

RESEARCH ARTICLES

Pharmacy Students' Knowledge, Attitudes, and Evaluation of Direct-to-Consumer Advertising

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Objectives. To assess pharmacy students' knowledge, attitudes, and evaluation of direct-to-consumer advertising (DTCA).

Methods. A cross sectional, self-administered, 106-item survey instrument was used to assess first, second, and third professional year pharmacy students' knowledge about DTCA regulations, attitudes toward DTCA, and evaluation of DTC advertisements with different brief summary formats (professional labeling and patient labeling) and in different media sources (print and television).

Results. One hundred twenty (51.3%) of the 234 students enrolled participated in the study. The mean percentage knowledge score was 48.7% ± 12.5%. Based on the mean scores per item, pharmacy students had an overall negative attitude toward DTC advertisements. Students had an overall negative attitude toward television and print advertisements using the professional labeling format but an overall positive attitude toward the print advertisement using the patient labeling format.

Conclusions. Lectures discussing DTC advertising should be included in the pharmacy curriculum.

Keywords: direct-to-consumer advertising, pharmacy students, prescription drug advertising

INTRODUCTION

Direct-to-consumer advertising (DTCA) involves pharmaceutical companies promoting prescription drugs directly to consumers by the use of popular media such as television, radio, and printed publications.¹ The United States and New Zealand are the only 2 industrialized countries that allow DTCA.² In 1999, about 15.3 million Americans asked their physician to prescribe a DTC advertised drug and 12.9 million received the requested prescription.² In 2002, 1 in 5 Americans was prompted by a DTC advertisement to contact their physician and discuss the advertised drug.³ Pharmaceutical companies spent an estimated \$4.2 billion on DTCA in 2005.⁴

Many studies have been conducted to assess the impact of DTCA on health care providers and consumers. Physicians and pharmacists have listed improved communications with their patients and increased awareness about medical conditions and available treatment options as positive impacts of DTCA.^{1,2,5-7} However, physicians

and pharmacists have expressed concerns over DTCA misleading patients, promoting inappropriate prescribing, and creating unrealistic expectations of drugs.^{1,2,5-7} Health care providers have also expressed concerns that information presented in DTC advertisements may not be balanced and may confuse patients about the appropriateness and effectiveness of advertised treatment options.^{2,5,8} Patients' requests for specific brand name drugs are fulfilled even though less expensive and equally effective alternatives are available.^{2,5,8}

While health care providers' views about DTCA have often been reported in the literature, health care professional students' views about DTCA have not been reported as often. One study compared and assessed pharmacy, medical, and nurse practitioner students' understanding of their relationship with the pharmaceutical industry.⁹ The only aspect of DTCA that the study assessed was students' confidence in handling patients' requests for advertised prescription drugs. Study participants were provided 6 hypothetical clinical scenarios representing medically unjustified patient requests for specific DTC advertised prescription drugs. Pharmacy students were more confident than medical and nurse practitioner students in their ability to guide patients to

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a more appropriate drug instead of the advertised drug requested by the patients. Results of a DTCA study conducted by Glinert et al of first-professional year pharmacy students indicated that pharmacy students' recall of general and specific side effect information in DTC television advertisements was improved if the advertisement was for a prescription drug with high risk severity associated with its use. Pharmacy students' recall of information was also higher with the presentation of risk information at the end of the advertisement, use of a female voice over, and use of captions in addition to oral messages in the advertisement.¹⁰

Patients are constantly exposed to information about prescription medications through DTC advertisements and may have questions about information presented through these advertisements. A study conducted by Food and Drug Administration (FDA) researchers reported that consumers ranked pharmacists second, after physicians, as a source of additional health care information after seeing a DTC advertisement.⁵ Since consumers approach pharmacists for health care-related information, it is important to assess pharmacists' attitudes toward DTCA. While studies have been conducted to assess pharmacists' attitudes toward DTCA, studies specifically assessing pharmacy students' knowledge about DTCA regulations and attitudes toward DTCA have not been reported.

Pharmacy students may have to answer patients' questions related to DTCA during their training and later on in their practice as licensed pharmacists. DTCA may provide pharmacy students with an opportunity to enhance the pharmacist-patient relationship by answering patients' questions about advertised drugs.¹¹ In order to facilitate informed discussions and as participants in the drug use process, pharmacy students need to be aware of the health care information that is being disseminated to their patients through DTCA. Increased awareness about information provided in DTC advertisements might not only help pharmacy students better answer patients' DTCA questions but also increase pharmacy students' awareness of any false and/or misleading claims in DTC advertisements to which their patients may be exposed. Thus, it is important to assess whether pharmacy students are aware of DTCA and the information presented to their patients through DTC advertisements.

Studies have been conducted to assess the quality of information disseminated through DTCA by using health care providers and consumers as evaluators. However, studies involving pharmacy students' assessment of the quality and the extent of information provided in DTC advertisements have not been conducted. Having hands-on experience in evaluating DTC advertisements gives pharmacy students a better understanding of the informa-

tion to which their patients are exposed. Also, evaluating actual DTC advertisements might change pharmacy students' attitudes toward DTCA.

Thus, the objectives of this study were to assess (1) pharmacy students' knowledge about DTCA regulations; (2) pharmacy students' attitudes toward DTCA; (3) pharmacy students' evaluation of examples of actual DTC advertisements disseminated to consumers in various media sources; and (4) whether there is a change in pharmacy students' attitudes toward DTCA following exposure and evaluation of actual examples of DTC advertisements.

METHODS

The study included a self-administered, cross sectional, 106-item survey instrument completed by a convenience sample of first-, second-, and third-professional year pharmacy students at the University of New Mexico College of Pharmacy. The population included 234 students, with 82 students from the first-year class, 86 students from the second-year class and 66 students from the third-year class. To recruit students for the study, an e-mail message describing the research objective was sent out to students 2 weeks before the study. An announcement describing the study and soliciting participation was made in each of the classes a day after sending out the initial e-mail message. An e-mail message reminder was sent to all students a day before the actual study and students were again reminded on the day of the study by an announcement in all 3 classes. To accommodate students who could not participate on the scheduled date, the survey instrument was re-administered once more 1 day after the original study date. As the survey instruments had no personal identifiers, study participants were not required to complete a consent form. The study participants were informed that voluntary participation and completion of the survey instrument would be considered their consent to participate. The University of New Mexico Health Sciences Center Human Research Review Committee granted approval for the study.

Prior to questionnaire development, the media sources to be used for the study were explored and the DTC advertisements to be evaluated by pharmacy students were selected. A Time Inc. research report listed print and television as the top 2 media sources used by consumers for obtaining health care information. Thus, for the purposes of this study, print (magazines) and television media were chosen as the media sources from which DTC advertisements would be selected for pharmacy students to evaluate.¹² Time constraints and feasibility did not permit analysis of other media sources like the Internet.

DTC print advertisements can adhere to either the patient labeling or the professional labeling format to

fulfill the brief summary requirement. The brief summary included information on the advertised product's side effects, contraindications (including warnings, precautions, cautions, special considerations, important notes), and effectiveness.¹³ The professional labeling format, used to represent the brief summary, includes detailed information on all the side effects and contraindications of the drug product and uses highly technical medical terminology.¹⁴ The patient labeling format includes FDA-approved information about prescription drugs provided to patients by pharmacists and other health care providers and is written in consumer-friendly language.¹⁴ To assure both formats were represented in the study, participants were asked to assess 2 print advertisements, 1 representing the professional labeling format and 1 representing the patient labeling format.

The study advertisements were selected based on an IMS Health Report listing the top 10 products with the highest spending on DTCA for the year 2003.¹⁵ Nexium (esomeprazole magnesium) topped the IMS list and the professional labeling format was used to fulfill the brief summary requirement. The only pharmaceutical product in the IMS list using the patient labeling format was Zyrtec (cetirizine hydrochloride). Therefore, Nexium was used to represent a print advertisement using the professional labeling format and Zyrtec was used to represent a print advertisement using the patient labeling format. In order to facilitate comparison of information provided in print versus television media, the researchers decided to use Nexium to represent the television advertisement. The study advertisements were selected from *Readers Digest* magazine, which has a high circulation and targets consumers in all age groups.

The study questionnaire consisted of 6 sections and a total of 106 items. The first section solicited demographic information about study participants. All demographic items were closed ended. Since no previous DTCA-related studies were conducted in pharmacy students, demographic variables assessed in studies involving health care providers and consumers were selected for the purposes of this study.

The second section assessed study participants' knowledge about DTCA regulations. Federal regulations and guidances and the New Mexico State Board of Pharmacy regulations for prescription drug advertising were used to develop knowledge section items.^{13,14,16-19} The study participants were asked to mark either true or false for each of the 13 items in the knowledge section.

The third section assessed study participants' attitudes toward DTCA (pretest attitudes). The attitudes section included a total of 19 items. Since no previously validated questionnaire to assess pharmacy students' atti-

tudes toward DTCA was available, items from a questionnaire developed by Desselle et al to obtain pharmacists' attitudes towards DTCA and items from a published literature review of the health system impacts of DTCA were used to develop the attitudes section items.^{2,7}

The fourth section contained items directed at the study participants' evaluations of the 3 DTC advertisements. Due to the absence of any previously validated questionnaires, items were developed by the researchers. Fourteen items were designed to assess study participants' evaluation of the print advertisements for Nexium and Zyrtec and 13 items were designed to assess their evaluation of the television advertisement for Nexium. The study participants were also asked to evaluate the 3 advertisements from a patient's perspective.

The fifth section contained items to assess whether there were any changes in the study participants' attitudes toward DTCA after exposure to and evaluation of the 3 DTC advertisements (posttest attitudes). These posttest attitudinal items were identical to the pretest attitudinal items. The study participants' comments about the study and DTCA were solicited in the last section. For all items in the attitudes and evaluation section, study participants were asked to mark their responses on a 5-point Likert type scale, on which 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

After an initial review of all items in the questionnaire by the researchers, the questionnaire was pilot tested. A convenience sample of 6 pharmacy students, 2 each from the first-, second-, and the third-professional year classes were selected for the pilot test. The purpose of the pilot test was to evaluate the face validity of the questionnaire by soliciting comments on the clarity, relevance, and wording of the items and inclusion of any additional items or identification of any redundant items. The pilot test was also used to determine the amount of time required to complete the study.

Due to the different schedules of the 3 pharmacy classes, the study was conducted in 3 different sessions, 1 session for each class. To accommodate students who could not participate on the scheduled date, the survey was re-administered (1 day after). However, this time the study was conducted only once, during the students' common hour. Based on the results of the pilot test it was determined that study participants would need approximately 45 minutes to complete the study. A script was prepared and followed to ensure that students participating in the study at different times received the exact information and directions to complete the study. First, the study participants' knowledge and attitudes toward DTCA were assessed. The study participants were then asked to evaluate the Nexium print

advertisement, followed by an evaluation of the Nexium television advertisement, and finally the Zyrtec print advertisement. After their evaluation of the 3 advertisements, the study participants were asked to complete the posttest attitudes section. All participants were reimbursed \$10 for participating in the study upon handing in their completed questionnaires. Internal College of Pharmacy research funds were used to conduct this study.

All data were entered and analyzed using the SPSS, version 11.0 (SPSS). Questionnaires with either less than 80% of all responses complete or questionnaires with less than 80% of the responses in any one section complete were excluded from data analysis.²⁰ Survey instruments filled out by pharmacy students in their fourth-professional year were also excluded from data analyses. Reliability estimates for different sections of the questionnaire were calculated using Chronbach's alpha coefficients. The corrected item to total correlations were calculated for all items and items with corrected item to total correlations lower than 0.30 were evaluated.²¹ The Kuder-Richardson reliability scores (KR-20) were calculated for the knowledge section.

Knowledge scores were calculated for each participant based on the number of correct responses. A percentage knowledge score for each participant was also calculated. Mean scores were calculated for each item in the attitudes and advertisement evaluations section. For items in the attitudes and evaluations section, a higher mean score for an item indicated greater agreement with the statement. Difference between the mean attitude scores on the pretest and posttest were analyzed using paired *t* test ($p \leq 0.05$). A multiple regression analysis was performed to determine whether any of the demographic factors significantly predicted the knowledge score. A one-way analysis of variance was used to test whether there were any differences in knowledge, attitude, and evaluation scores across the 3 pharmacy classes ($p \leq 0.05$). One-way analysis of variance and *t* tests were used to test differences in the scores of the study participants' knowledge across demographic variables. Since 21 different tests were carried out to assess differences in pharmacy students' knowledge on DTCA regulations based on their demographics, to account for an α -slippage, a Bonferroni correction was applied to the level of significance of $p \leq 0.05$ and statistical significance was tested at a level of significance of $p \leq 0.002$.

RESULTS

Two students each from the first- and second-professional year classes and 1 student from the third-professional year class completed the pilot test. Comments from

the pilot test participants did not significantly change the study questionnaire.

The survey instrument was completed by 116 students including 46 students from the first year, 32 students from the second year, and 38 students from the third year. Since there were no significant changes to the survey instrument after the pilot test, the researchers decided to include the responses from the 5 pilot test participants in the final analysis. Pharmacy students who participated in the pilot test did not participate in the final study. No completed questionnaire contained less than 80% of responses to the entire questionnaire or less than 80% responses per section. A total of 120 out of 234 questionnaires were used in the final data analysis with a usable response rate of 51.3%.

Demographic information about the study participants is provided in Table 1. The mean age of the study participants was 27.5 years \pm 7.0 years and the study participants indicated that they had 23.9 months \pm 30.7 months of pharmacy-related work experience. The study participants indicated having about 2.9 \pm 3.3 lectures in which DTCA was discussed. Demographic information (gender, age, education, and number of pharmacy students) of the sample was compared with the demographic information of the study population which included all students enrolled in the first- through third-professional year pharmacy program at the University of New Mexico. The Chi square goodness of fit and the one sample *t* test indicated no significant differences except that more study participants indicated they had master's (6 vs. 5) and doctorate (7 vs. 2) degrees than was recorded in the College of Pharmacy records.

The face validity of the questionnaire was evaluated by conducting a pilot test. Content validity was evaluated by identifying items after a thorough review of the literature and evaluation of all items by the 5 researchers. Construct validity was examined by calculating Pearson product-moment correlations for items in each section of the questionnaire. For items in the attitudes and advertisement evaluation sections, significant positive correlations were observed between items considered to be intuitively related to the same theoretical construct and significant negative correlations were observed between items considered to be intuitively related to different theoretical constructs, providing some evidence of convergent validity. For example, significant positive correlations were observed between the pretest attitude items "DTCA helps patients to take a more active role in their health care" and "DTCA encourages patients to see their health care provider more often" ($p < 0.01$), and significant negative correlations were observed between the pretest attitude items "DTCA creates unrealistic expectations about

Table 1. Demographic Information of Participants in a Study to Assess Pharmacy Students' Knowledge, Attitudes and Evaluation of Direct to Consumer Advertising (n = 120)

Variable	Frequency, %*
Gender	
Male	47 (39.2)
Female	73 (60.8)
Bachelors degree or above	50 (41.7)
Pharmacy work experience	88 (73.3)
Pharmacy practice setting	
Chain	72 (60.0)
Hospital	16 (13.3)
Other	12 (10.0)
Independent	12 (10.0)
Health insurance coverage	87 (72.5)
Prescription coverage	83 (69.2)
DTCA discussion with patient	24 (20.0)
Request for a DTC advertised drug	19 (15.8)
Questions from patients about DTCA	88 (73.3)
Seen Nexium dvertisement	115 (95.8)
Seen Zyrtec dvertisement	93 (77.5)
Received prescription for Nexium	6 (5.0)
Received prescription for Zyrtec	19 (15.8)

*Percentages may not equal 100% because of missing values

drugs” and “DTCA satisfies consumer demand for drug information” ($p < 0.01$).

Pharmacy students' knowledge about DTCA regulations was assessed using 13 true or false items. An analysis of the 13 knowledge items indicated that study participants had a mean knowledge score of 6.3 ± 1.6 (on a scale of 0-13) and a mean percentage knowledge score of 48.7 ± 12.5 (on a scale of 0-100). Table 2 presents results for items assessing pharmacy students' knowledge about DTCA regulations. The regression analysis indicated that none of the demographic variables were significant predictors of the knowledge score.

Pharmacy students participating in this study had an overall negative pretest attitude toward DTCA, based on the mean score for each attitudinal statement. Pharmacy students in this study perceived that DTCA helps patients to take a more active role in their health care and that DTCA may lead to a higher treatment rate of undertreated disease conditions. However, pharmacy students expressed concerns that DTCA may result in inappropriate prescribing and may lead to increased medication use by promoting a “pill for every ill.”

Based on the mean scores, pharmacy students had an overall negative attitude toward DTCA after evaluating the 3 DTC advertisements and perceived benefits and concerns similar to their pretest attitudes. Table 3 presents the mean scores of pharmacy students' pretest and post-

test attitudes toward DTCA. The results are presented in the descending mean order. A comparison of pharmacy students' pretest and posttest attitudes found no significant differences.

Based on the mean scores, pharmacy students in this study had an overall negative attitude toward the Nexium print and the Nexium television advertisement, but they expressed an overall positive attitude toward the Zyrtec print advertisement. Tables 4 and 5 present pharmacy students' evaluations of the 3 advertisements. Pharmacy students in this study were of the opinion that DTC advertisements should follow the patient labeling format used by the Zyrtec print advertisement, as it gives patients only the information they need.

An analysis was also conducted to assess if there were any differences in first-, second- and third-professional year students' knowledge, attitudes, and evaluation of DTC advertisements and no differences were found.

Forty-two (35%) survey instruments included comments about DTCA and the study. Pharmacy students indicated that pharmacists need to be aware of the issues surrounding DTCA. Several students suggested that more information on DTCA needs to be incorporated in the PharmD curriculum to help them better understand the pros and cons of DTCA. As one student explained: “While these advertisements usually help people realize a disease state, they can confuse and mislead patients. Therefore I think pharmacists can play a huge role in providing proper education on disease states and optimal therapies. More education on these DTCA and ways to talk to patients about them should be focused on and built into this curriculum.”

DISCUSSION

The results of this study indicate that pharmacy students' do not have sufficient knowledge about DTCA regulations to effectively advise patients upon entering practice. Pharmacy students' knowledge about some of the DTCA regulations was similar to consumers' knowledge about DTCA regulations. In a study conducted by Bell et al, 50% of 329 Sacramento residents incorrectly believed that government regulators preview advertisements before they are disseminated via the media.²² A nearly equal percentage (49.2%) of pharmacy students in this study also had this misperception. Three fourths of the pharmacy students in our study also incorrectly believed that federal regulations prohibit DTC advertising of controlled substances.

The issuance of regulatory letters by the FDA provides some evidence of dissemination of some potentially misleading DTC advertisements through various media sources. The FDA's Division of Drug Marketing,

Table 2. Pharmacy Students' Knowledge About Direct-to-Consumer Advertising Regulations (n = 120)

Item*	Correct Answer	Correct, No. (%)
DTCA are regulated by the Federal Trade Commission.	False	41 (34.2)
DTC broadcast advertisements (television, radio and telephone advertisements) are regulated by the FDA.	True	71 (59.2)
DTC advertisements must be approved by the FDA before they are advertised to consumers.	False	59 (49.2)
DTC broadcast advertisements must include a brief summary (each side effect, warning, precaution and contraindication of the advertised product) in their advertisement.	False	14 (11.7)
The FDA regulates DTC advertisements in foreign languages.	True	40 (33.3)
Federal regulations prohibit DTCA of controlled substances.	False	30 (25.0)
DTC advertisements on the Internet are not regulated.	False	45 (37.5)
The FDA regulates reminder advertisements (Reminder advertisements call attention to the name of the drug but not its intended use).	True	39 (32.5)
The FDA can initiate a criminal investigation if pharmaceutical manufacturers do not take corrective actions against false and misleading DTC advertisements.	True	104 (86.7)
The New Mexico Board of Pharmacy prohibits DTC advertisements of prescription drugs for which a black box warning has been issued (boxed warnings are used in labeling to convey serious risks associated with the use of the drug product).	True	75 (62.5)
The FDA regulates help-seeking advertisements (Help-seeking advertisements discuss a disease or a treatment but do not mention any specific drug or device).	False	80 (66.7)
The New Mexico Board of Pharmacy prohibits DTC advertisements of controlled substances.	True	84 (70.0)
Federal Regulations do not permit reminder advertisements for products with a black box warning.	True	78 (65.0)

*KR-20 score for knowledge items = 0.48

Advertising and Communications (DDMAC) issued 88 regulatory letters, including 84 untitled letters and 4 warning letters, from August 1997-2002 to pharmaceutical companies who violated DTCA regulations.²³ In 2005, 13 advertising related warning letters were sent by the FDA to pharmaceutical companies.²⁴ This warrants the need for increasing pharmacy students' awareness as their patients may be exposed to some potentially false and/or misleading claims in DTC advertisements. Awareness that the FDA does not preview DTC advertisements might encourage pharmacy students to be more attentive towards DTC advertisements and may help them critically evaluate DTC advertisements.

Pharmacy students' attitudes in this study were similar to physicians and pharmacists' attitudes toward DTCA.^{1,5-8,11} Pharmacy students' attitudes toward DTCA further help delineate both the positive and negative impacts of DTCA. Pharmacy students in this study perceived a value of DTCA in encouraging patients to take a more active role in their health care and promoting treatment of under-treated disease conditions. Pharmacy students can be instructed to use DTCA as an opportunity to educate and facilitate informed discussions with patients.

Pharmacy school is the ideal time for students to receive training in DTCA as it may affect the opinions they form and their approach to DTCA-related questions from consumers when they enter the workforce. Despite this, at the time of this study, a complete lecture dedicated to DTCA-related issues was not being conducted at the College. However, DTCA was being introduced to students as a portion of at least 3 lectures in different courses of their pharmacy curriculum.

Pharmacy students in this study perceived a value of DTCA in increasing pharmacists' role as health educators. During their training and later on in their practice as licensed pharmacists, pharmacy students may face questions from patients who may be confused about information presented in DTC advertisements or may have misinterpreted information presented in DTC advertisements. Pharmacy students should thus be trained to handle patient questions about DTC advertisements and provide patients with balanced information about both the benefits and risks of DTC advertised drugs.

Additionally, it is important to use examples of DTC advertisements while training students about DTCA. The use of DTC advertisement examples in this study forced pharmacy students to critically evaluate the information

Table 3. Pharmacy Students' Pretest and Posttest Attitudes Toward Direct-to-Consumer Advertising (n = 120)

Item*	Pretest Mean (SD) [†]	Posttest Mean (SD) [†]
Some DTCA claims may be misleading to a typical consumer.	4.4 (0.6)	4.2 (0.5)
The FDA should mandate pre-approval of all DTCA.	4.3 (0.6)	4.3 (0.6)
DTCA promotes greater utilization of expensive brand name prescription drugs even though cheaper generic alternatives may be available.	4.2 (0.7)	4.2 (0.6)
DTCA may lead to inappropriate prescribing to satisfy patient's requests.	4.2 (0.8)	4.2 (0.6)
DTCA leads to increased medicalization (society's tendency to make a social or personal problem, a medical one) of minor health problems.	4.1 (0.7)	4.0 (0.7)
DTCA creates unrealistic expectations about drugs.	4.2 (0.8)	4.2 (0.6)
DTCA costs will be passed on to consumers through high prices.	3.9 (0.8)	4.0 (0.9)
DTCA requires professional judgments that consumers do not possess.	3.8 (0.8)	3.8 (0.9)
Risk information in DTC advertisements may lead some patients not to take the needed medicines.	3.7 (0.9)	3.5 (0.8)
DTCA increases pharmacists' role as health educators.	3.6 (1.0)	3.7 (1.0)
DTCA helps patients to take a more active role in their own health care.	3.5 (1.0)	3.6 (0.8)
DTCA may lead to a higher treatment rate of under treated disease conditions.	3.4 (1.0)	3.5 (0.9)
DTCA encourages patients to see their health care provider more often.	3.2 (0.9)	3.5 (0.9)
DTCA on the Internet should not be permitted.	3.2 (1.0)	3.1 (1.0)
DTCA is an effective way to communicate information about disease conditions and their treatment to consumers.	2.9 (1.1)	3.0 (1.0)
DTCA confuses patients about risks and benefits associated with a drug.	4.0 (0.8)	3.8 (0.7)
DTCA satisfies consumer demand for drug information.	2.5 (0.9)	2.7 (0.8)
DTCA improves patient compliance.	2.5 (0.9)	2.5 (0.8)
DTCA will result in the lowering of drug prices due to increased market competition.	2.2 (1.0)	2.1 (0.9)

*Cronbach's alpha for pretest attitude section = 0.52, Cronbach's alpha for posttest attitude section = 0.60

[†]Mean scores are based on the following scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

DCTA = Direct-to-Consumer Advertising

presented in the advertisements. As a result of evaluating DTC advertisements, pharmacy students may be more attentive towards information about prescription drugs to which patients are exposed and may be more aware of any potentially misleading or confusing information in DTC advertisements. This might also help pharmacy students improve their communication with patients about DTC advertised drugs.

Pharmacy students' evaluations of the DTC advertisements indicated that they preferred the patient labeling format over the professional labeling format on prescription drugs. This finding may have public policy implications in that prescription drug advertisements in media venues directed to the public should use the patient labeling format, which is more consumer friendly and easy to understand, to fulfill the brief-summary requirement rather than the more technical and detailed professional labeling format.

Limitations

The study design has certain limitations, which should be noted. As with any research study using a ques-

tionnaire, there is always a potential for measurement error. The reliability of the different sections of the study questionnaire was low (0.50-0.60), indicating that there was the potential for measurement error. The reliability of a questionnaire can be improved by addition of items which measure similar concepts or by rewording the items used in the questionnaire.²⁵ However, since no previous DTCA-related studies using pharmacy students had been conducted, this study had a broad objective and therefore included a lengthy questionnaire. While the addition of more items measuring similar concepts would have increased reliability, it would have also increased the respondent burden. Although the questionnaire was long, students completed the questionnaire in parts and were viewing advertisements in between answering questions. Further, a pilot test was conducted to check the clarity of the questionnaire items.

Another limitation may be use of the Nexium advertisement to represent both the print advertisement and the television advertisement. The researchers decided to use Nexium to represent both the print and the television advertisement to facilitate comparison of the extent to which

Table 4. Pharmacy Students' Evaluations of Nexium and Zyrtec Print Advertisements (n = 120)

Item*	Nexium Print Mean (SD) [†]	Zyrtec Print Mean (SD) [†]
The information about Nexium (Zyrtec) presented in the advertisement may encourage consumers to contact their health care provider.	4.1 (0.7)	4.1 (0.5)
After seeing the advertisement, some consumers may pressure their physicians to prescribe Nexium (Zyrtec), even if the physician determines that Nexium (Zyrtec) is not appropriate for them.	4.1 (0.7)	4.0 (0.7)
Some of the claims in the advertisement could be misleading to a typical consumer.	4.0 (0.8)	3.2 (0.9)
From a typical patient's perspective, the advertisement makes Nexium (Zyrtec) seem better than other products used to treat heart burn (allergies).	3.9 (0.8)	4.2 (0.7)
The advertisement may confuse patients who are being treated for heart burn (allergies) but are on a medication other than Nexium (Zyrtec).	3.8 (0.7)	3.7 (0.9)
There is information presented in the advertisement which is unnecessary for a typical consumer.	3.7 (1.2)	2.5 (0.9)
The risk information in the advertisement might discourage some patients who are already on Nexium (Zyrtec) from taking it.	3.3 (1.0)	2.4 (0.9)
The advertisement clearly indicates that the product is available by prescription only.	3.1 (1.2)	3.3 (1.2)
A typical consumer will be able to easily determine the specific population for whom the drug is indicated.	2.6 (1.1)	3.6 (0.9)
A typical consumer will be able to easily determine how to take the medication, from the information provided in the advertisement.	2.5 (1.1)	3.6 (1.1)
A typical consumer will be able to easily determine if he/she is suffering from the condition the drug is stated to treat.	2.5 (1.0)	3.6 (0.9)
In your opinion, DTC advertisements should follow the format used by the advertisement for Nexium (Zyrtec), because it gives patients detailed information (because it gives patients only the needed information) about the product.	2.4 (1.0)	3.5 (1.0)
A typical consumer will be able to easily understand the brief summary (patient information), provided on the adjacent page of the advertisement.	1.8 (.93)	3.8 (0.8)
The type and the font used in the brief summary (patient information), provided on the adjacent page of the advertisement were easy to read.	1.5 (.8)	3.4 (1.1)

*Cronbach's alpha for Nexium print section = 0.60, Cronbach's alpha for Zyrtec section = 0.50

[†]Mean scores were based on the following scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

information presented in the print media differs from information provided in the television media. However, it is possible that detailed information provided in the Nexium print advertisement may have sensitized the study participants to the information provided in the Nexium television advertisement. Also, about 16% of the study participants had taken Zyrtec, which may have affected their evaluation.

Another potential limitation of the study is that it may not provide sufficient evidence of construct validity. Factor analysis is a powerful method of construct validation.²⁵ The researchers decided to limit the scope of this study to an initial analysis of pharmacy students' knowledge, attitudes, and evaluation of examples of DTC advertisements. Thus, for the purposes of this study, factor analysis was not conducted. However, significant Pearson product-moment correlations provided some evidence of convergent validity. Further, the researchers took measures to assess the face validity and content validity.

The potential impact of the order of viewing DTC advertisements on differences in pharmacy students' pretest and posttest attitudes is interesting and a potential limitation of the study. A limitation of this study design may be that the posttest attitudes section was administered immediately after pharmacy students' evaluation of the Zyrtec print advertisement. It is possible that the posttest attitudes were reflective of their analyses of the Zyrtec advertisement.

Pharmacy students' evaluation of DTC advertisements reflects their evaluation of the Nexium and Zyrtec advertisement, drugs used to treat heartburn and allergies, respectively. It is possible that pharmacy students' evaluation of DTC advertisements may have been different if advertisements for prescription drugs used to treat other disease conditions were used as study advertisements.

The results of this study reflect the knowledge, attitudes, and evaluations of students enrolled in the pharmacy program at the University of New Mexico's College

Table 5. Pharmacy Students' Evaluations of Nexium Television Advertisement (n = 120)

Item*	Mean [†] (SD)
From a typical patient's perspective, the advertisement makes Nexium seem better than other heartburn products.	4.5 (0.7)
Information presented in the advertisement was in a consumer friendly language.	4.1 (0.7)
The information about Nexium in the advertisement may encourage consumers to contact their health care provider.	4.1 (0.7)
After seeing the advertisement, some consumers may pressure their physicians to prescribe Nexium, even if the physician determines that Nexium is not appropriate for them.	4.1 (0.7)
The advertisement may confuse patients who have been diagnosed with heart burn but are on a medication other than Nexium.	4.1 (0.8)
The emotive content (voice-overs, visual aids) in the advertisement may distract the consumer's attention from the factual information presented in the advertisement.	4.0 (0.9)
Some of the claims in the advertisement could be misleading to a typical consumer.	4.0 (0.8)
A typical consumer will be able to remember the advertisement directing them, for additional information, to refer to a:	
Health care professional	3.8 (1.0)
Toll free number	3.0 (1.3)
Web page address	2.9 (1.3)
Print advertisement	2.1 (1.2)
The advertisement clearly indicated that the product is available by prescription only.	2.9 (1.2)
The risk information in the advertisement may discourage some patients already on Nexium from taking it.	2.5 (1.0)
A typical consumer will be able to easily determine the specific population for whom the drug is indicated.	2.4 (1.0)
A typical consumer will be able to easily determine if he/she is suffering from the condition the drug is stated to treat.	2.4 (1.0)
A typical consumer will be able to easily determine how to take the medication from the information provided in the advertisement.	1.7 (0.8)

*Cronbach's alpha for Nexium television section = 0.54

[†]Mean scores are based on the following scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

of Pharmacy and cannot be generalized to all pharmacy students in the United States.

Future research should be directed at conducting a study to assess knowledge and attitudes of a national sample of pharmacy students. The impact of demographic factors on pharmacy students' attitudes toward DTCA and their evaluation of examples of DTC advertisements could also be assessed. It would also be interesting to evaluate whether pharmacy students' attitudes toward DTCA predict their responsiveness to patient questions about advertised prescription drugs and their attentiveness to prescription drug advertising. To prevent an order effect, in the future the study design should be modified so that half the sample completes the posttest attitudes section after evaluating the Zyrtec print advertisement and the other half completes the posttest attitudes section after evaluating the Nexium print advertisement.

CONCLUSIONS

The results of this study indicate that pharmacy students' knowledge about DTCA regulations is in need of improvement. Pharmacy students' had an overall negative attitude toward DTCA both before and after the ad-

vertisement evaluation. Pharmacy students also preferred the use of the patient labeling format compared to the professional labeling format for DTC print advertisements and indicated that they were not aware of the differences that existed in the presentation and the amount of information included in the 2 formats used to fulfill the FDA's brief summary requirement. The researchers suggest that lectures discussing various DTCA-related issues should be conducted in the pharmacy curriculum to increase pharmacy students' awareness of DTCA.

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