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Implementation of a Vital Signs Skills Programme at a US School of Pharmacy: A Mechanism to Assess Competency for First-Year Student Pharmacists

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Abstract

Context: Vital signs skills should be emphasized in US pharmacy curricula. However, there is no standard method for teaching these skills.

Programme: A 3-hour vital signs skills education programme for first professional year students was provided. After the programme, students completed a survey and demonstrated in an assessment manual blood pressure skills on a programmable mannequin arm. Competence in manual blood pressure assessment was evaluated with the mannequin and associations between confidence, experience, and training with performance were determined.

Evaluation: Most students correctly identified the pre-programmed blood pressure on the mannequin within two attempts (102/120, 85%). Most students were confident in their ability to measure blood pressure (98/117, 83.7%). The likelihood of passing trended towards a lower probability of passing among students reporting greater confidence, training, and experience.

Implementation. Develop an observed structured clinical exam as an alternative means to verify student competence in blood pressure assessment after participating in a 3-hour skills programme.

Keywords: *Curriculum design, pharmacy students, vital signs*

Context

According to the Accreditation Council for Pharmacy Education (ACPE) standards in the United States (US), active learning strategies should be implemented to foster the development of pharmacy practice skills in student pharmacists (ACPE Accreditation Standards, 2006). In addition, "patient assessment laboratory" is described as an essential subject that should be included as part of pharmacy curricula. Since the role of US pharmacists in the area of patient care is continually evolving to be more directly involved in therapy management, the importance of teaching physical assessment skills to students has been emphasized.

The Teaching Patient Assessment Skills (TOPAS) study found that there was a significant variability in education on physical assessment skills across US colleges of pharmacy (Spray & Parnapy, 2007). Since there are no standard methods for teaching these skills, several schools have taken the initiative to evaluate and improve the way these skills are taught in their respective curricula. Texas Tech School of Pharmacy implemented a new assessment course for teaching blood pressure skills. These skills were assessed objectively by comparing manually obtained measurements of classmates to measurements obtained by automatic monitor (McCall *et al.*, 2007). The University of Pittsburgh School of Pharmacy used simulation-based instruction on blood pressure assessment. These results suggested that post-intervention, student pharmacists had improved skills and were more confident and satisfied with the learning experience (Seybert & Barton, 2007).

ACPE encourages schools of pharmacy to continually assess and develop innovative teaching methods that adhere to the principles of effective learning (ACPE Accreditation Standards, 2006). With this, and in response to the expanding scope of practice of US pharmacists, the University of California San Francisco (UCSF) School of Pharmacy began enhancing physical assessment education in the curriculum (Nkansah, Mostovetsky & Yu, 2010).

The 2010 vital signs skills programme was refined to reach a testable standard; it consisted of pre-classroom preparation, classroom-based interactive instruction, a skills lab, a survey and an assessment of blood pressure skills using a programmable mannequin arm.

The aim of this report was to evaluate the 2010 programme by measuring the ability of students to demonstrate competence in manual blood pressure skills and to determine if there was an association between competence and self-reported confidence in assessing blood pressure, participation in previous blood pressure trainings, and prior experience in measuring blood pressure on patients.

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Programme

Students in the first professional year at UCSF were assigned reading in the Handbook of Nonprescription Drugs on blood pressure monitoring and to view a video detailing blood pressure skills (Williams, Brown & Conlin, 2009). Following this, students participated in a two-hour facilitated discussion using the iClicker classroom response system (Macmillian Company, New York, 2005). Groups of twelve students in the one-hour skills laboratory practiced measuring blood pressure of other students. A five-item survey to ascertain their confidence in measuring blood pressure, prior number of blood pressure measurements attempted on patients, and previous blood pressure trainings was administered. Responses were based on a 5-point Likert scale. Face validity of the survey was determined by two faculty members. Then, each student demonstrated blood pressure skills using a mannequin blood pressure training arm (Laerdal Corporation, Stavanger, Norway, 2007) for a faculty member. A passing score was defined as performing the skills correctly (Table 1) and reporting a systolic and diastolic blood pressure within 8 mmHg (+/-4) of the programmed blood pressure in no more than two attempts. The UCSF Institutional Review Board approved this study.

Table 1: Mannequin Assessment Checklist

Steps for measuring a manual BLOOD PRESURE

1. Placed the stethoscope ear pieces correctly into his/her ears	YES NO
2. Placed the diaphragm of the stethoscope on the brachial artery just below the area of the blood pressure cuff	YES NO
3. After pumping cuff up to 180 mmHg, the student opened the valve to slowly release air from the cuff at ~2 to 3 mmHg per beat	YES NO
4. Reported the systolic and diastolic pressures in mmHg	YES NO
5. Blood pressure reported	1st: ____ ____mmHg 2nd: ____ / ____mmHg

Statistical Methods

Survey responses were collapsed binomially, into Very Confident/Confident versus Undecided/Not Confident/Very Not Confident. Categorical comparisons were made using chi-square statistics and logistic regression, including multivariable logistic regression to adjust for potential confounding between variables. P-values and adjusted and unadjusted odds ratios (OR) with 95% confidence intervals (95% CI) are reported. Statistical analyses were performed using STATA SE 10.1 (Statacorp, College Station, Texas, 2009).

Evaluation

Of 120 students, 102 (85.0%) received a passing score, more than half passed with one assessment attempt (66 of 120, 55.0%), and approximately one-third (36 of 120, 30%) passed in two attempts (mean 1.6). Of the non-passing students (n=18), one did not place the stethoscope correctly (5.6%) and three did not slowly release the blood pressure cuff (16.7%). The other 14 non-passing students reported two out of range blood pressures with no observable errors. The range of differences between student reported and mannequin programmed blood pressures was -20 to 40 mmHg for systolic blood pressure and -20 to 16 mmHg for diastolic blood pressure.

Of the 120 students, 118 completed the survey on their experience and confidence in assessing blood pressure. The majority of students were confident or very confident in their abilities to assess blood pressure (98/117, 83.7%) (Table 2), had assessed blood pressure in the prior six months (68/118, 57.6%), and had participated in a prior blood pressure training (79/118, 66.9%). Reporting of being confident or very confident in measuring blood pressure was strongly associated with any prior experience obtaining a blood pressure (OR 4.82, 95% CI 1.6-14.5) and marginally associated with any prior training (OR 2.64, 95% CI 0.97-7.18).

The likelihood of passing the blood pressure skills assessment was not greater among students with higher confidence, prior experience in obtaining blood pressures, or participation in prior trainings (Table 2). In fact, greater confidence, experience, and training appeared to be associated with a lower likelihood of passing the assessment, although the comparisons did not reach statistical significance. Among eight students who did not describe themselves as confident and had not had prior experience or blood pressure training, all passed (100%). Of the 51 students who reported high confidence and prior experience and other blood pressure training, 42 (82.3%) passed. A multivariable logistic regression model examining the effect of confidence, experience, and training on likelihood of passing did not reveal statistically significant effects (Table 2).

Future Plans

The majority of student pharmacists were able to demonstrate competency by passing the mannequin arm blood pressure assessment in two attempts, but with a non-passing rate of 15.0%. This may be because blood pressure assessment is a challenging skill to master due to multiple steps and coordinated use of a stethoscope, sphygmomanometer, and blood pressure cuff. There are also many potential errors in technique which can lead to inaccurate measurements (Williams, Brown & Conlin, 2009). In the mannequin assessment, it was possible to evaluate errors in stethoscope placement and too rapid of a cuff deflation. The reported blood pressure was found to be greatly variable for those who did not pass. Only four of the student pharmacists who did not pass the blood pressure assessment were found to either have deflated the cuff too quickly or placed the stethoscope earpieces backwards. No students were identified who had incorrect stethoscope diaphragm placement, but this is more likely due to the design of the mannequins indicating where the Korotkoff sounds can be auscultated, which circumvents the necessity to identify the location of the brachial artery.

Table 2: Student pharmacist survey results.

Student group	Total	Proportion passing	Unadjusted odds ratio for passing	Adjusted odds ratio for passing
Confident or very confident in blood pressure assessment				
No	19/117 (16.2%)	17/19 (89.5%)	1 (reference)	1 (reference)
Yes	98/117 (83.7%)	82/98 (83.7%)	0.64 (0.13 – 2.87)	1.00 (0.18 – 5.32)
Number of manual blood pressures taken in prior six months				
None	50/118 (42.4%)	45/50 (90.0%)	1 (reference)	1 (reference)
1-5	59/118 (50.0%)	49/59 (83.1%)	0.54 (0.17 – 1.71)	0.52 (0.15 – 1.83)
6 or greater	9 /118 (7.6%)	6/9 (66.6%)	0.22 (0.04 – 1.17)	0.14 (0.02 – 0.93)
Participation in prior blood pressure training				
None	39/118 (33.1%)	34/39 (87.2%)	1 (reference)	1 (reference)
Student project Training	71/118 (60.2%)	61/71 (85.9%)	0.89 (0.28 – 2.84)	1.28 (0.36 – 4.53)
Other training only	8/118 (6.7%)	5/8 (62.5%)	0.25 (0.04 – 1.36)	0.27 (0.04 – 1.63)

No significant association in varying ratings of confidence and student competence in blood pressure assessment were found in this study. Interestingly, student confidence in ability to demonstrate blood pressure assessment skills was not a statistically significant predictor of objectively measured performance, and students with greater confidence trended towards a lower likelihood of demonstrating competency in blood pressure assessment. This brings into question if self-reported confidence in performing blood pressure is an adequate method of evaluating the success of a skills programme. These findings are consistent with a simulation-based study where students in the lowest quartile overestimated self-assessed performance significantly higher than faculty members (Mort & Hasen, 2010). The current study found students with the most patient experience, other training, and were "Confident" to "Very Confident" in blood pressure assessment skills showed a trend in being more likely to not pass than those with no experience or previous training. Perhaps students with previous experiences and other training learned incorrect techniques originally. An alternative hypothesis is these students were overconfident and took the programme and assessment less seriously than those without previous training or experiences. Since self-reported confidence in ability to perform blood pressure assessment skills appears to not be a good predictor of objective performance, caution is encouraged in faculty members who may expect experienced and confident student to perform skills with competence.

Most student pharmacists demonstrated competence in blood pressure skills after a 3-hour vital signs skills programme. The mannequin arms provide an objective measure of blood pressure, but not clinical skills. In order to evaluate competency in clinic and blood pressure skills, second and third professional year OSCEs are being piloted. OSCEs will be included in the curriculum to evaluate competency in blood pressure skills in a clinically simulated setting that will be more "real world" than using a mannequin arm. Multiple exposures to blood pressure assessment education further ensure maintained competency over time. Therefore, our institution is investigating ways to incorporate additional experiences before clinical rotations when students must assess blood pressure on actual patients.

Declaration of Interest

The authors declare no conflicts of interest or financial interests in any product or service mentioned in this article, including grants, employment, gifts, stock holdings, or honoraria.

References

ACPE Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree. (2006) Chicago, IL: Accreditation Council for Pharmacy Education (online). Available at: http://www.acpe-accredit.org/pdfACPERevisedPharmDStandardsAdopted Jan152006.pdf. Accessed 19 January, 2009.

McCall K.L., Raehl C., Nelson S., Haase K., Fike D.S. (2007) Evaluation of pharmacy students' blood pressure and heart rate measurement skills after completion of a patient assessment course. *American Journal of Pharmaceutical Education,* **71**, 1.

Mort J.R., Hansen D.J. (2010) First-year pharmacy students' self-assessment of communication skills and the impact of video review. *American Journal of Pharmaceutical Education*, **74**, 78.

Nkansah N., Mostovetsky O., Yu C., Chheng T., Beney J., Bond C.M., Bero L. (2010) Effect of outpatient pharmacists' non-dispensing roles on patient outcomes and prescribing patterns. *Cochrane Database Syst Rev*, 7, CD000336.

Seybert A.L., Barton C.M. (2007) Simulation-based learning to teach blood pressure assessment to doctor of pharmacy students. *American Journal of Pharmaceutical Education*, **71**, 48.

Spray J.W., Parnapy S.A. (2007) Teaching patient assessment skills to doctor of pharmacy students: the TOPAS study. *American Journal of Pharmaceutical Education*, **71**, 64.

Williams J.S., Brown S.M., Conlin P.R. (2009) Videos in clinical medicine. Blood-pressure measurement. *The New England Journal of Medicine*, **360**, e6.