RESEARCH

The Impact of Student Pharmacists at Health Fair Events

Karl M. Hess, PharmD,[a] Christine Gabrielian, PharmD,[b] Emmanuelle Schwartzman, PharmD,[a] and Anandi V. Law, PhD, BPharm[a]

[a]Western University of Health Sciences, College of Pharmacy, Pomona, CA
[b]Kaiser Permanente, Woodland Hills, CA

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Objectives. To evaluate student pharmacists' impact on health fair participant knowledge of selected disease states and to evaluate the intent of health fair participants with abnormal screening results to seek follow-up care within 1 month of screening.

Methods. Health fair participants were assessed for changes in their knowledge of specific diseases before and after screenings. Participants' intent to seek health care was assessed through a survey instrument developed using Rosenstock's Health Belief Model.

Results. Increases in participant knowledge of hypertension, diabetes, dyslipidemia, and body mass index were significant, and 78% of participants with abnormal results intended to contact a provider.

Conclusions. Student pharmacists' had a positive impact on health fair participants' disease knowledge and intent to follow up with a provider.

Keywords: health fairs, student pharmacists, health beliefs, communications

INTRODUCTION

Community-based health fair events promote health and wellness awareness by providing access to personalized health information and screenings for such disease states as diabetes, hypertension, and hyperlipidemia.[1] For the profession of pharmacy, health fair events are an avenue to educate the public on the roles that this profession can play in patient care; from performing point-of-care testing and interpreting test results to providing education about the effects of medications and lifestyle factors on one's health. Health fairs are also a valuable means of training student pharmacists to apply concepts from the classroom to experience in real-world practice scenarios. Further, Standard 12 of the Accreditation Council for Pharmacy Education states that pharmacy school graduates must achieve competencies that "promote health improvement, wellness, and disease prevention in cooperation with patients, communities, at-risk populations, and other members of an interprofessional team of health care providers."[2]

Despite the value and importance of health fairs, there is a dearth of literature in this area. Some studies have only described the logistical details and/or the author's impressions of the health fair event, while others studies have demonstrated that health fairs can identify at-risk patients for enrollment in disease management services.[3-5] While some studies have reported that student pharmacist participation in health fairs increased their knowledge, no objective evidence for this finding was provided.[6,7] However, another study showed that participants' knowledge of healthy values for blood pressure, blood glucose, total cholesterol, and body mass index significantly increased after attending a pharmacist- and student-led health screening and educational intervention. On a post-survey instrument administered 4-8 weeks after the screening, 68.8% of participants reported healthy lifestyle changes and 64.4% had either seen their physician or had scheduled an appointment.[8] However, the degree to which students were involved in providing patient education and counseling post-screening is unclear. To our knowledge, there is no study documenting the impact of student pharmacists on increasing health fair participants' disease -specific knowledge and influencing their future health-seeking behaviors.

At the Western University of Health Sciences College of Pharmacy, students are trained to conduct blood glucose, blood pressure, cholesterol, osteoporosis, and body fat analysis screenings and are given opportunities to practice their technique in class as part of the first-year curriculum in the Foundations of Pharmacy Practice and Self Care Therapeutics I course. In addition, the doctor of pharmacy (PharmD) program curriculum prepares students to effectively communicate medical information to a variety of patient types (eg, emotionally challenging

Corresponding Author: Karl Hess, PharmD, FCPhA. 309 E. Second St. Pomona, CA 91766. Phone: 909-469-5500, Fax: 909-469-5539, Email: khess@westernu.edu

patients, patients who have disabilities, etc) to increase patient understanding and comprehension. Subsequently, students are assessed on these skills and abilities in an environment similar to that for an objective structured clinical examination using a clinical skills checklist. These activities serve the dual purpose of meeting educational standards and preparing students to provide health services to local communities. While students are tested within the program, the value of these skills and abilities and their transferability to practice settings and community outreach activities are assumed and have not been previously tested.

This study explored and evaluated the impact of student pharmacists at health fair events. The objectives of this study were: (1) to evaluate student pharmacist impact on the knowledge of health fair participants about selected disease states, and (2) to evaluate the intent of health fair participants with abnormal screening results to seek follow-up care.The Rosenstock Health Belief Model was used to test objective 2, because it attempts to explain and predict the health behaviors of individuals based on various precedents, including their attitudes and beliefs and the filter of perceived benefits and barriers to a behavior.[9] We hypothesized that the counseling and education that student pharmacists provided during health fair events would (1) enhance participant knowledge of the specific diseases for which they were being screened, and (2) encourage those with abnormal results to see a medical provider.

METHODS

The study used an observational pre-post survey design to measure health fair participants' knowledge. A control group was not used. The sample was drawn from individuals who participated in 1 of 3 health fair events organized by the student chapter of a professional pharmacy organization at the primary author's institution. Sampling was convenient and purposive.

Selected health fairs occurred between 2009 and 2010. Prior to each event, all student pharmacists who volunteered to work at the health fair received additional training on how to convey educational information to health fair participants. Opportunities to practice using the screening devices also were provided prior to each health fair, to ensure consistency of the screenings performed during the event. Each training session lasted approximately 1 hour and covered all of the disease state screenings planned for that health fair. In addition, a 13-item survey instrument consisting of multiple-choice questions with responses rated on a 4-point Likert scale of agreement (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree) was administered to all student pharmacists prior to the start of each session. This survey instrument measured students' confidence in counseling and educating patients, as well as in their ability to perform the technical aspects of screening. Students who volunteered were also informed of the logistics of the health fair event and were briefed on this research study and its purpose. Institutional Review Board approval at the expedited level was sought and received from the primary author's institution.

Inclusion criteria for this study were all health fair participants who were 18 years of age or older, could read and speak English, and wished to have their blood pressure, blood glucose, cholesterol, and/or body mass index measured, and to be screened for hypertension, diabetes, dyslipidemia, and/or obesity, as appropriate. Exclusion criteria included pregnancy status, which was determined by asking female attendees prior to participation at the health fair event.

All data collection instruments were developed by the authors and included knowledge survey instruments for blood pressure/hypertension, blood glucose/diabetes, body mass index/obesity, and cholesterol/dyslipidemia. Each knowledge survey instrument consisted of 4 to 5 multiple-choice questions regarding basic information on each disease state (eg, risk factors, complications of the disease, signs and symptoms, and dietary and lifestyle factors). A panel of content experts developed either 2 or 4 responses to each multiple-choice question. Participants were allowed to write in "I don't know" in response to questions for which they did not know the answer. Demographic information such as age, gender, race/ethnicity, education, and insurance status were extracted from study consent forms.

A survey instrument based on the Rosenstock Health Belief Model was developed using each construct of the model (readiness to act, perceived susceptibility to illness, perceived seriousness of illness, perceived benefits and barriers to taking action, and cues to action) for administration to participants with abnormal screening results. This survey instrument consisted of 11 multiple-choice questions with responses rated on a 4-point Likert scale of agreement (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree). All survey instruments developed and used for this project were reviewed by a panel of pharmacists as well as those with experience in developing survey instruments for face and content validity and are available from the primary author upon request.

Health fair attendees were required to sign an informed consent form before participating in health fair screenings. They also had to sign a second informed consent form to participate in this research project. Prior to

receiving any screening or disease state education, study participants completed 4 knowledge survey instruments (1 for each of the disease states being screened at the health fair event) regardless of the specific screenings they wished to complete. Following a 10-minute screening and educational intervention provided by a student pharmacist, the participant completed a post-intervention survey instrument for each of the screenings they underwent.

Pre- and post-screening survey instruments for each participant were subsequently linked together for data analysis using a unique file number that was assigned to each individual at the time consent was obtained. One week after the event, study investigators contacted participants who had 1 or more abnormal screening results by phone and administered the Rosenstock health belief survey instrument to determine the participant's intent to see a physician about their screening results. If the participant was not available to take the survey at the time of the initial phone call, up to 2 more phone calls were made 2 days apart.

De-identified data from the health fairs were analyzed using SPSS, version 17.0 (SPSS, Inc, Chicago, IL). Knowledge scores in each disease state were recoded into binary data and summated. Analysis included paired comparisons of the participant's mean summated pre-post knowledge scores in each disease state. Correlational analysis was conducted between intent to follow up with a health care provider and demographic variables using eta (η). Eta values range from 0 to 1, with values closer to 1 indicating a stronger correlation; in this case, intent to seek health care. All analyses were conducted at a 95% significance level. The confidence of students was assessed using summative scores from their survey instruments.

RESULTS

Of the 132 individuals who underwent a health screening at these health fair events, 94 consented to participate in this research project (response rate 71%). Study participants were mainly female (62%), had a mean age of 47.2 $\pm$ 16.4 years, 28% had a bachelor's degree and identified themselves as Asian, Caucasian, or Hispanic. The majority (60%) reported having health insurance (Table 1).

Matching survey data were available for 40 blood pressure screenings, 28 blood glucose screenings, 37 body mass index screenings, and 16 cholesterol screenings. Paired comparison analysis between responses on pre- and post-intervention survey instruments showed an increase in participants' mean knowledge scores. This increase was significant across all disease states (Figure 1).

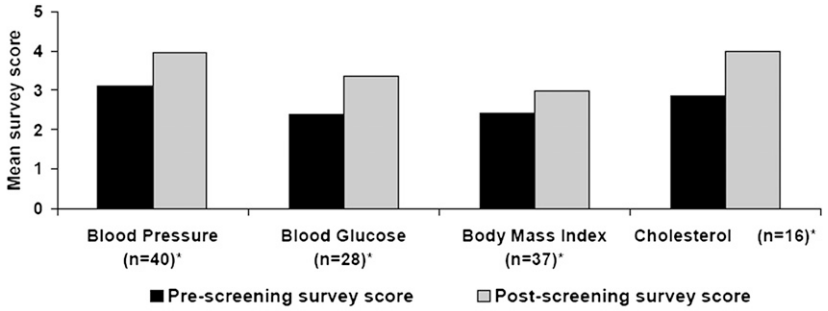
Table 1. Demographics of Health Fair Participants (n=94)

Characteristic[a]	Total
Age in years, No. (SD)	47.2 (16.4)
Education	
General Equivalency Diploma	4 (4)
High school	20 (21)
Some college	10 (11)
Bachelor's degree	26 (28)
Master's degree	10 (11)
Doctorate degree	4 (4)
Other	10 (11)
Not reported	10 (11)
Insurance status	
Yes	56 (60)
No	32 (34)
Not reported	6 (6)
Gender	
Male	31 (33)
Female	62 (66)
Not reported	1 (1)
Race/Ethnicity	
African American	2 (2)
Asian	22 (23)
Caucasian	27 (29)
Hispanic	30 (32)
Not reported	13 (14)

[a] Data for age is presented as mean ($\pm$ SD). All other characteristics are presented as frequency (%). Frequency is based on total number of responses for each item and varied depending on missing data for a specific item.

Of those individuals who were originally screened, 40 had 1 or more abnormal results. Matching survey data for those with abnormal results was available for 21 blood pressure screenings, 12 blood glucose screenings, 13 body mass index screenings, and 7 cholesterol screenings. Paired comparison analysis between pre- and post-intervention in this group showed a significant increase in the mean knowledge scores for blood glucose and blood pressure screenings (Figure 2).

Thirty-six individuals with abnormal results provided current contact information for study investigators to follow up with them and administer the Rosenstock health belief survey. Seventy-eight percent of participants (n=28) who completed this survey intended to follow up with a healthcare provider within 1 month after the health screening. In this group, race/ethnicity displayed a higher eta value (0.713), indicating a stronger correlation of intent to follow up with a healthcare provider compared with the other demographic characteristics of gender, education, and health insurance (Table 2). Age was also not significantly correlated to intent to follow up with a provider. The sample size of this subgroup precluded testing



* $p < 0.05$

Figure 1. Mean change in overall participant knowledge, by disease state/screening (n=94). Note: participants were able to complete one or more screenings; therefore, the total N for all screenings is greater than the participant N.

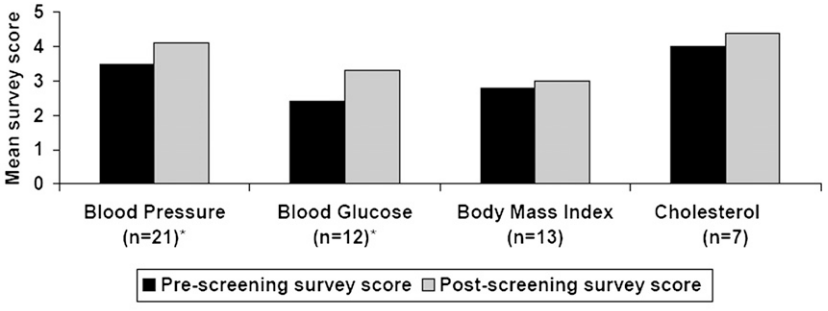
of Rosenstock's model; however, significant correlations were found between cues to action (eg, information provided during the screening) and intention to follow up with a provider.

DISCUSSION

In the present study, the increase in understanding of disease-specific information following screening and counseling indicates that student pharmacists were effective in educating health fair participants. Specific points of education were disease risk factors and complications, and signs and symptoms of disease, as well as dietary and lifestyle modifications for diabetes, high blood pressure, high cholesterol, and obesity. Participants wrote in "I don't know" periodically on all pre-intervention survey instruments (range 3.2% to 26.6%), but less frequently on the post-intervention survey instruments (range 1% to 5%) and only for certain questions on blood pressure, cholesterol, and body mass index. This may further demonstrate the effectiveness of the education efforts made by the student pharmacists. However, improvement in content delivered may be needed in areas on which participants responded "I don't know" on the post-intervention survey questions, eg, the dietary causes and complications of high blood pressure, the differences between high-density lipoprotein (HDL) cholesterol and low-density lipoprotein (LDL) cholesterol, and the importance of measuring body mass index.

Our primary results also appear to be in agreement with those of Mooney and Franks[8] who reported students' ability to increase health fair participant's knowledge of coronary heart disease risk factors and understanding of healthy ranges for laboratory values, although no specific knowledge changes were reported in that study. In our study, we reported knowledge change in specific disease state areas and also clarified the role and impact of pharmacy students at health fair events on specific outcomes.

Approximately 42% of individuals screened in this study had 1 or more abnormal results. There was a strong reported intent to seek further health care to follow up on abnormal results based upon the Rosenstock health belief survey tool, correlated with information via cues to action. However, participants' responses may have been influenced by social desirability, thereby causing over



* $p < 0.05$

Figure 2. Mean change in participant knowledge for those with abnormal screening results, by disease state/screening (n=40). Note: participants were able to complete one or more screenings; therefore, the total N for all screenings is greater than the participant N.

Table 2. Correlation of Demographic Characteristics Towards Intent to Seek Healthcare (n=36)

Characteristic[a]	Subtotal	η[b]
Gender		0.215
Male	17 (47.2)	
Female	19 (52.8)	
Education		0.312
High school	10 (27.8)	
Some college	5 (13.9)	
Bachelor's degree	13 (36.1)	
Master's degree	4 (11.1)	
Other	4 (11.1)	
Health Insurance		0.304
Yes	23 (65.7)	
No	12 (34.3)	
Race/Ethnicity		0.713
Asian	5 (16.1)	
Caucasian	14 (45.2)	
Hispanic	12 (38.7)	

[a] All characteristics are presented as frequency (%). Frequency is based on total number of responses for each item and varies depending on missing data for a specific item.
[b] η = eta value ranges from 0 to 1. Values closer to 1 indicate a stronger correlation to seek healthcare.

reporting of a positive behavior. There may also have been some self-selection bias in that health fair participants may have been more aware and conscientious about their health in general and therefore more willing to get screened and follow up on any abnormal result. It is also unclear why significant increases in knowledge were observed only for the blood pressure and blood glucose surveys in this group. The student pharmacists providing the screenings and counseling at the blood pressure and blood glucose stations may have been more consistent in their counseling, as many health fair events involve these particular screenings; however, further evaluation is needed.

A post-hoc analysis was conducted to examine whether a correlation existed between health insurance status and participant intent to follow up with a provider in order to determine if lack of health insurance discouraged or prevented participants from following up. However, no significant association between the 2 was found. This may be the result of the accessibility of free clinics or similar facilities in the area, or the result of social desirability bias that occurred while responding to survey questions over the phone. Regardless, these factors need to be explored further.

While not part of our primary study objectives, in a post-hoc analysis, overall mean student confidence for performing the technical aspects of health screenings was highest for blood glucose measurements among first- and second-year students (3.7 and 3.4, respectively, out of a maximum confidence score of 4). Mean student confidence with regard to providing education and counseling was also highest for blood glucose and blood pressure measurements for first-year students (3.4) and blood pressure measurements for second-year students (3.4) (Table 3). However, differences in confidence scores between first- and second-year students in terms of performing screenings and providing education were not significant. Furthermore, there was no correlation between student confidence score and participant change in knowledge. Upper class students may communicate more effectively than their peers; however, we were only able to measure the differences in confidence between first- and second-year students because not enough third- and fourth-year students participated to determine this.

Study results need to be viewed in light of some limitations. The practice sessions for students held prior to the health fair event were not evaluated for their consistency, which may have led to some variability in the content delivered during the health fair event. In addition, many participants failed to complete the post-screening disease state knowledge surveys. Therefore, we could not analyze these survey data for pre-post differences. Furthermore, increases in disease state knowledge could reflect immediate recall of information rather than a true increase in knowledge and understanding. However, we felt that results from a post-survey administered immediately after completion of the intervention would be more accurate than a survey administered at a later date at which point bias may have been introduced as other

Table 3. Mean Student Confidence Score in Performing Screenings and Providing Patient Counseling, by Screening Type (n=61)[a]

	Blood Pressure	Blood Glucose	Cholesterol	Body Mass Index
Confidence in Screening				
First Year Student	3.3	3.7	3.3	2.8
Second Year Student	3.3	3.4	3.0	3.2
Confidence in Counseling				
First Year Student	3.4	3.4	3.0	2.7
Second Year Student	3.4	3.2	3.1	3.3

[a] Scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree.

sources may have added to the patients' knowledge. Further, the sample size for evaluating intent to seek healthcare was slightly limited because of some missing and/or incorrect telephone numbers and because the sample size was too small to evaluate specific ethnic groups who may be more or less likely to see a provider. Lastly, as data were generated from samples obtained from local communities in Southern California, our results may not be generalizable to a larger population in other geographic areas.

CONCLUSIONS

Student pharmacists had a positive impact on health fair participants in terms of increasing their knowledge of selected disease states and increasing their intent to see a provider for further evaluation and care. The students' level of confidence in performing these screenings and communicating with patients was also high. Other long-term outcomes such as sustained health knowledge and awareness, health-seeking behaviors, and differences between specific ethnic/racial groups, will be/should be the focus of future studies in this area. Colleges and schools of pharmacy are in an excellent position to coordinate, collect, and analyze data from health fairs in partnership with their student chapter organizations to better determine the impact student pharmacists can have during these events.

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