materials into the curriculum. Second, faculty were involved prior to the development of any curricular materials to ascertain the appropriate contexts and formats for dissemination, and to ensure that the materials addressed broader issues important for medical school education. Third, teaching materials were developed that could be easily assimilated by faculty tutors in a short period of time. All training modules included instructional resources that allowed faculty to facilitate learning in the area of FASDs without requiring them to be experts in this area. This served the dual purposes of helping them as educators and providing education for them as clinicians.

There are some limitations to this study that merit discussion. At the time the new materials were introduced, it was not possible to obtain pretest evaluations for the first-year medical students regarding their attitudes, knowledge, and skills in the area of FASDs or prenatal alcohol exposure. Thus, it was not possible to determine precisely how much change was effected by the new curriculum, although results of the needs assessment survey suggest that the students likely benefited from the instructional modules. Additionally, it is unknown to what degree the information and skills students learned during their first year of medical school will be retained and carried into their professional practices. In light of these limitations, it is important to view current findings as preliminary; such findings will inform further efforts to introduce additional training materials on FASDs at later points in the curriculum, such as during third-year clerkships.

This study demonstrates the successful integration of an innovative educational program on FASDs, a topic with profound public health implications, into an existing medical school curriculum. Teaching materials were developed that focused on key areas of competency as identified by the CDC, NOFAS, and five fetal alcohol syndrome regional training centers. Using existing curricular time, students were able to integrate diverse materials (embryology, brain development, health behavior, and ethics) around one unifying theme, FASDs. Furthermore, training materials have since been revised based on student and faculty feedback. For example, instructional guides for faculty were revised to present relevant teaching materials more concisely and clearly, thus allowing faculty to facilitate student learning more effectively. Our hope is that these efforts will better prepare physicians in training with important knowledge and skills to prevent alcohol-exposed pregnancies and to facilitate diagnosis and treatment for those individuals already affected by prenatal exposure to alcohol.

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TABLE 1

Overview of Fetal Alcohol Spectrum Disorders Training Materials

			Results (N = 150)	
Learning Objectives	**The learner should:**	**Teaching Format**	**Student Ratings**	**Additional Ratings of Effectiveness**
1	**a.** Understand biomedical foundation of FAS; **b.** Understand how clinical questions fostered discovery and generated research on FAS	Videotaped lecture and classroom discussion led by faculty member	3.5	Post-test exam questions (% correct): • 85% identified the major determinant of fetal blood alcohol concentration • 82% identified possible mechanism of alcohol's effect on brain of fetus
2	**a.** Understand importance of screening all women of childbearing age for alcohol use **b.** Be sensitive to risks of prenatal exposure to moderate levels of alcohol for fetal development **c.** Describe and use appropriate tools for screening adolescents regarding alcohol use **d.** Be familiar with how to implement the basic steps of a brief intervention	PBL case of pregnant woman who drinks socially	3.6	Review of student responses to learning issues: • Case was effective in sensitizing students to importance of counseling women regarding the risks of prenatal alcohol use.
		SP case of adolescent female who is binge drinking and has an unplanned pregnancy	3.4	Standardized patient ratings of students: • 100% assessed patient for alcohol use • 85% counseled patient regarding risks of alcohol use • 45% provided brief intervention to patient Post-test exam questions (% correct): • 84% identified possible substance abuse in an adolescent • 84% identified alcohol abuse and dependence • 61% identified correct techniques for brief intervention
3	**a.** Define and recognize substance abuse; **b.** Understand role of physician in treatment of substance abuse **c.** Know epidemiology and risk factors for alcohol abuse	SP case of alcoholic physician	3.5	Post-test exam questions (% correct): • 86% identified effects of withdrawal after chronic alcohol use

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Learning Objectives	The learner should:	Teaching Format	Results (N = 150) Student Ratings	Additional Ratings of Effectiveness
4	**a.** Understand impact of prenatal alcohol exposure on growth and brain development in animals and humans	Interactive computer lab	3.6	Post-test exam questions (% correct): • 100% identified effects of alcohol on cell development • 93% identified facial features of FAS • 100% identified appropriate recommendation regarding alcohol consumption during pregnancy
5	**a.** Know the continuum of effects of prenatal alcohol exposure **b.** Be familiar with methods of assessing FASDs **c.** Know differential diagnoses	PBL case of 8-year old child with FAS	3.5	Post-test exam questions (% correct responses): • 91% identified effects of prenatal exposure to alcohol as a function of period of exposure • 95% identified diagnostic criteria for FAS • 82% identified deficits in individuals with ARND
6	**a.** Know about interventions for individuals with FASDs **b.** Be aware of importance of early intervention			Faculty ratings of case (% agree or strongly agree): • 100% case effective in generating relevant and valuable learning issues • 94% FAS dysmorphology exam exercise useful • 100% tutor guide provided necessary information to effectively facilitate case • 100% case enhanced own knowledge of FASDs
7	**a.** Apply the four basic principles of medical ethics to common medical situations **b.** Apply ethical and legal principles when the rights of a mother and her fetus are in conflict	Interactive workshop using an episode from the television show, *Law and Order*	3.4	Observations of student discussions: • Observations by four faculty members of small group student discussions indicated they effectively applied the principles of respect for autonomy, beneficence, non-maleficence, and justice to a legal case of maternal versus fetal rights

FASDs = fetal alcohol spectrum disorders; FAS = fetal alcohol syndrome; PBL = problem-based learning; SP = standardized patient; ARND = alcohol related neurodevelopmental disorder.

Students rate each training module on a 5-point Likert scale: 1 = not effective, 2 = less effective, 3 = effective, 4 = more effective, 5 = very effective.