INSTRUCTIONAL DESIGN AND ASSESSMENT

A Workshop on Smoking Cessation for Pharmacy Students

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Objective. To develop, implement, and evaluate a targeted educational intervention focusing on smoking cessation with final-year undergraduate pharmacy students.

Design. A smoking-cessation educational workshop entitled Smoking Cessation in Pharmacy (SCIP) was designed on the principles of adult learning and implemented with a full cohort of final-year undergraduate pharmacy students at the University of Sydney. A previously validated questionnaire testing the knowledge and attitudes of respondents was administered both before and after implementation of the designed workshop to evaluate changes resulting from the intervention. Informal feedback was obtained from students.

Assessment. Pre-course mean total knowledge and attitude scores calculated were 65.8±9.1 and 86.4±12.1, respectively. The post-course mean total knowledge score was 74.9±8.1, and the attitude score was 88.8±9.1. Improvement in knowledge and attitudes was significant (p<0.05).

Conclusion. Educational interventions for pharmacy students designed with careful attention to pedagogic principles can improve knowledge about evidence-based smoking-cessation strategies and enhance positive attitudes to pharmacist roles in smoking cessation.

Keywords: pharmacy students, smoking cessation, workshop

INTRODUCTION

Smoking remains the leading cause of mortality and morbidity in the developed world.1 With increased awareness of the enormity of the problem and the clinically established benefits of smoking cessation,2 the need for implementing smoking-cessation services is increasing. Medical professionals possess the greatest potential to promote a reduction in tobacco use.3 The role of pharmacists, in particular, is important, because they have a wide client base that presents regularly, and, in many countries, smoking cessation aids are retailed in pharmacies. Therefore, pharmacists can access a wide spectrum of patients, such as those willing to quit, those who have unsuccessfully attempted to quit, and patients in need of support, motivation, or enhanced awareness about nicotine dependence and avenues of treatment.4 The World Health Organization’s (WHO) Tobacco Free Initiative highlights the role of health professionals such as pharmacists in implementing smoking-cessation services.3 However, to be competent in providing smoking-cessation interventions, pharmacists need to establish and demonstrate knowledge, skills, and confidence in this field.

The knowledge-based nature of the pharmacy profession necessitates that pharmacists maintain training in smoking cessation if they are to incorporate such activities in their practice.5 Knowledge and skills related to smoking cessation are important not only for practitioners but also for pharmacy students. As future pharmacists, they may find that the service-provision roles of their profession are further evolving.6 Future practitioners may also encounter more recalcitrant smokers who have tried but failed to quit smoking or are unable to quit without assistance.7 Prescription pharmacotherapies targeting smoking cessation are available primarily through pharmacies. Nonprescription nicotine-replacement therapies are also often available in pharmacies. Thus, pharmacy students must receive comprehensive training for assisting patients with quitting.8

From an educational perspective, the WHO code of practice on tobacco control proposed the development of training materials for health professionals and the facilitation of training workshops at country-level for treating tobacco dependence. This code highlights the importance of incorporating tobacco control in the curriculum of health and educational institutions.3 In the United States, the Accreditation Council for Pharmacy Education...
(ACPE) Standards 2011, Version 2.0, for the program in pharmacy leading to the doctor of pharmacy (PharmD) degree, emphasized the promotion of preventive health services, such as tobacco-cessation counseling. The standards also advocate that students be allocated experiential learning sites that demonstrate a strong commitment to health promotion and illness prevention. For smoking cessation, the suggested measures range from a minimum of not stocking cigarettes or other tobacco products to providing comprehensive quit services.\(^9\) Smoking cessation was also a component of the 2004 educational outcomes of the Center for Advancement of Pharmacy Education, which accentuated the development of public health policies to “promote health improvement, wellness, and disease prevention in cooperation with patients, communities, at-risk populations, and other members of an interprofessional team of healthcare providers.”\(^10\)

Educators have also been active in the area of smoking cessation. For instance, proactive educator groups at the University of California, San Francisco, developed a shared, comprehensive curriculum program entitled “Prescription for Change,” which equips health professions students and licensed clinicians with state-of-the-art knowledge and skills to assist patients with quitting. This evidence-based program showcases the dissemination of principles set forth in the US Public Health Service Clinical Practice Guideline for Treating Tobacco Use and Dependence.\(^11\) The program was incorporated in the core curriculum of all pharmacy colleges and schools in California in 2001.\(^12\) Assessment of this program revealed a significantly positive impact on pharmacists’ perceived abilities and confidence for providing tobacco-cessation counseling to patients.\(^13\)

In Australia, the Pharmacy Guild, which consists of the national body representing community pharmacy, accentuated the importance of pharmacist-led smoking cessation interventions in its latest status report: “The Roadmap - The Strategic Direction for Community Pharmacy.”\(^14\) Based on professional directives on the pharmacist’s role in smoking cessation, the University of Sydney, which is considered 1 of Australia’s larger university providers of pharmacy training, elected to include a smoking-cessation workshop in its new revised curriculum for fourth-year undergraduate students (bachelor of pharmacy [BPharm]). In Australia, the 4-year BPharm degree allows graduates to enter an internship year, the completion of which renders them eligible for registration.

A needs analysis, previously conducted with a final-year cohort at the University of Sydney, indicated that there were “knowledge gaps” in pharmacy students’ awareness of current evidence-based smoking-cessation practice.\(^15\) The needs analysis results provided the impetus to include comprehensive smoking-cessation training in the curricular revisions that the Faculty of Pharmacy at the University of Sydney undertook between 2008 and 2011. The primary goal of this study was to develop, implement, and evaluate a targeted educational activity on smoking cessation with final-year undergraduate pharmacy students.

Shifting from traditional classroom teaching to interactive-learning methods represents an essential component of current thinking in pharmacy education.\(^16\) In light of this trend, an interactive workshop was proposed as the format of the scheduled smoking-cessation activity in the novel curriculum. Active learning stimulates higher-order thinking, cultivates more thorough learning, and improves motivation to learn. Engaging students in their own learning process makes them more likely to apply the knowledge they gain to new contexts.\(^17\) This style of teaching is also consistent with ACPE standards that support the development of critical-thinking and problem-solving skills through active-learning strategies.\(^9\) The study hypothesis was that participating in an interactive 3-hour educational activity would improve students’ knowledge about and attitudes toward smoking and smoking-cessation-related practice.

**DESIGN**

The purpose of the SCIP workshop was to improve pharmacy students’ knowledge, attitudes, and skills in key areas of smoking-cessation practice. The specific educational objectives included: (1) understanding the significance of smoking and its health-related complications; (2) understanding the pharmacokinetics of nicotine and pathophysiology of nicotine dependence; (3) understanding different aspects of pharmacotherapy in terms of doses, adverse effects, contraindications, drug interactions, and instructions for use; (4) recognizing the significant role of pharmacists in implementing up-to-date smoking-cessation interventions; (5) applying the “5As” of quitting smoking (ie, Ask about current tobacco use to identify patients who smoke; Advise smokers to quit; Assess their level of nicotine dependence and willingness to quit; Assist patients with appropriate treatment and counseling; Arrange follow up to prevent relapse), and acquire the skills to develop a pharmacy-based, smoking-cessation clinic.

The SCIP was a 3-hour workshop that was incorporated in the undergraduate pharmacy curriculum as part of the Professional Practice course at the University of Sydney. Professional Practice is a 12-credit core pharmacy course offered in the final year of study. The course focuses on knowledge consolidation, therapeutics, application of
knowledge, continuing professional education practices, pharmacy workplace, and disease-state management, and consists of lectures, hands-on workshop sessions, online learning, and problem-based tutorial classes. The workshop was included as an experiment to determine if it added value to a suite of applications and service models provided to pharmacy students. Within the SCIP, learning outcomes, learning activities, and assessments were strategically aligned, and learning objectives were assessed using Bloom's Taxonomy of Learning Outcomes. The students' achievement of learning outcomes was assessed based on the Biggs' SOLO (Structure of Observed Learning Outcomes) proposal.

The smoking-cessation workshop was administered over 2 weeks to 136 fourth-year pharmacy students during the second semester of 2011. A 1-hour lecture providing an overview of smoking and smoking cessation was delivered 1 week prior to the workshop, after which the course coordinator divided the students into 6 groups of 20 to 23 students each. The workshop was administered to the first 3 groups on 3 consecutive days during the first week and to the remaining 3 groups on 3 consecutive days during the second week (1 group per day for 6 days). The workshop took place in an allocated tutorial room within the faculty of pharmacy.

On the day of the workshop, the instructor spent approximately 5 minutes at the beginning explaining the objectives and the content of the workshop. Students were then randomly allocated to 1 of 4 groups. Each group consisted of 5 to 6 students and was assigned a specific table in the room. A 15-minute preworkshop assessment of knowledge about and attitudes toward smoking and issues related to smoking cessation was then administered to students prior to the commencement of workshop activities. The previously constructed and psychometrically tested SCIP questionnaire was used for the assessment. Students were asked to individually complete and hand in the questionnaire without seeking help from each other or referring to any related resources or notes they had.

Multiple learning formats layered within the workshop included games, clinical cases, class discussions, practical demonstrations, and a short lecture covering key issues and take-home messages. Table 1 describes the content of the workshop material. From an instructional perspective, all workshop components were constructed to accomplish the learning objectives and achieve the anticipated learning outcomes. Table 2 summarizes the learning outcome typology of the workshop. Different active-learning strategies were used to enrich the learning process. For instance, cooperative learning was encouraged by means of group work and class discussions.

Case-based learning also represented a major component of the workshop. For this purpose, cases were designed to expose the students to various scenarios involving issues related to smoking cessation that could be encountered in practice. Each group was presented with a different case scenario. Table 3 describes the case content. Games and practical demonstrations were also incorporated to solidify learning in an enjoyable, relaxed environment. The nature of the workshop created an interactive atmosphere, with students moving around and discussing and sharing ideas. Students were permitted to use the available computers as well as any medical references they had to complete their work. The instructor also provided assistance by guiding the flow of activities and answering questions. The study was approved by the Human Research Ethics Committee at the University of Sydney.

EVALUATION AND ASSESSMENT

Because academic procedures should be carefully planned and continuously examined, it is crucial to monitor teaching innovation and learning performance to ensure the delivery of a well-conceived, targeted educational activity. During the course of the smoking-cessation workshop, students' performance was evaluated by means of observing their in-class progress. This assessment accounted for 5% of each student's final grade in the course. This portion of the final grade was determined by the instructor according to set scoring criteria based on the student's participation in group discussions, questioning, completion of assigned tasks, enthusiasm and engagement in practical demonstrations, and attentiveness to the presentation of lecture slides.

The validated SCIP questionnaire was used to assess students' knowledge about and attitudes toward smoking and smoking cessation. The questionnaire was divided into 4 sections. Section I included 12 yes/no and short-answer questions covering basic demographic information and general data about the participants' history in smoking-cessation training, if applicable. Section II, the knowledge section, consisted of 2 parts. Part 1 included 24 true/false questions, covering basic epidemiologic, pharmacologic, and therapeutic aspects of smoking and smoking cessation; part 2 included 8 multiple-choice questions related to clinical case scenarios and specific pharmacotherapeutic issues. Section III, the attitudes section, consisted of 18 yes/no questions designed to assess respondents' attitudes toward smoking and smoking-cessation practices. Section IV included 16 yes/no questions and short-answer questions about the respondents' personal smoking status. The survey instrument was used as a means of assessing possible changes in students'
### Table 1. Content of Smoking-Cessation Workshop

<table>
<thead>
<tr>
<th>Activity/Aim</th>
<th>Time Allocated</th>
<th>Description</th>
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<tbody>
<tr>
<td>Online games – introducing the prospect of interactive educational learning</td>
<td>20 minutes (10 minutes playing and 10 minutes discussion of games)</td>
<td>Each group of students was given a game card with reference to a game available on <a href="http://www.oxygen.org.au">www.oxygen.org.au</a>, along with associated instructions. The games were smokes and ladders, fact or myth, the O2 quiz, and interactive biopsy. They included general questions about smoking statistics, health effects, cigarette constituents, social smoking, and common myths. Students were given 10 minutes to complete their assigned games. Then, 10 minutes were allocated for group discussions led by the instructor, where each group had to describe its game in terms of content, common questions answered incorrectly, new things learned, and the likelihood of applying this game in future practice.</td>
</tr>
<tr>
<td>Clinical cases – enticing critical thinking and clinical expertise</td>
<td>80 minutes (30 minutes for solving the cases and 50 minutes for class discussion)</td>
<td>Each group of students was given a case about a different smoking-related clinical scenario that could be encountered in practice. Students were given 30 minutes to read, discuss, and analyze the case, and propose an appropriate smoking cessation plan for their patient. All students were provided with the Fagerstrom test for nicotine dependence, along with a smoking-cessation plan template to guide their thinking and highlight key points to stress on. Then, 50 minutes were allocated for discussing the 4 cases. Each case was displayed on multimedia screens and read out by the corresponding group. The instructor then guided the discussion by asking questions and stimulating queries. Discussions focused mainly on key issues to consider when encountering a smoking patient, key recommendations, and key counseling points. All groups were encouraged to take part in the discussion and provide input.</td>
</tr>
<tr>
<td>Demo cigarette game – evoking a visual response to cigarettes</td>
<td>5 minutes</td>
<td>A big demo cigarette, designed by the instructor from colored cardboard and paper, was presented to the students. Each student was asked to say the first thing that comes to his/her mind when carrying the cigarette and thinking of smoking. Once done, he/she had to pass the cigarette on to the next student. The purpose of this activity was to learn to say ‘No’ to a cigarette.</td>
</tr>
<tr>
<td>Class activity – conceptualizing a professional service</td>
<td>10 minutes</td>
<td>Students were asked to design a smoking-cessation clinic based at a community pharmacy. Students were provided with major key points to help them. Five minutes were allocated for brainstorming within groups, and then, the instructor led the discussion. This activity was open-ended, engaging everyone and collating various interesting ideas. Main issues covered included goals, budgeting, products and resources needed, training, and advertising.</td>
</tr>
<tr>
<td>Lecture – solidifying learning concepts</td>
<td>30 minutes</td>
<td>The instructor delivered a small lecture summarizing key points covered throughout the workshop, while focusing mainly on smoking-cessation pharmacotherapies.</td>
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<tr>
<td>Practical demonstrations – visualizing and practicing acquired knowledge</td>
<td>10 minutes</td>
<td>The instructor demonstrated the use of the carbon monoxide (CO) monitor. CO levels were checked for 2 student volunteers and interpreted accordingly. Samples of nicotine gums, patches, inhalers, and microtablets were also displayed with emphasis on correct instructions for use.</td>
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</tbody>
</table>

* Total time was 160 minutes as 20 minutes were allocated at the beginning of the workshop for the introduction and preworkshop assessment.
Table 2. Specific Learning Objectives and Typology for Smoking-Cessation Workshop

<table>
<thead>
<tr>
<th>Specific Learning Objectives: After completing the workshop, students will be able to:</th>
<th>Learning Activity Associated with Learning Objective</th>
<th>Type of Learning: Knowledge, Attitude, or Skill*</th>
<th>Assessment Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the significance of smoking and its health-related complications</td>
<td>Online games, demo cigarette game, and lecture</td>
<td>Knowledge and attitudes – comprehension, application, analysis</td>
<td>Level and quality of participation in anticipated activities and observation of attentiveness and note-taking throughout the lecture</td>
</tr>
<tr>
<td>Understand the pharmacokinetics of nicotine and pathophysiology of nicotine dependence</td>
<td>Lecture</td>
<td>Knowledge and skills – comprehension, application, analysis</td>
<td>Observation of attentiveness and note-taking throughout the lecture</td>
</tr>
<tr>
<td>Understand different aspects of pharmacotherapy in terms of doses, adverse effects, contraindications, drug interactions, and instructions for use</td>
<td>Clinical cases, lecture, and practical demonstrations</td>
<td>Knowledge and skills – comprehension, application, analysis, synthesis, evaluation</td>
<td>Successful completion of clinical cases, level and quality of participation in anticipated activities, and observation of attentiveness and note-taking throughout the lecture</td>
</tr>
<tr>
<td>Recognize the significant role of pharmacists in implementing up-to-date smoking-cessation interventions</td>
<td>Clinical cases and class activity</td>
<td>Attitudes – application, analysis, synthesis, evaluation</td>
<td>Successful completion of clinical cases and level and quality of participation in anticipated activities</td>
</tr>
<tr>
<td>Apply the “5As” of quitting smoking (Ask about tobacco use, Advise to quit, Assess dependence, Assist with pharmacotherapy and counseling, Arrange follow-up)</td>
<td>Clinical cases, lecture, and practical demonstrations</td>
<td>Knowledge and skills – comprehension, application, analysis, synthesis</td>
<td>Successful completion of clinical cases, level and quality of participation in anticipated activities, and observation of attentiveness and note-taking throughout the lecture</td>
</tr>
<tr>
<td>Develop a pharmacy-based smoking-cessation clinic</td>
<td>Class activity and practical demonstrations</td>
<td>Knowledge, attitudes, and skills – comprehension, application, analysis, synthesis, evaluation</td>
<td>Level and quality of participation in anticipated activities</td>
</tr>
</tbody>
</table>

*Classification by Bloom’s Taxonomy.

knowledge and attitudes. Postworkshop assessment took place 3 weeks after completion of the workshop. As with the preworkshop assessment, students were asked to individually complete and hand in the survey instrument without seeking help from each other or referring to any related resources or notes they had. The postworkshop assessment took place in the same workshop room facility at the beginning of a specific course tutorial not related to smoking cessation that had been assigned by the course coordinator.

Data from completed survey instruments were collated and analyzed using Statistical Package for Social Sciences (SPSS version 20.0, IBM, Armonk, NY, USA). The total knowledge score was computed as the sum of scores of the 32 knowledge questions in section II, and the attitude score was computed as a total of the 18 attitude questions in section III of the survey instrument. Subsequently, mean total preworkshop and postworkshop scores presented as mean ± SD were calculated. The paired-samples t test was used to compare scores before and after completion of the workshop.

One hundred thirty-one fourth-year pharmacy students completed the preworkshop assessment, for a response rate of 96.3%, and 128 (94.1%) students completed the
postworkshop assessment. Before the workshop, the mean knowledge and attitude scores obtained were 66.8% ± 9.1% and 86.4% ± 12.1%, respectively. After completing the workshop, the mean knowledge score was 74.9% ± 8.1%, and the attitude score was 88.8% ± 9.1%. Table 4 presents and compares the total scores obtained. Changes in mean total knowledge and attitude were both significant (p < 0.05).

From an educational and instructional viewpoint, the workshop content was evaluated by comparing item difficulty and discrimination results preworkshop and postworkshop. Item difficulty and discrimination were calculated to review the ability of the 24 true/false knowledge items of the survey instrument to discriminate between respondents who scored at either end of the score spectrum. Item difficulty was calculated as the proportion of the total number of students who answered a true/false item correctly from the 24 true/false items in section 2 of the SCIP survey instrument. For item discrimination, point bi-serial correlation, which measures the correlation of the score on a particular item with the total score, was measured by determining the Pearson coefficient. The discrimination index, which refers to the ability of a specific item to differentiate students with more knowledge (eg, those with a higher score) from those with less, was also calculated by separating the top-scoring students from the bottom-scoring students and comparing their response patterns. Before the workshop, mean item difficulty and discrimination were 0.73 and 0.30, respectively. After completing the workshop, mean item difficulty was 0.82 and mean item discrimination was 0.25. The item discrimination index was 0.17, pre-workshop and 0.14, post-workshop.

The students’ overall performance in class was generally favorable. Most students handled their cases well and proposed optimal therapeutic plans. The level of participation and engagement in group discussions and activities was noteworthy for most of the workshops, with most students getting good grades (mean = 3.5 on a scale of 1 to 5). The instructor and the course coordinator both noticed considerable enthusiasm about the topic of smoking cessation.

Table 3. Content of Clinical Case Scenarios in Smoking-Cessation Workshop

| Case | Description                                                                                                                                  | Clinical Expertise Tested                                                                 |
|------|---------------------------------------------------------------- Adamitvlo悔, 35.5年-old male with a long medical history and a recent diagnosis of COPD, seeking smoking-cessation advice after a failed attempt of self-treatment with nicotine gums | Possible reasons for failure, assessment of level of dependence, therapy selection/counseling, lifestyle modifications/risk assessment, drug-smoking interactions |
| 2    | A 38-year-old female with a prescription for Champix inquiring about Champix, CO monitoring, associated blood testing, and possibility of giving Champix to her 15-year-old son | Addressing patient’s concerns, assessment of level of dependence, therapy counseling, lifestyle modifications/risk assessment, drug-smoking interactions |
| 3    | A 30-year-old female with a history of major depression, epilepsy, peptic ulcer disease, and mild eczema, inquiring about the possibility of taking bupropion as a smoking-cessation aid | Addressing patient’s concerns, assessment of level of dependence, therapy selection/counseling, lifestyle modifications/risk assessment, drug-smoking interactions |
| 4    | A 60-year-old male, postmyocardial infarction, with a history of emphysema, hypertension, diabetes, and dyslipidemia, seeking assistance after suffering from cravings and withdrawal symptoms from not being able to smoke | Fletcher-Peto graph analysis, assessment of level of dependence, therapy selection/counseling, lifestyle modifications/risk assessment, drug-smoking interactions |

Abbreviations: COPD = chronic obstructive pulmonary disease, CO = carbon monoxide

Table 4. Mean Total Knowledge and Attitude Scores Preworkshop and Postworkshop

<table>
<thead>
<tr>
<th>Areas of Assessment</th>
<th>Scores Preworkshop, Mean (SD)</th>
<th>Postworkshop, Mean (SD)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total knowledge score (SCIP section II)</td>
<td>65.8 (9.1)</td>
<td>74.9 (8.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total T/F knowledge score (SCIP section II, part 1)</td>
<td>72.8 (10.5)</td>
<td>81.0 (8.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total MCQ knowledge score (SCIP section II, part 2)</td>
<td>44.8 (14.6)</td>
<td>56.6 (15.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Total attitude score (SCIP section III)</td>
<td>86.4 (12.1)</td>
<td>88.8 (9.1)</td>
<td>0.012</td>
</tr>
</tbody>
</table>

Abbreviations: SCIP = Smoking Cessation in Pharmacy, T/F = true/false, MCQ = multiple-choice questions.
As a university policy, students have the right to provide direct feedback about any unit of study to its corresponding course coordinator. This information can assist faculty members in evaluating the pharmacy curriculum at determined intervals of time. As a result, students were encouraged to provide informal feedback about the smoking-cessation workshop in particular, as it was the first time such a workshop had been administered to pharmacy students at the University of Sydney. Although Unit of Study Evaluations, a formal process by the university’s learning and teaching institute can be ordered, these evaluations are about the overall course rather than only specific components thereof.

Feedback provided by students was extremely positive. Formats for feedback included personal communication with the course coordinator in subsequent workshops and e-mail correspondence. Positive feedback regarding the workshop included that it was informative and well delivered, that the content and delivery facilitated student learning and information retention, and that it was a memorable learning experience. As a result of this research exercise, the SCIP has been retained in the final-year pharmacy curriculum as a component of the course.

**DISCUSSION**

With increasing evidence regarding the leading role that pharmacists could play in the area of smoking cessation, introduction of a smoking-cessation element into the pharmacy curriculum at the University of Sydney was considered crucial. The smoking-cessation workshop was conceived in collaboration with education, pharmacy, respiratory, and smoking-cessation experts. Based on previously identified and explored knowledge gaps among students regarding smoking cessation, the workshop was carefully constructed based on principles of adult learning, and embedded into an existing unit of study in the fourth-year (ie, final-year) undergraduate pharmacy curriculum. The goal was to assess students’ prior knowledge, build on their current understanding, and provide them with further comprehension and awareness to evaluate various patient case scenarios and offer assistance accordingly. Students demonstrated satisfaction and significant improvements in knowledge about, and attitudes toward, smoking cessation, leading to the ongoing inclusion of the smoking-cessation workshop in the curriculum.

The improvement in total knowledge scores post-workshop was significant in terms of both general knowledge about smoking and smoking cessation (total true/false knowledge score) and specific clinical-based and pharmacotherapeutic-related knowledge (total multiple-choice question knowledge score). Although most students had positive attitudes toward smoking cessation and its implications before the workshop, the mean total attitude score increased significantly postworkshop ($p=0.012$). With respect to knowledge gains, there was an increase in the mean item difficulty and decrease in the discrimination index values postworkshop. Before the workshop, the proportion of knowledge questions answered correctly was lower, and it was easier to differentiate between high- and low-scoring students; thus, knowledge distribution in the learner set was better. After completing the workshop and with improved knowledge levels, the total scores were higher and less scattered. These results add merit to the previously obtained knowledge scores, and from an instructional perspective, can be attributed to the content of the designed workshop.

Student feedback about the workshop was overwhelmingly positive. Students reported that the interactive nature of the workshop increased the level of engagement between the instructor and the students and among the students themselves, which contributed to improved learning. They remarked that having realistic clinical scenarios and practical demonstrations made the workshop more comprehensive and relevant to everyday pharmacy practice. These comments suggest that learning outcomes extended beyond the unistructural element to the relational elements in the SOLO framework. Students also stated that the introduction of learning games into a workshop was unique and made the activity more engaging, competitive, and appealing. They suggested that this style of workshop should be used for teaching various pharmacy subjects within the curriculum.

Instructional strategies, which included using fun activities and games as student engagement boosters and as a foil to “heavy” clinical cases requiring applied cognitive effort, appear to have served their intended purpose well. Games have been used in health professions education with success, even at a high-skill training level, such as that for surgical residents. An article in an issue of *Nature* discusses how games and other informal approaches to teaching science can be used to produce a “science-savvy citizenry.”

Although our educational intervention was complex, and it would be difficult to pinpoint effective elements, our perception is that using online games at the beginning of the workshop resulted in students being more receptive to and actively involved in the ensuing clinical case activities, particularly as this workshop was different from traditional workshops on smoking-cessation practice.

Health professions students often have positive attitudes regarding their role in smoking cessation, even in developing countries such as India, where smoking prevalence is high and public health messages about
smoking are only now taking effect. Given the highly positive attitudes of students at the beginning of our workshop, the workshop surprisingly resulted in incremental increases in attitude positivity. Given this outcome, it is important to provide students with the concrete skills to assist smokers in quitting. When health professionals become progressively strapped for time, exposure to people who are unwilling to change harmful health behaviors can cause them to experience intervention initiation fatigue. Thus, with increasing practice experience, pharmacists’ interventions may become desultory. Well-designed workshops for pharmacy students just before they enter the profession can help prepare them for the wide spectrum of smoking patients they are likely to encounter and better equip them with strategies to help these patients stop smoking. Given that previous studies have indicated that the nature of interventions delivered to smokers by pharmacists is associated with the pharmacists’ knowledge and attitudes about smoking cessation, workshops such as the SCIP have an important priming role.

A possible limitation of this study included test-retest bias, wherein students knew that the same survey instrument would be used to assess their knowledge and attitudes both before and after the workshop. Another limitation could be lack of a follow-up study to examine the degree and quality of smoking-cessation interventions provided throughout the daily practice of the students once they became practicing pharmacists.

The findings of this study indicate the significant role of up-to-date educational programs and professional training in the area of smoking cessation to improve current knowledge, skills, and practice standards. The literature on the effect of providing smoking-cessation training to pharmacy students is supportive; education was found to significantly improve pharmacy students’ perceived confidence and ability to provide tobacco-cessation counseling. As a result, the smoking-cessation workshop was retained in the pharmacy curriculum and has been administered to final-year undergraduate pharmacy students at the University of Sydney after the conclusion of the study in 2011.

**SUMMARY**

A smoking-cessation workshop for final-year undergraduate pharmacy students was successfully designed, implemented, and evaluated. Students’ overall knowledge about and attitudes toward smoking cessation and its implications improved significantly after they completed the workshop. This study highlights the role of up-to-date, evidence-based educational programs in improving current smoking-cessation practice standards and should lead the way to the nationwide emergence and provision of specialized smoking-cessation training programs that are tailored to meet the needs of practicing pharmacists.

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**REFERENCES**