BRIEF

Pharmacy Student Perceptions and Knowledge of Online Pharmacy Use

John B. Hertig, PharmD, MS, Tyler M. Kennedy
Butler University, College of Pharmacy and Health Sciences, Indianapolis, Indiana
Submitted October 25, 2021; accepted March 14, 2022; published February 2023.

Objective. Currently, there is no set of accreditation standards for integrating the dangers of illegal online pharmacies into Doctor of Pharmacy (PharmD) curricula. As a result, many pharmacists are unable to recognize the differences between a legal and illegal online pharmacy or educate patients on the dangers of online pharmacies. The objectives of this study were to assess gaps in student pharmacists' knowledge and to assess the impact of adding education regarding online pharmacies into PharmD programs.

Methods. A pre- and postsurvey design was developed. Data were collected through an electronic questionnaire distributed to second-year pharmacy (P2) students to evaluate student knowledge gaps at baseline and after education on illegal online pharmacies.

Results. A total of 102 students responded to the presurvey, with 93 (91%) consenting to participate. Out of 100 respondents to the postsurvey, 84 (84%) students consented. Approximately 87% (81/93) of respondents indicated some awareness of prescription medications being purchased online. Most students (89%, 77/86) stated that they do not believe the university has provided adequate curriculum on illegal online pharmacies and counterfeit medications. After receiving education on the relevant topics, 64% (55/85) stated they now felt their education was adequate.

Conclusion. Although pharmacy students were aware of the existence of illegal online pharmacies, they were not aware of the significance of this patient safety issue or how to accurately identify suspicious websites. It is imperative that PharmD programs incorporate formal education on the risks that illegal online pharmacies pose to patient and medication safety.

Keywords: substandard, falsified, illegal, online pharmacy

INTRODUCTION

Since its creation, the internet has become an ever-increasing method of purchasing goods and services worldwide. A 2017 report from PricewaterhouseCoopers reported that the counterfeit drug market earns between $163 billion to $217 billion per year. From the start of the COVID-19 pandemic, consumers have turned to buying more products online from the safety of their own homes, with prescription medications being no exception. While online pharmacies can provide patients with an efficient way to purchase medications, there are many patient safety risks associated with internet pharmacies. The COVID-19 pandemic has provided rogue online pharmacies with the ideal opportunity for criminals to target already fearful consumers by selling potentially harmful medications. The biggest risk to patients is the distribution of substandard and falsified drug products.

Illegal rogue online pharmacies are those that act in violation of the United States Federal Food, Drug, and Cosmetic Act by unlawfully selling prescription medications without a valid prescription, adequate directions for safe use, or required warnings, and with unclear safety and efficacy information. A safe, legal online pharmacy will always require a prescription from a health care provider, have a physical address and telephone number in the United States, be licensed in the state(s) in which they operate and do business in, and have state-licensed pharmacists to answer patient questions. A report published by the National Association of Boards of Pharmacy determined that 95%-96% of websites selling prescription drugs are operating illegally and putting the health of patients in danger. Many illegal online pharmacies “manufacture” and distribute substandard and falsified medical products. These products put patients at risk of potential subtherapeutic effects or cause harm to the patient, including death. The World Health Organization defines substandard and falsified medical products as authorized medical products that fail to meet either quality standard or specifications and deliberately or fraudulently misrepresent a product’s identity, composition,
or source. Substandard and falsified medications affect every region of the world and may also contribute to other global health issues like antimicrobial resistance and drug trafficking.

Currently, many Doctor of Pharmacy (PharmD) programs lack components of a curriculum that educate students on the dangers of online pharmacies. As a result, many practice pharmacists are unable to recognize the differences between a legal and illegal online pharmacy or properly educate patients on the dangers of internet prescription medications. The objectives of this study were to determine gaps in student pharmacists’ knowledge, assess awareness of illegal online pharmacies, and determine the impact of adding a curriculum on online pharmacies to PharmD programs.

METHODS

To accomplish these study objectives, a pre- and post-survey design was developed. Data were collected through an electronic questionnaire distributed to second-year pharmacy (P2) students at Butler University in Indianapolis, Indiana. Descriptive statistical analysis was performed via Excel and Qualtrics (Qualtrics International Inc) to evaluate student knowledge gaps at baseline and after the lecture on illegal online pharmacies. Students’ ability to identify illegal websites was also assessed as application data. This study was reviewed by Butler University’s institutional review board and was deemed exempt.

Inclusion in this survey was voluntary, with respondents first providing informed consent. This survey was given to P2 students at Butler University College of Pharmacy and Health Sciences during the spring 2021 semester from January 2021 to May 2021. During the P2 semester of the program, students were enrolled in a practice management course in which a two-hour lecture session was devoted to education on the risks and benefits of online pharmacies. This course was held prior to the law course in students’ third (P3) year. In the 2021 course, topics covered in the lecture included the prevalence and impact of illegal online pharmacies, how illegal online pharmacies operate globally, assessing the validity of an online pharmacy (eg, Is the online pharmacy in compliance with the laws in both the country of origin and the country of destination? Does it require a valid prescription for prescription medications?), and visual cues for identifying illegal online pharmacies (eg, excessive product promotion/sales, fraudulent use of seals/badges, and absence of the pharmacy top-level domain). A presurvey was administered to students before the lecture on online pharmacies to gauge their prior knowledge, and a postsurvey was administered immediately following the lecture to measure the impact of this education.

At a 90% confidence interval (error margin ±5%), the ideal sample size was calculated to be greater than 75 participants. The surveys were completed electronically during dedicated lecture time, and participants did not receive financial compensation for completing the survey.

The Qualtrics tool was used to create a web-based survey that consisted of 19 questions in the presurvey and 21 questions in the postsurvey. Survey questions included a mixture of multiple-choice, Likert-type scale, and yes-no questions. The survey was estimated to take approximately five to 10 minutes to complete. Presurvey questions focused on the students’ prior knowledge of online pharmacies as well as their potential advantages and disadvantages, such as prevalence, ease of availability, and safety. To assess the students’ abilities to identify illegal online pharmacies based on webpage appearance, two illegal (or rogue) websites and one known legal website were selected for inclusion in the survey, and students were asked to answer a few questions regarding their legitimacy. Appendix 1 shows the three webpages used for this survey. The postsurvey also included the same questions to analyze the impact of the lecture. Additional questions were added to gauge students’ confidence level in identifying illegal websites as well as counseling patients about the dangers of illegal pharmacies.

Both the pre- and postsurvey were conducted before lectures in March 2021. Students were given time at the beginning of the lectures to complete these surveys. Participants consented to the study while reading an informational summary about legal and illegal online pharmacy usage. The survey and specific questions are provided in the supplemental material.

RESULTS

A total of 102 students responded to the presurvey, with 93 (91%) consenting to participate and answering at least one question. Out of the 100 students that responded to the postsurvey, a total of 84 (84%) students consented and answered at least one question as well. Since responding to each question was not mandatory, the denominator used to evaluate the results of each item varied.

Prior to any formal education on online pharmacies, approximately 87% (81/93) of respondents indicated some awareness of prescription medications being purchased online, and many students stated that the potential problems caused by illegal online pharmacies are of at least moderate importance in the United States today. In the presurvey, most students (89%, 77/86) stated that they do not believe the university has provided adequate curriculum on illegal online pharmacies and counterfeit medications up to this point in their pharmacy education. When given statements to rank on both possible advantages and
disadvantages of online pharmacies, most students either somewhat agreed or strongly agreed with statements regarding the disadvantages of an online pharmacy, including not receiving the correct product (94.2%, 81/86), not receiving proper information on a medication (94.2%, 81/86), and the potential to receive counterfeits (96.5%, 83/86). Figure 1 displays the full response breakdown for these selected questions.

In the presurvey, 44% (40/90) of students were unable to determine whether webpage A (an illegal website) was operating legally or illegally. In the postsurvey, students improved, with 82% (70/85) able to identify it as an illegal website. With webpage B (a legal webpage), 46% (41/89) of students labeled it illegal in the presurvey, and 57% (49/85) labeled it illegal in the postsurvey. With webpage C (illegal), most students were able to accurately identify it as an illegal webpage in both the presurvey (66%, 58/88) and the postsurvey (80%, 68/85). Figure 2 breaks down the specific pre- and postsurvey results for each webpage. When students were asked to rank their confidence level (using a scale of one to 10, with one being the least confident and 10 being the most confident) on their ability to differentiate between an illegal and legal online pharmacy in practice, most students (69%, 58/84) ranked themselves in the six to eight range. The final question asked students whether they believe Butler University...
has now provided them an adequate curriculum on illegal online pharmacies and counterfeit medications, of which 64% (55/85) stated that the school has provided this.

DISCUSSION

Although pharmacy students were aware of the existence of illegal online pharmacies, the results from this study illustrate that, prior to the lecture, they were not aware of the patient safety impact of this issue or how to properly distinguish between a legal and illegal online pharmacy. Many students underestimated the impact that illegal online pharmacies have on patient and medication safety globally. Students improved in comprehension and application on nearly every measure between the pre- and postsurvey, emphasizing the need for more formalized education on illegal online pharmacies to be incorporated into PharmD programs across the United States and the globe. Despite crowded curricula, it is essential for space to be afforded to contemporary topics of immediate importance. Courses in the socioadministrative sciences, including those covering law, regulation, and/or practice management, would be natural locations for this specific content. Broadly, and as standards allow, faculty should prioritize these areas of growing relevance over topics becoming increasingly outdated.

Notably, once students were educated on the impact of fraudulent online pharmacies and how to identify them, most students were able to correctly determine a legal versus illegal online pharmacy on two of the three screenshots.

Figure 2. Second-year Doctor of Pharmacy students’ responses to survey items regarding the validity of three online pharmacy websites prior to and following a two-hour lecture session on the risks and benefits of online pharmacies.
provided in the survey. Webpage B (Appendix 1) was the most difficult for students to identify because of the suspicious appearance of the webpage itself, even though it is the webpage of a legal online pharmacy. Students were taught to identify legal online pharmacies by either locating the Verified Internet Pharmacy Practice Sites accreditation or authenticating the “.pharmacy” domain, neither of which were present on webpage B. Pharmacy students must be educated on the dangers of online pharmacies to public health, as more and more patients have turned to online resources because of the COVID-19 pandemic. To support education in this field, it is important to develop accreditation standards around these topics to demonstrate students’ awareness of the resources available to properly educate their patients. Despite the positive impact a two-hour session had on student learning (improving from 11% of students agreeing that education on the topic was adequate in the curriculum to 64% of students agreeing), there are additional topics that should be incorporated in a curriculum. Pharmacists are highly accessible health care professionals that many patients view as their main source of medication information. Providing all future pharmacists with this timely education will help prevent public misinformation and limit purchases from illegal online pharmacies.

Given the nature of this survey-based study, there are limitations to note. First, only students in their second professional year of pharmacy school at Butler University were included in this study. This limits the generalizability of results to all pharmacy students. Participants were not required to answer all questions, which yielded receipt of only partial data on certain questions. Although the voluntary nature of the questions likely increased student participation overall, it may have led to results with differing percentage estimates per question. Importantly, both the overall response rate and the individual item responses were consistent between the two surveys.

CONCLUSION

This study demonstrated that pharmacy students were aware that illegal online pharmacies exist, but they did not understand their impact or how to properly identify them prior to education on this material. Many students were not able to accurately classify online pharmacy webpages as either legal or illegal prior to any formal lecture on the subject matter. After receiving education on this material, most students were able to apply the lesson by correctly identifying the legality of sample webpages, thus differentiating safe sources from unsafe sources of medication online. It is imperative that pharmacy schools begin to incorporate formal education on the current risks that illegal online pharmacies pose to patient and medication safety. Additional research into the impact of a formalized curriculum on this subject matter with a larger cohort will ensure pharmacy students are adequately trained to both identify illegal websites and inform the public on the threat of illegal online pharmacies.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the assistance of Karolina Cieslak, PharmD, and Vraj Patel, PharmD, in reviewing and editing the manuscript for this study.

REFERENCES

Appendix 1. Screenshots of the three online pharmacy webpages included in a survey administered to assess pharmacy students’ perceptions and knowledge of online pharmacy use.
Appendix 1. (Continued)