Enhancing Knowledge and Clinical Skills Through an Adolescent Medicine Workshop

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Objective: To determine the effect of a medical school adolescent medicine workshop on knowledge and clinical skills using standardized patients.

Design: Randomized controlled trial.

Setting: The University of Kentucky College of Medicine, Lexington.

Participants: A total of 186 third-year medical students.

Intervention: Medical students assigned to the intervention group (n=95) participated in a 4-hour adolescent medicine workshop using standardized patients to practice interviewing and counseling skills. Medical students assigned to the control group (n=91) participated in an alternative workshop.

Outcome Measures: Medical student adolescent interviewing and counseling skills were assessed using adolescent standardized patient encounters during the end-of-clerkship examination and during the end of the third-year Clinical Performance Examination. Medical student knowledge was assessed at the end of the clerkship using an open-ended postencounter written exercise and the questions specific to adolescent medicine on the clerkship written examination.

Results: Both groups had comparable baseline characteristics. Medical students in the intervention group scored significantly higher on both measures of clinical skills, the standardized patient stations during the end-of-clerkship examination and the Clinical Performance Examination. Intervention medical students also scored significantly higher on both measures of knowledge, the open-ended postencounter written exercise and the written examination.

Conclusions: A brief adolescent medicine workshop using standardized patients improved medical students’ knowledge and skills at the end of a 4-week clerkship, and the improvement in clinical skills persisted at the end of the third year of medical school.

example, in an analysis of more than 6000 adolescent physician visits, the top counseling issues discussed by physicians were nutrition (49%), weight (43%), and exercise (41%). Specific topics such as sexual behaviors are rarely discussed (15%) despite the fact that most adolescents (89%) value their physicians' opinions about sex. A discrepancy obviously exists between the information that adolescents desire and value and the information being given to them by physicians.

Perhaps clinicians’ reticence to discuss sensitive issues is owing to their own perceived inadequacy. In a national survey of more than 351 primary care physicians, all respondents indicated deficiencies in dealing with adolescents’ high-risk health behaviors including delinquency, drug and alcohol abuse, eating disorders, and homosexuality. The same study showed that 45% of physicians also perceived deficits in treating adolescents’ social and/or emotional concerns including suicide, depression, and family conflicts. More recently, a national survey on sexual health education found that less than half of practicing pediatricians considered themselves to be knowledgeable regarding contraception counseling and teenage pregnancy.

Adult learning theory suggests that learning is most powerful when new skills and knowledge can be put into practice immediately. Thus, workshops incorporating standardized patient (SP) interactions have recently been used to improve physician comfort with adolescent counseling. Hardoff and Schonmann used adolescent SPs to teach communication skills to pediatricians, family physicians, and gynecologists. In addition, 2 recent studies using SPs have demonstrated success in changing attitudes and perhaps even the practices of physicians. These studies suggest that SP workshops can improve adolescent counseling. However, their effect is difficult to determine because neither study randomized participants nor controlled for preworkshop performance.

Whereas residents and practicing physicians can definitely improve their adolescent counseling skills, this training may be even more important during undergraduate medical education. Spencer and Silverman propose that undergraduate education is the ideal time to raise students’ awareness of critical communication skills. Unfortunately, few studies describe adolescent medicine (AM) interventions in undergraduate medical education. Our prior experience with domestic violence and sexual history—taking/human immunodeficiency virus—risk reduction counseling (SHHIVC) workshops suggests that critical counseling techniques can be effectively taught to medical students using SPs. While prior AM workshops have used SPs, few have been empirically validated. Given the importance of AM training in undergraduate medical education, we set out to develop a training module that could be easily incorporated into a third-year internal medicine clerkship. The AM workshop used the same principles that were successful in our prior curricula, both of which demonstrated improvement in students’ knowledge and clinical skills. We hypothesized that students participating in the AM workshop would score significantly higher than nonparticipants on several measures of AM knowledge and counseling skills.

At the University of Kentucky, the third year of medical school consists of 9 clinical clerkships encompassing a total of 48 weeks and concludes with a comprehensive Clinical Performance Examination (CPE). One of the required clerkships is Primary Care Internal Medicine, which is 4 weeks in duration and accommodates 6 to 8 students per rotational block. During the first 3 days, students participate in live 3- to 4-hour clinically-based SP workshops. Workshops begin with a brief introduction by the faculty preceptor that outlines the workshop agenda and emphasizes the importance of the issue to primary care.

Following the introduction, students participate in 4 role plays using SPs that represent different clinical scenarios of that domain. One or 2 students interview and counsel each SP in front of the other 4 to 6 students for about 15 minutes each. Following the SP exercises, the workshop coordinator leads the students in a discussion of the nuances of each case and the topic in general.

Three days of workshops are followed by 3.5 weeks of clinical duties. About half of the students rotate with a general internist through one of the 8 Area Health Education Centers in Kentucky while the rest of the students spend their clinical time with faculty in the Division of General Internal Medicine at the University of Kentucky. On the final day of the clerkship, students complete a multispecialty SP examination with an open-ended written exercise corresponding to each station as well as a 100-item multiple-choice examination.

For the past 5 years we have developed several workshops aimed at conveying critical knowledge and skills for primary care and evaluated their effectiveness as they were integrated into our clerkship. In developing our workshops, we focused on common primary care problems that are inadequately covered elsewhere in curriculum and are included in the Healthy People 2010 Objectives. As mentioned above, 2 workshops, domestic violence and SHHIVC, were previously found to be effective instructional tools were delivered to all 12 clerkship rotations from 2004 to 2006 along with a preventive medicine and routine screening workshop. In addition, with University of Kentucky institutional review board approval, each student rotation group was randomly assigned to an AM workshop or another control workshop. Therefore, the AM workshop was delivered to 6 groups of students each year and each student rotation group had an equal chance of participating in the AM workshop (Figure). All students had assigned readings on AM topics.

Prior to integration into the clerkship, the workshop coordinator developed 4 SP cases, each with a training guide and checklist. The SPs introduced AM to the students through the following characters: (1) Mark Yates is a 16-year-old boy who presents to established care and during the interview reveals that he is engaging in multiple risky behaviors including drug use, alcohol use, and reckless behavior. (2) Josh Reynolds is a 15-year-old boy who presents for a cross-country sports physical, but will disclose that he smokes cigarettes if tactfully asked. (3) Sara Davis is a 17-year-old girl who presents for a softball sports physical, but is also interested in birth control. (4) Angela Monroe is a 15-year-old girl who presents with headaches, but a thorough interview will reveal that she is depressed following her parents’ separation, she severely restricts caloric intake, and she rigorously exercises to lose weight.

Following these SP role plays, the AM workshop coordinator led the students in a dialogue of the issues present in each case. Topics of discussion included adolescent development, history-taking (rapport-building, interviewing techniques, confidentiality, and consent for treatment), and the specific counseling issues raised in each case.
The end-of-clerkship 9-station SP examination included 1 AM station, a 16-year-old girl presenting for a sports physical for basketball. Thorough history-taking revealed that the patient has experimented with cigarettes, alcohol, ecstasy, and marijuana, and has engaged in oral sex with a partner infected with a sexually transmitted infection. The students had 15 minutes to interview and counsel the patient. Case-specific checklists were developed by a panel of faculty; the checklists contained items thought to be important in addressing the clinical situation, including general interviewing and communication skills, following standards of usual educational practice in the SP literature. The AM checklist contained 72 total items including 38 items regarding the patient’s social history (eg, asks if patient is sexually active) and 16 counseling items (eg, discusses the importance of condom use) for a total of 54 items specific to AM. The internal consistency of each of these scales was determined by calculating Cronbach’s α.49 AM-specific items, α = .86; social history–taking subscale, α = .82; counseling subscale, α = .75. There were 18 items on the checklist not specific to AM but related to interpersonal and communication skills (eg, “I was comfortable being interviewed by this student”). The SP completed this yes/no checklist after encountering each student. Our measures of AM clinical skills were students’ total scores on the 54 AM-specific items, including the specific AM history-taking and counseling subscales. Following the encounter, the students had 5 minutes to complete a written exercise related to the case (for the AM case, “List counseling points or screening issues which should be discussed with every adolescent during a routine health evaluation”). Following the SP examination, the students completed a 100-item multiple-choice written examination that included 6 AM questions (eg, “What is the leading cause of death in the adolescent age group?”). Our measures of AM knowledge for this study were the number of correct responses on the 6 AM questions and scores on the post–SP encounter written exercise.

Furthermore, the comprehensive CPE at the end of the third year also included an AM case for the 2004-2005 academic year. The CPE is a 12-station SP examination occurring between 1 and 45 weeks following completion of the Primary Care Internal Medicine clerkship. The AM station consisted of a 15-minute interviewing and counseling session for a 17-year-old boy who has engaged in several risk-taking behaviors. Our measure of AM clinical skills was the student’s total score on the 47 AM-specific items on the SP checklist.

The Pearson χ² test was used to test associations between sex and the allocation-to-study groups. An association between continuous covariates and study group were tested using the t test. Data were analyzed using regression approaches from the general linear model, controlling for student sex and 2 prior third-year clerkships that teach AM content, family practice, and pediatrics. Our clinical performance measures were controlled with checklist scores from the 1 common preventive medicine station in the end-of-clerkship SP examination used in all 12 rotations for both years. A dummy code was created to indicate participation or nonparticipation in the AM workshop, which served as the independent variable in analyses. Dependent variables in separate analyses included the following scores: 54 AM-specific checklist items; AM history-taking and counseling subscales; 6 AM-specific written questions; post-SP encounter written exercise; and the 47 AM-specific checklist items on the CPE.

Between 2004 and 2006, 95 students participated in the AM workshop and 91 did not. Baseline academic performance was similar in both groups, with a mean (SD) United States Medical Licensing Examination step 1 score for the AM workshop students of 216.8 (18.7) and for the control students of 216.3 (18.8). The groups did differ with respect to sex distribution; the AM workshop group had 52% women compared with only 35% in the control group (χ² = 5.06; P = .03). The 2 groups also differed in clinical performance on the preventive medicine station during the end-of-clerkship examination, with the students in the AM workshop scoring significantly better (mean [SD] score, 54.4 [8.8]) than the control students (51.0 [8.5]), with a mean difference of 3.4 (95% confidence interval, 0.8-6.1).

Regarding knowledge, workshop participants performed significantly better than nonparticipants on the 6 AM written examination items and the post–SP encounter written exercise (Table). Similar results were noted for clinical skills; workshop participants scored significantly better than nonparticipants on the AM-specific checklist items as well as the AM history-taking subscale and the AM counseling subscale. As for longer term outcomes of clinical skills, workshop participants during the 2004 to 2005 academic year performed significantly better on the CPE AM checklist items. Controlling for the timing of the primary care internal medicine rotation did not alter the positive long-term effects of the workshop. Both control and workshop students performed better at the end of the year than at the beginning, but the difference between workshop and control students remained the same.

### RESULTS

### COMMENT

Third-year medical students participating in a 4-hour AM workshop outperformed nonparticipants on several measures of clinical skills and medical knowledge. Surprisingly, these results occurred despite student participation in other clerkships with adolescent medicine content. This demonstrates the effectiveness of using a SP workshop to teach the special clinical skills that are so important but...
often not applied in caring for adolescent patients. Additionally, the improved AM clinical skills persisted over time when measured an average of 6 months after completion of the workshop as measured by one station on the CPE. The length of time that the intervention positively affects performance is not known, but would seem to be greater than 6 months because we were not able to demonstrate a difference in performance related to the timing of the primary care internal medicine rotation. We were not surprised by this finding because it is consistent with our earlier work in which the time since a domestic violence workshop did not affect performance on the domestic violence items on one station on the CPE. To our knowledge, this is the first study to demonstrate improved AM knowledge and actual skills of third-year medical students following a brief intervention.

We promote the viewpoint that a continuum of educational opportunities starting in medical school aimed to facilitate communication leads to better acquisition of knowledge and skills. In addition, many physicians who care for adolescent patients will not have instruction in AM during their residency training. We believe that integrating an AM workshop into the medical school curriculum provides a foundation on which residency AM curricula can build and ensures that all students, regardless of future career goals, receive training in AM.

Our study has several limitations, as it was conducted at a single institution, the University of Kentucky, and our students and curricula may differ from those at other medical schools. For example, the first- and second-year curriculum at other institutions may include varied emphasis on AM and subsequently may increase or decrease the magnitude of our findings. However, we did control for other third-year clerkships where curricular exposure to AM might have affected our results. For example, students may have had prior experience with AM in pediatrics or family practice clerkships prior to our internal medicine course; however, controlling for those factors did not change our results. If anything, prior exposure to AM in either the family medicine or the pediatric clerkship would have negatively affected our findings. Additionally, emphasis on AM may have varied among the numerous faculty members who supervised the students’ clinical duties in our clerkship. Internists care for a broad range of patients and the number of adolescent patients may vary greatly among practitioners.

Even so, we conclude that our AM curriculum resulted in enhanced student knowledge and skills. We believe that the essential concept in this workshop was the use of SP encounters to provide the requisite experience to acquire counseling skills. As noted in the study by Hardoff and Schonmann, learners respond well when given immediate feedback. Our workshop provided students with immediate feedback from the SPs, other students, and the faculty preceptor, which allowed the group to collectively decide on appropriate counseling techniques. This adult-centered active learning process should improve the acquisition of new skills. In addition, it allows medical students to learn and practice critical communication skills in a low-stakes environment that is accepting of mistakes. Furthermore, our study design, a prospective, randomized, controlled trial provides credence to our findings. Also, our study can serve as an example to other medical educators that well-designed, randomized, controlled educational studies can be performed and this methodology can be used to validate new curricula. Future educational projects should consider using SPs to teach communication and counseling skills, and should use a randomized controlled design.

The authors will provide standardized patient materials (cases and checklists) and the Adolescent Medicine Student and Instructor References to any clerkship or residency program directors requesting the materials.

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Author Contributions: Study concept and design: Feddock, Griffith, Wilson, and Haist. Acquisition of data: Feddock, Hoellein, Wilson, and Lineberry. Analysis and interpretation of data: Feddock, Hoellein, Wilson, Lineberry, and Haist. Drafting of the manuscript: Feddock, Hoellein, Wilson, and Lineberry. Critical revision of the manuscript for important intellectual content: Hoellein, Griffith, and Haist. Statistical analysis: Wilson and Lineberry. Obtained funding: Haist. Administrative, technical, and material support: Feddock, Hoellein, Griffith, Wilson, Lineberry.

Table. Comparison of Students Who Received the AM Workshop With Students Who Did Not

<table>
<thead>
<tr>
<th>Items, No.</th>
<th>Intervention (n=95)</th>
<th>Control (n=91)</th>
<th>Mean Difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM-specific SP items</td>
<td>54</td>
<td>67.2 (11.2)</td>
<td>50.1 (12.35)</td>
</tr>
<tr>
<td>AM history taking</td>
<td>38</td>
<td>64.0 (11.8)</td>
<td>49.1 (11.8)</td>
</tr>
<tr>
<td>AM counseling</td>
<td>16</td>
<td>74.8 (16.5)</td>
<td>55.2 (16.4)</td>
</tr>
<tr>
<td>Open-ended post-SP written exercise</td>
<td>25</td>
<td>49.6 (12.0)</td>
<td>42.0 (10.7)</td>
</tr>
<tr>
<td>AM written examination questions</td>
<td>6</td>
<td>75.3 (17.3)</td>
<td>67.5 (19.3)</td>
</tr>
<tr>
<td>End of third-year CPE</td>
<td>47</td>
<td>78.2 (4.7)</td>
<td>75.0 (5.4)</td>
</tr>
</tbody>
</table>

Abbreviations: AM, adolescent medicine; CI, confidence interval; CPE, Clinical Performance Examination; SP, standardized patients.
Lineberry, and Haist. Study supervision: Feddick, Hoellein, Griffith, and Haist.

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REFERENCES


Announcement

Trial Registration Required. In concert with the International Committee of Medical Journal Editors (ICMJE), Archives of Pediatrics and Adolescent Medicine will require, as a condition of consideration for publication, registration of all trials in a public trials registry (such as http://ClinicalTrials.gov). Trials must be registered at or before the onset of patient enrollment. This policy applies to any clinical trial starting enrollment after July 1, 2005. For trials that began enrollment before this date, registration will be required by September 13, 2005, before considering the trial for publication. The trial registration number should be supplied at the time of submission.

For details about this new policy, and for information on how the ICMJE defines a clinical trial, see the editorials by DeAngelis et al in the September 8, 2004 (2004;292:1363-1364) and June 15, 2005 (2005;293:2927-2929) issues of JAMA. Also see the Instructions to Authors on our Web site: www.archpediatrics.com.