EVALUATION OF PHARMACISTS' AWARENESS OF THE PREVALENCE AND NEGATIVE CONSEQUENCES ASSOCIATED WITH ILLEGAL INTERNET PHARMACIES

John B. Hertig*, PharmD, MS and Nikki Sebahar**, PharmD Candidate

Introduction: The illegal internet pharmacy market is becoming more prevalent, with up to 35,000 active internet pharmacies at any given point in time. These pharmacies impose a threat to public safety, and unfortunately, they can be difficult to identify. Consumers are highly encouraged to rely on medication experts to guide them in the right direction when seeking safe therapy, but even pharmacists struggle to distinguish the illegal internet pharmacies from those that are legal. The purpose of this study was to determine gaps in knowledge between pharmacists and the illegal internet drug market and to assess the need for additional cross-sectional research.

Methods: A descriptive design utilizing an electronic questionnaire was used to survey licensed pharmacists in the state of Indiana. Data were collected and analyzed using descriptive statistics.

Results: A total of 80 Indiana pharmacists participated in the study. Approximately 89% of pharmacists claimed they are not provided training on illegal internet pharmacies at their current practice sites, and 54% were unable to determine the legitimacy of an illegal internet pharmacy.

Conclusion: Licensed pharmacists are aware of the risks associated with these internet pharmacies, but they are unable to determine legitimacy based on the look of the webpages. Additionally, results show that study pharmacists are not confident in their knowledge to counsel patients on the issue. Further research is necessary to determine and analyze pharmacists' knowledge and awareness of illegal online pharmacies.

The internet is constantly growing, with over 1.7 billion websites active in March 2017.[1] Due to this growing nature of the World Wide Web, there is potential for an increase in cybercrime. In fact, the Federal Bureau of Investigation reported a cost of $1,070,711,522 due to internet crimes in 2015.[2] These crimes ranged from corporate data breach and identity theft to health care-associated events.[2] Health care-related crime includes the financial impact associated with the illegal internet pharmacy market. An illegal internet pharmacy can be described as an online-accessible outlet that distributes substandard, falsely labeled, falsified, and counterfeit (SSFFC) medications.[3] It may fail to: comply with applicable law, have a pharmacy/physician staff clear of a disciplinary record, hold a legal pharmacy license, dispense or offer to dispense prescription drugs without receipt of a valid prescription, and/or register with an accurate street address for the dispensing pharmacy.[3] This unlawful market is alleged to be worth more than $200 billion annually and dominates other industries of the underground economy, including prostitution, human trafficking, and illegal arms sales.[4] Illegal internet pharmacies are active and available to anyone who has internet access, and there are more than a handful to choose from. In fact, there are anywhere from 30,000 to 35,000 active pharmacies online at any given point in time. Although some online pharmacies operate legally, more than 96% of them do not.[6]

Internet pharmacy use is pervasive throughout all demographics. Parents who cannot afford their child's rare disease medication, the

*John B. Hertig is the Associate Director for Purdue University College of Pharmacy Center for Medication Safety Advancement, Fishers, IN.

**Nikki Sebahar is a PharmD Candidate, Purdue University College of Pharmacy, West Lafayette, IN.

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elderly veteran who has trouble sleeping, or the mental health patient who is ashamed of their condition, patients and their caregivers all turn to this seemingly affordable and convenient internet pharmacy market. The drug products distributed by these pharmacies are delivered directly to the consumer's door and are often manufactured in unsanitary and unsafe conditions. They may contain little to no active ingredients and/or toxic substances, such as concrete, chalk, road tar, paint, anti-freeze, floor wax, and others.[7] Unfortunately, these products are often indistinguishable from authentic medications, making it even more difficult to determine illegitimacy. **Figure 1** illustrates two examples of how similar SSFFC medications can be to the real pharmaceutical products.[8,9]

Pharmacists are considered the medication experts who directly interact with patients regarding their drug therapy more often than physicians.[10] To become licensed professionals, pharmacists study pharmacotherapy, pharmacokinetics, pathophysiology, and other related topics in a comprehensive professional curriculum lasting at least four academic years in addition to at least two years of prerequisite didactic instruction. Despite this intensive training, pharmacy students are provided little, to no, education on SSFFC medications and identifying them and illegal internet pharmacies. Accredited colleges of pharmacy follow Accreditation Council for Pharmacy Education (ACPE) accreditation standards to plan their Doctorate of Pharmacy curriculums, and the 2016 standards do not require the incorporation this topic.[11] Yet, it is essential that pharmacists are fully aware of the prevalence and risks associated with purchasing drugs from illegal internet pharmacies. If pharmacists can better identify illegal online pharmacies, and subsequently understand the associated risks inherent in purchasing from these sites, then they will be better positioned to counsel patients and work with other health professionals to limit the potential for negative consequences, including patient harm and death.

Methods

DESIGN

The objective of this study was to determine pharmacist knowledge and awareness of illegal online pharmacies.

To accomplish this study objective, a descriptive survey design was developed, and data was collected through an electronic questionnaire. Descriptive statistical analysis was performed to assess pharmacist knowledge gaps and the ability of pharmacists to identify illegal online pharmacies.

The survey was determined to be exempt from full Institutional Review Board approval. Participation was voluntary, and the results were anonymous.

Figure 1. Examples of legitimate and illegitimate medicines.[8,9]

The image above shows counterfeit Viagra™ alongside the legitimate version.[8]

The image above shows the counterfeit anti-influenza agent Tamiflu™ alongside the legitimate version.[9]

SETTING AND SAMPLE

Inclusion criteria for this study was membership in the Indiana Pharmacists Alliance (IPA) professional organization. Study participants were contacted using the IPA electronic distribution list. Indiana pharmacists who were not members of IPA were excluded from participation. Study participants were not compensated for their participation.

INSTRUMENTS

The Qualtrics® (Provo, UT) tool was used to create a web-based survey. The survey consisted of 38 questions (18 multiple choice, 17 Likert scale, two yes/no, one short answer) and was estimated to take around eight minutes to complete. The questions focused on the participants' overall knowledge and confidence of the prevalence and negative clinical and safety impact associated with illegal internet pharmacies. Questions were designed to gauge participants' confidence level regarding the topic when counseling patients.

To ensure the inclusion of realistic questions in the survey, LegitScript℠ provided a data file identifying illegal internet pharmacies in the Midwest in which consumers are directed to when searching for medication sold online. Utilizing five common medications known to be purchased online—Cialis™, Advair Diskus™, Zithromax™, Celebrex™, and hydrocodone™—LegitScript℠ conducted a total of five queries from a Chicago, IL IP address in August 2016. These queries were run on two search engines — Google and Bing — capturing the first three pages of data and returned a total of 422 search results, including both organic (unpaid) and sponsored (paid advertisements). The data sweep was provided in the form of a spreadsheet that outlined top search results. The organic listings identified primarily illegal internet pharmacies, apart from a few that were operating legally. After thorough review of the data, three webpages were selected that were included in the data file. These sites were screen-captured to create survey questions evaluating participants' ability to identify illegal and legal internet pharmacies and can be viewed in **Appendix A**.

PROCEDURE

The electronic survey was created in October 2016 utilizing the Qualtrics® tool. It was piloted in early November to 13 pharmacists who provided feedback regarding length and readability of the survey. Edits were made following the test to ensure clarity throughout, and the survey was finalized on November 18, 2016.

IPA sent an email with the survey link to pharmacists on November 30, 2016, which explained the research project and asked for voluntary participation. A reminder email with the survey link

Table 1.
Demographics of study sample. (*n*=80)

Demographics		
	n%	**#**
Gender (n=80)		
Female	59	47
Male	41	33
Time as Pharmacist (n=80)		
0-5 years	30	24
6-10 years	14	11
11-20 years	19	15
Over 20 years	37	30
Pharmacy Degree* (n=79)		
B.S.	40	30
Pharm.D.	72	57
M.S.	4	3
Ph.D.	0	0
Other	1	1
Post-Graduate Training* (n=36)		
Residency-PGY1	53	19
Residency-PGY2	25	9
Fellowship	11	4
M.S.	8	3
Ph.D.	3	1
MBA	2	6
Other	22	8
Current Practice Site (n=78)		
Community chain/grocery	19	15
Community independent	8	6
Ambulatory clinic	9	7
Hospital	26	20
Long-term care	1	1
Home health	0	0
Managed care	5	4
Academia	8	6
Industry	10	8
Other	14	11

*Survey question allowed multiple answers

was subsequently sent to the same study population on January 3, 2017.

The participants could take the survey independently and on their own time, and no restrictions were placed on internet usage while the study sample completed the survey. Participants consented to the study before reading a summary of legal and illegal internet pharmacies and answering questions. There were no question requirements, as participants could leave questions unanswered. The survey was closed on January 16, 2017, and the results were reviewed.

Results

Out of the study sample, 80 pharmacists submitted the survey and were included in the results and discussion. Approximately 59% of the study sample were female and 41% were male. Participants' time as practicing pharmacists varied with the following ranges: 0-5 years (30%), 6-10 years (14%), 11-20 years (19%), and over 20 years (38%). Practice sites for the study sample varied and can be reviewed in **Table 1**, along with other participant demographics.

Approximately 91% (73/80) of pharmacists claimed to have known about the existence of illegal internet pharmacies prior to completing the survey, and 89% (70/79) stated they are not provided training on the topic at their current practice sites. Illegal internet pharmacies make up roughly 96% of the internet pharmacy market, yet 93% (74/80) of participating pharmacists believe less than 81% of internet pharmacies operate illegally. Despite their awareness, 42% (33/80) of pharmacists are not confident in their ability to counsel patients on the prevalence of illegal internet pharmacies, and less than half (37/80; 46%) are confident in their ability to counsel patients on the availability of these sites (**Table 2**).

Nearly the entire study sample (77/80; 96%) disagreed that all medications sold on the internet to United States (US) consumers are manufactured in the US and are free from adulterants. Most study participants (76/80; 95%) disagreed that all medications sold on the internet to US patients are Food and Drug Administration (FDA)-approved and comply with US pharmacy law, but they were unsure if an internet pharmacy requires a valid physical location to operate legally (**Table 3**).

Majority of pharmacists surveyed (53/80; 66%) disagreed that illegal internet pharmacies are easily identifiable, and only 34% (27/80) are

Table 2.
Summary of pharmacists' confidence in ability to counsel patients on the shown statements. (*n*=80)

	Not at all confident		**Not very confident**		**Neutral**		**Somewhat confident**		**Very confident**		**N/A**	
	***n*%**	**#**	***n*%**	**#**	***n*%**	**#**	***n*%**	**#**	***n*%**	**#**	***n*%**	**#**
Prevalence of illegal internet pharmacies	14	11	28	22	14	11	39	31	6	5	0	0
Availability of illegal internet pharmacies to patients	13	10	24	19	16	13	40	32	6	5	1	1
Determining legitimacy of an internet pharmacy	11	9	38	30	15	12	29	23	5	4	3	2
Types of medications sold by illegal internet pharmacies	10	8	28	22	19	15	30	24	10	8	4	3
Risk associated with medications sold by illegal internet pharmacies	6	5	16	13	11	9	38	30	26	21	3	2

confident in their ability to counsel patients on how to determine their legitimacy. When asked to determine legitimacy of an internet pharmacy based on the look of its webpage, approximately 54% (43/80) of pharmacists were unsure and 17% (14/80) falsely determined it to be legal. **Figure 2** outlines these results, along with pharmacists' ability to determine legitimacy of other example sites.

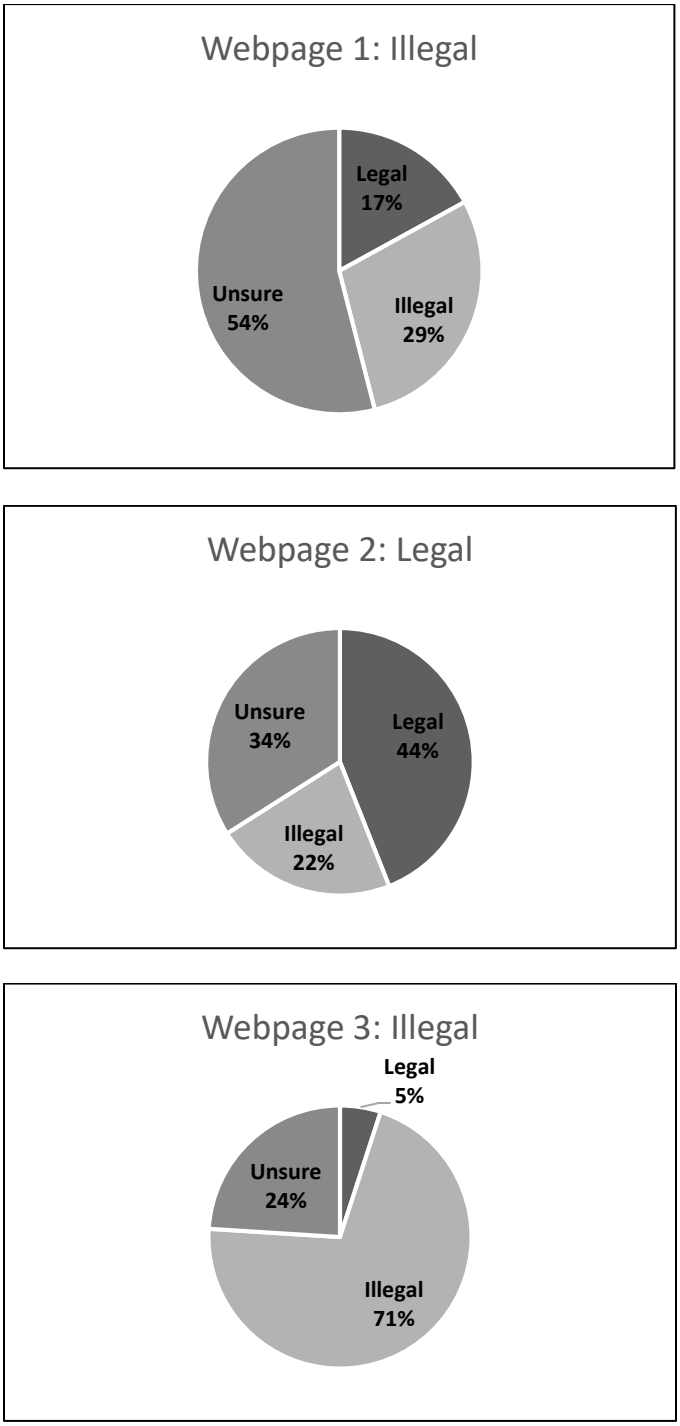
Discussion

The objective of this study was to determine pharmacists' knowledge and awareness of illegal internet pharmacies. Results from the research survey showed that although pharmacists have a decent understanding of the risks associated with illegal internet pharmacies, they believe that less than 81% of internet pharmacies are illegal, however, nearly 96% do not comply with applicable US law. Study pharmacists were unaware of exactly how prevalent illegal internet pharmacies are on the World Wide Web, and they are not confident in their ability to counsel patients about these obscure websites.

Although pharmacists are not typically trained regarding the prevalence and identification of illegal internet pharmacies, the study participants acknowledged the severity of the risks to patients associated with them. Study participants were aware that not all internet pharmacies comply with applicable US law, nor do they always require a valid prescription to purchase medicine. The study pharmacists also recognized that medications sold on the internet to US patients are not always FDA-approved, may be contaminated with adulterants, and are not always manufactured in the US by approved manufacturers. Despite these realizations, only one pharmacist agreed that illegal internet pharmacies are easily identifiable, and only four pharmacists are confident counseling patients on how to determine these sites' legitimacy. However, more than half of surveyed pharmacists were unable to determine legitimacy of an actual illegal internet pharmacy, further emphasizing the reality that there is a deficiency in this knowledge.

The illegal internet pharmacy market is alleged to be worth more than $200 billion annually, meaning people are turning to these sites for medications, usually unaware of the illegitimacy and risks.[4] Since the SSFFC medicines sold by illegal internet pharmacies are nearly indistinguishable from genuine drug products, there is an immense risk posed

Figure 2.
Pharmacists were shown screenshots of real websites* and asked, "Based on the look of this webpage, do you think it is legal, illegal, or are you unsure?" Below is a summary of pharmacists' responses. (*n*=80)



*Screenshots of websites are included in Appendix A

Table 3.
Summary of pharmacists' level of agreeance with statements regarding illegal internet pharmacies. (*n*=80)

	Disagree		**Somewhat Disagree**		**Neutral**		**Somewhat Agree**		**Agree**	
	***n*%**	**#**	***n*%**	#	***n*%**	**#**	***n*%**	#	***n*%**	**#**
Illegal internet pharmacies are easily identifiable	15	12	51	41	15	12	18	14	1	1
Illegal internet pharmacies sell medications without a valid prescription	1	1	3	2	11	9	28	22	58	46
All medications sold on the internet to US patients are FDA-approved	84	67	11	9	4	3	1	1	0	0
All medications sold on the internet to US patients comply with US pharmacy law	84	67	11	9	4	3	1	1	0	0
All medication sold on the internet are free from adulterants	84	67	13	10	4	3	0	0	0	0
All medications sold on the internet to US consumers are manufactured in the United States	93	74	4	3	3	2	0	0	0	0
Internet pharmacies require a valid physical location	16	13	10	8	19	15	20	16	35	28

to public health. Pharmacists have the unique opportunity to directly interact with patients when they obtain their medication, and there is an opportunity available to counsel them about illegal internet pharmacies and SSFFC medicines. However, although they are aware of the dangers associated with purchasing drugs from illegal pharmacies, pharmacists struggle to identify their legitimacy and are not confident talking to patients about them. If licensed professionals are unable to differentiate an illegal internet pharmacy from a legally compliant one, it is unlikely pharmacists can adequately guide patients on making safe choices when going online for their medication. The results from this study suggest that there is a need to better prepare pharmacists to counsel patients about illegal internet pharmacies.

Conclusion

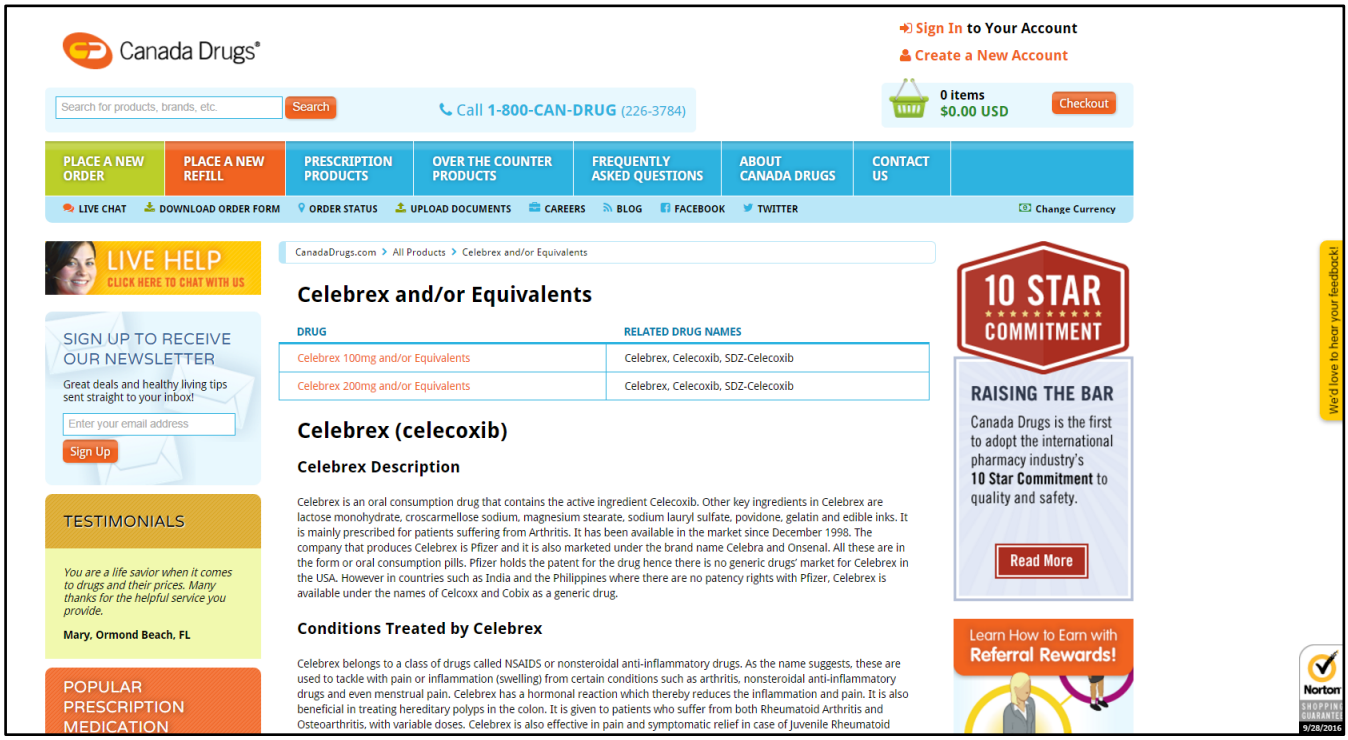
Illegal internet pharmacies provide consumers with SSFFC medications that are nearly indistinguishable from authentic medicines. Results from this pilot research study suggest that licensed pharmacists are aware of the risks associated with these internet pharmacies, but they are unable to determine legitimacy based on the visual attributes of the webpages. Additionally, these results demonstrate pharmacists are relatively unaware as to the prevalence of this issue and are not sufficiently confident in their knowledge. Further education and research is necessary to assist pharmacists' and other health professionals as they help patients stay safe online.

REFERENCES

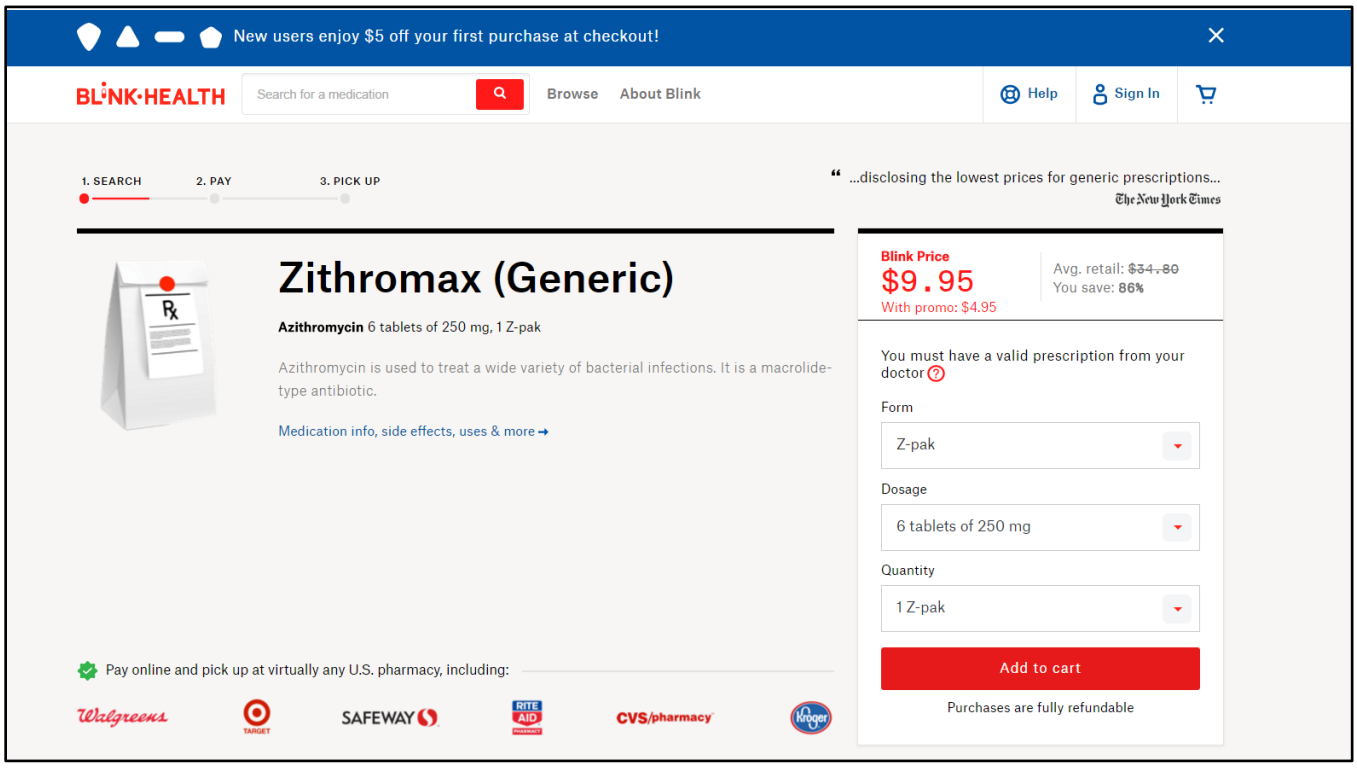
1. *March 2017 Web Server Survey*. Netcraft. Netcraft Ltd. March 2017. Accessed April 16, 2017. Available at: https://news.netcraft.com/archives/category/web-server-survey.
2. *2015 Internet Crime Report.* Internet Crime Complaint Center, 2015. U.S. Department of Justice Federal Bureau of Investigation. Available at: https://pdf.ic3.gov/2015_IC3Report.pdf
3. Substandard, Spurious, Falsely labelled, Falsified and Counterfeit (SSFFC) Medical Products. World Health Organization. Available at: http://www.who.int/medicines/regulation/ssffc/en/
4. LegitScript International Pharmacy Certification Standards. Available at: https://www.legitscript.com/certification/pharmacies/standards/
5. Counterfeiting: An Industry Three Times Larger than the Illicit Global Drug Trade, Sophic Capital, 2014.
6. Internet Drug Outlet Identification Program, National Association of Boards of Pharmacy, 2016.
7. Poisons Found in Counterfeit Medicines, Partnership for Safe Medicines, 2012.
8. ASOP [BuySafeRx]. (2017, March 3). Available at: https://twitter.com/BuySafeRx/status/837663348082769922/photo/1
9. ASOP [BuySafeRx]. (2017, March 2). Available at: https://twitter.com/BuySafeRx/status/837414584675942401/photo/1
10. Collins, S. Making a world of difference for patients with multiple medications. American Pharmacists Association, 2014. Available at: https://pharmacist.com/making-world-difference-patients-multiple-medications
11. *Accreditation Standards and Key Elements for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree*. Accreditation Council for Pharmacy Education, 2015. Available at: https://www.acpe-accredit.org/pdf/Standards2016 FINAL.pdf

APPENDIX A: Website examples from LegitScript data sweep

Webpage 1: Illegal



Webpage 2: Legal



Webpage 3: Illegal