Pharmacy Education, 2012; 12 (1): 20 - 24

Improving Student Confidence in Skill Performance in a Pharmaceutical Care Lab Setting

RUCHA BOND*, CATHERINE CONE

University of New Mexico College of Pharmacy, MSC 09 5369, 1 University of New Mexico, Albuquerque, New Mexico 87131-0001

Abstract

Objectives: The objective of this study was to evaluate the effectiveness of improving student self-confidence in performing skills taught in the second-year pharmaceutical care lab (PCL).

Design: Pre-semester and post-semester surveys were administered to students in order to assess whether student confidence in performing the skills covered in the curriculum improved.

Assessment: A paired t-test was used to assess the ordinal data under the assumption that the difference between ranks is approximately equivalent

Conclusions: Results indicate that student confidence significantly improved in most areas covered in the second-year pharmaceutical care lab curriculum.

Keywords: *confidence, laboratory, skill, students*

Introduction

Colleges of pharmacy are charged with training competent pharmacists. Competence is defined as "the condition of being capable" to perform the duties of a profession. In the case of a healthcare provider, competence requires knowledge, ability to perform clinical skills, and moral or professional development (Epstein and Hundert 2002). Much of the focus of pharmacy education is centered on creating and assessing educational competencies which focus on knowledge and abilities. While ensuring that pharmacy students are competent in these two areas is critical in the educational process, providing formative environments designed specifically to allow students to self-evaluate and build confidence in their abilities is also important in order to address the third component of competence, moral or professional development. Students who are more confident in their abilities will be more likely to apply their knowledge, skills, and abilities on experiential rotations, will be more likely to undertake new challenges related to patient care, and will be more likely to acquire the skills necessary for professional life-long learning.

Social Cognitive Theory provides a foundation for the importance of the role of confidence, which is defined as "belief in own abilities" in creating self-directed, life-long learners. Bandura's work in the area of self-efficacy, or confidence, reveals much about life-long learning and motivation that can be applied to pharmacy education. Self-efficacy or confidence is acquired by three steps. The first is by developing capabilities which corresponds to the didactic portion of a pharmacy curriculum. The second step, removing aids, corresponds to the experiential portion of a pharmacy curriculum. The final step is the individual being able to use self-directed mastery which corresponds to students applying the life-long learning skills to their practice of pharmacy (Bandura 1993). In his paper on perceived self-efficacy in cognitive development and functioning, Bandura states that "guided mastery serves as the principal vehicle for the cultivation of competencies" (Bandura 1993). Due to the application of Bandura's Social Cognitive Theory to pharmacy education, building student confidence should be a component of a pharmacy curriculum.

Confidence is critical to ensuring that students will apply what they have learned in experiential and practice settings. Confidence increases a health care practitioner's willingness to undertake and successfully complete the tasks involved in patient care. This concept was reported in a study by Stewart and colleagues who looked at the impact of competence and confidence in four newly graduated physicians serving in the role of house officers. They found that while confidence was not associated with fewer mistakes, it was vital in dictating whether the house officer would undertake new tasks. Since undertaking new tasks and approaching new situations is important in order to be an effective health care practitioner, those with less confidence in their abilities may not achieve their full potential as providers (Stewart *et al.* 2000).

Despite the importance of confidence, conflicting studies exist on the correlation between competence and confidence. Some studies have shown that competence and confidence are not correlated and that students who are confident in their abilities do not necessarily perform well academically. Liddell and Davidson evaluated the relationship between perceived importance of skills, confidence in performing

*Correspondence: Prof. Rucha Bond, *Assistant Professor – Clinical Educator, University of New Mexico College of Pharmacy MSC 09 5369, 1 University of New Mexico, Albuquerque, New Mexico 87131-0001. Tel: + 00 1 505.272.5033. Email: rbond@salud.unm.edu*

ISSN 1447-2701 online

skills, and academic results in medical students. They found that there was no link between students' confidence in performing skills and their abilities to perform them. Additionally, Valdez and colleagues evaluated the correlation between pharmacy student confidence and competence by assessing knowledge and confidence in two therapeutic areas four months after students received education and training in those areas. They found disconnect between student confidence in their abilities to answer questions in those therapeutic areas their retention of information on the knowledge assessment (Valdez *et al.* 2006). Therefore, based on current knowledge educators cannot assume that students who are more confident in their abilities will be more competent in performing their duties (Liddell and Davidson 2004).

There is some evidence to support a correlation between confidence and competence. Popovich evaluated the relationship between knowledge and confidence in a nonprescription drugs course and found a relationship between confidence and competence in knowledge level. Students who scored higher on exams and were labeled "High knowledge" students reported higher confidence in the answers to examination questions than the "low knowledge" students. Additionally, he found that both knowledge and confidence had increased at the conclusion of the course as compared to the beginning (Popovich and Rogers 1987). The results of his study indicate that there may be a correlation between student knowledge or competence and confidence.

In nursing students, lack of confidence was found to interfere with the ability to acquire new knowledge and negatively impacted the ability to approach unfamiliar and difficult situations. The importance of incorporating confidence building educational tools into the nursing curriculum was addressed by Karen Lundberg who discussed teaching mechanisms to improve student confidence by providing a safe practice environment and formative feedback. Teaching tools suggested to improve confidence included scenario simulation, human patient simulators, role playing, peer modeling, story sharing, skill review sessions, and self-reflection (Lundberg 2008). These types of activities allowed students to practice skills in a safe environment, benefit from instructor formative feedback, and to reflect on their own performance. Pharmacy schools, like the nursing school, should incorporate confidence building scenarios into the curriculum in order to prepare students for their Introductory Pharmacy Practice Experience (IPPE) and Advanced Pharmacy Practice Experience (APPE).

Pharmaceutical care labs (PCL) have been developed and implemented at numerous colleges of pharmacy and represent the ideal setting for improving a student's confidence prior to experiential education (Evans 2007). These labs have expanded beyond the basic pharmacist compounding and dispensing skills to include skills needed by licensed pharmacists such as drug information, patient care, communication, physical assessment, and interprofessional collaboration (Chereson, Bilger, Mohr, Wuller 2005). The format of PCL divides a pharmacy class into smaller sections and allows for a smaller instructor to student ratio and more opportunities for direct instructor feedback. In addition, the structure of PCL is formative in nature and provides students with a safe environment to develop and apply skills to simulated situations. The combination of a skills based curriculum, small group environment, and safe setting with frequent formative feedback makes the PCL an ideal setting for confidence building activities.

In 2006, The University of New Mexico College of Pharmacy (UNM COP) incorporated PCL into the curriculum for each of the first six semesters of student education and training. The UNM PCL integrates information taught in traditional lecture style courses with pharmacy practice skills in a simulated patient care environment. During the first semester, the UNM PCL curriculum is heavily based on foundations and compounding to parallel the concurrent didactic coursework. The subsequent five semesters of PCL serve to introduce and develop numerous pharmaceutical care skills in parallel to the lecture-style pharmacotherapy blocks. Students learn pharmaceutical skills with simulated scenarios in laboratory activities and then demonstrate those skills on simulated patients and in written scenarios during their Objective Structured Clinical Exams (OSCE) which occur once or twice each semester.

During the fall 2007– spring 2008 school year, the second-year pharmaceutical care lab was developed and implemented at UNM. The corresponding didactic courses were self-care therapeutics in the fall semester and pharmacotherapy I and drug information in the spring semester. Pharmacotherapy I curriculum areas included cardiovascular, pulmonary, diabetes, and renal therapeutic areas. The purpose of this study was to evaluate the effectiveness of improving student self-confidence in performing skills taught in in the second-year PCL.

Methods

Data collection began in September of 2007 and ended in May of 2008. This study was approved by the Human Research Review Committee (HRRC) which is the University of New Mexico Institutional Review Board. In order to assess whether student confidence in performing the skills covered in the curriculum improved over the fall and spring semesters, two pre- and post-semester surveys ware designed (Table I) and implemented. During the fall and spring semesters, the PCL curriculum focused on the skills listed in Table I.

At the beginning of both the fall and spring semesters students were given a survey asking them to rank their confidence in performing the skills that were being taught each semester. The same survey was administered at the end of each semester. Students were instructed to rank their ability to perform a list of skills using the following likert-type scale. Table I states the questions asked on each survey.

1. *Very uncomfortable (don't know what to do and wouldn't know where to begin)*
2. *Uncomfortable (know what needs to be done but don't know how)*
3. *Somewhat comfortable (know what needs to be done and would give it a try)*
4. *Comfortable (know what needs to be done and could perform the skill)*
5. *Very comfortable (have the knowledge and experience to perform the skill perfectly)*

Table 1: Survey questions

Rate your comfort level with performing the below skills using the above scale	
Fall Semester	Spring Semester
• Taking a patient history • Evaluating a patient case, developing a care plan, and writing a SOAP note • Evaluating a medication for addition to an institutional formulary • Communicating effectively with other health care professionals • Using the following databases: ° IPA ° Natural Medicines Database ° PsycINFO ° National Guideline Clearinghouse • Helping a patient stop smoking • Working with a patient in need of emergency contraception • Preparing IV/Sterile products • Counseling a patient on OTC and Rx products	• Comparing and contrasting the validity and applicability of primary literature • Applying the information in clinical practice guidelines • Taking a blood pressure, interpreting the results, and creating a HTN care plan from the subjective and objective data • Using point of care machines (CholesTech and CardioChek) to obtain a lipid profile, interpret the results, and create a dyslipidemia care plan from subjective and objective data • Defining business aspects associated with an anticoagulation clinic • Recommending appropriate anticoagulation therapy and titrate doses based on lab results • Performing cardiovascular, HEENT, and pulmonary/ thorax physical assessment • Defining the pros and cons of direct to consumer (DTC) advertising • Using different pulmonary devices and counseling patients on use • Creating asthma care plans using subjective and objective data • Dosing medications for renally impaired patients

Curricular Content

The second-year PCL is a two-credit hour course comprised of a 2-hour weekly lecture and four, 3-hour lab sections. Approximately twenty students are assigned to each lab section. The course is primarily taught by clinical educator faculty from the department of pharmacy practice who were hired specifically for teaching in PCL.

Teaching in PCL focuses on formative instruction with one or two summative assessments occurring at the end of each semester. A variety of instructional tools are used in the PCL with the majority of the focus on active learning with formative feedback to guide students. Below are descriptions of the teaching tools commonly utilized in PCL:

- Scenario Simulation Patient scenarios or cases are often used to illustrate create a pharmaceutical problem or skill to address. These scenarios are used to address pharmacotherapy decision making and problem solving, pharmaceutical calculations and compounding, and physical assessment/information gathering skills.
- Role Playing Students are often instructed to play the role of a patient while another student is acting as the pharmacist in order practice communication and information gathering skills such as counseling and taking a medication history.
- Modeling Instructors frequently model or demonstrate the skills students are expected to demonstrate. Examples include demonstrating aseptic technique or compounding skills, physical assessment techniques, communication skills, and proper device or machine use technique.
- Skill Review Material taught in previous semesters is often reviewed so that skills learned in the past are not forgotten.
- Self-Reflection Students are asked to reflect on their abilities and growth areas at various times throughout each semester.
- Objective Structured Clinical Exam (OSCE) OSCE's are administered at least once a semester to observe student interaction and skill demonstration on simulated patients and in simulated written scenarios.

Table II: Fall Semester Pre-Post Student Confidence Survey

	Average Pre-test score (±SD)	Average Post test score	p-value
Overall (N=81)	2.3 (0.6)	3.7 (0.5)	$p < 0.001$
Taking a patient history	2.7 (1.0)	3.9 (0.6)	$p < 0.001$
Evaluating a patient case, developing a care plan, and writing a SOAP note	1.5 (0.7)	4.0 (0.7)	$p < 0.001$
Evaluating a medication for addition to an institutional formulary	1.5 (0.8)	4.0 (0.7)	$p < 0.001$
Communicating effectively with other health care professionals	3.3 (0.9)	4.2 (0.7)	$p < 0.001$
Using the following tertiary search engines:			$p < 0.001$
• IPA	1.5 (0.7)	4.0 (0.8)	
• Natural Medicines Database	1.5 (0.7)	4.2 (0.8)	
• PsycINFO	1.4 (0.7)	2.8 (1.1)	
• National Guideline Clearinghouse	1.4 (0.7)	2.8 (1.1)	
Helping a patient stop smoking	2.9 (1.0)	3.5 (.7)	$p < 0.001$
Working with a patient in need of emergency contraception	2.9 (1.2)	3.6 (.8)	$p < 0.001$
Preparing IV/Sterile products	3.3 (1.0)	4.0 (0.7)	$p < 0.001$
Counseling a patient on OTC and Rx products	3.2 (0.9)	4.0 (0.6)	$p < 0.001$

Results

Eighty-one pre- and post-tests were received during the fall semester and 67 were received in the spring semester. A paired t-test was used to assess the ordinal data under the assumption that the difference between ranks is approximately equivalent. Significant differences were found between the pre-and post-test for student confidence test for both the fall and spring semesters. Tables II and III outline the statistical results on the pre- and post-tests for each semester. A positive correlation was found overall between pre and post tests in the fall semester ($p<0.001$) and the spring semester ($p<0.001$).

Table III: Spring Semester Pre-Post Student Confidence Survey

	Average Pre-test score (±SD)	Average Post test score (±SD)	p-value
Overall (N=67)	2.5 (0.4)	3.6 (0.5)	p < 0.001
Comparing and contrasting the validity and applicability of primary literature	3.7 (0.7)	3.5 (0.7)	P=0.145
Applying the information in clinical practice guidelines	3.2 (0.8)	3.9 (0.6)	p < 0.001
Taking a blood pressure, interpreting the results, and creating a HTN care plan from the subjective and objective data	3.2 (0.8)	4.1 (0.6)	p < 0.001
Taking a blood pressure, interpreting the results, and creating a HTN care plan from the subjective and objective data	2.2 (1.0)	3.8 (0.8)	p < 0.001
Using point of care machines (CholesTech and CardioChek) to obtain a lipid profile, interpret the results, and create a dyslipidemia care plan from subjective and objective data	1.4 (0.6)	2.5 (1.0)	p < 0.001
Defining business aspects associated with an anticoagulation clinic	1.4 (0.6)	3.1 (0.8)	p < 0.001
Recommending appropriate anticoagulation therapy and titrate doses based on lab results	1.8 (0.9)	3.8 (0.9)	p < 0.001
Performing cardiovascular, HEENT, and pulmonary/ thorax physical assessment	2.7 (1.1)	3.9 (0.7)	p < 0.001
Defining the pros and cons of Direct to Consumer (DTC) advertising	3.4 (0.8)	4.1 (0.6)	p < 0.001
Using different pulmonary devices and counseling patients on use	2.5 (0.9)	3.9 (0.6)	p < 0.001
Creating asthma care plans using subjective and objective data	1.9 (0.9)	3.1 (0.9)	p < 0.001
Dosing medications for renally impaired patients	2.3 (0.9)	3.7 (0.7)	p < 0.001

Discussion

While ensuring student competence is vital in pharmacy education, providing educational opportunities for students to build confidence in their abilities should also be included in the curriculum. Students with more confidence will be likely to proactively apply their knowledge, skills, and abilities during their experiential rotations and will also be more likely to approach and attempt new and unfamiliar situations which are vital for professional growth and maturation.

PCL provides a unique instructional setting within the pharmacy curriculum. Formative instructional activities such as role playing, modeling, skill review, self-reflection, and OSCE's provide opportunities for students to practice skills. The smaller group setting of a PCL allows students to ask more questions and to receive more feedback from instructors. In turn, instructors have more opportunities to directly observe students than in a traditional lecture style classroom setting. In the pharmacy curriculum, the ideal setting for allowing students to build confidence in their abilities while developing and applying pharmaceutical skills is a PCL.

Results of the pre- post- surveys for the fall and spring semesters of the second-year PCL at the UNM COP indicate that students were significantly more confident in their abilities to perform skills after completing the semester curriculum than before. The exception occurred in the spring semester with comparing and contrasting the validity and applicability of primary literature. For this particular spring semester skill, students began the semester with a working knowledge in comparing and contrasting primary literature because they had completed a drug information didactic course the previous semester. The spring semester care lab activities that centered on evaluation of primary literature were challenging to students as indicated on student course feedback. This provides a likely explanation of why confidence in their abilities did not significantly change over the course of the semester.

There were several limitations to this study. The first limitation is the small study population since the data was only gathered on the graduating class of 2010. This occurred because the primary investigator only taught the second year PCL course for one year before becoming instructor of record for the third year PCL courses. The second limitation concerns the lack of improvement in confidence seen in the area of comparing and contrasting the validity and applicability of the primary literature during the spring semester. Likely the reason for a decrease in confidence rather than an improvement was due to hyper confidence in this area at the beginning of the semester. During that semester, students received detailed education in both the didactic and laboratory settings on literature evaluation. The skills lab activities involved initial evaluation of literature by students followed by group discussion and then re-evaluation of the literature. Students were surprised at how many key points they missed during their initial evaluations of the literature and possibly therefore their confidence in that area decreased.

The purpose of this project was to determine if student confidence in their abilities to perform the pharmacy skills taught during the fall 2007 and spring 2008 semesters improved as a result of the UNM PCL curriculum. Results indicate that student confidence significantly improved in most areas covered. Therefore, this could indicate that the

PCL curriculum may be effective at improving the skills covered. Additional research is needed to definitively conclude if and how confidence and competence are correlated and the impact of improved confidence on student abilities further into the curriculum.

References

Bandura A. (1993) Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, **28**, 117-48.

Bandura A. (1977) Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, **84**, 191-21.

Chereson R.S., Bilger R.B., Mohr S., Wuller C. (2005) Instructional design and assessment: design of a pharmaceutical care laboratory: a survey of practitioners. *American Journal of Pharmacy Education*, **69**, 19-24.

Epstein R.M., Hundert E.M. (2002) Defining and assessing professional competence. *The Journal of the American Medical Association*, **287**, 226-235.

Evans E.W. (2007) Implementation and assessment of an introductory pharmacy practice course sequence. *Journal of Pharmacy Teaching*, **14**, 5-17.

Liddell M.H., Davidson S.K. (2004) Student attitudes and their academic performance: is there any relationship? *Medical Teacher*, **26**, 52-56.

Lundberg K.M. (2008) Promoting self-confidence in clinical nursing students. *Nurse Educator*, **33**, 86-89.

Popovich N.G., Rogers W.J. (1987) An assessment of pharmacy student confidence in learning. *American Journal of Pharmacy Education*, **51**, 17-23.

Stewart J., O'Halloran C., Barton J.R., *et al*. (2000) Clarifying the concepts of confidence and competence to produce appropriate self-evaluation measurement scales. *Medical Education*, **34**, 903-909.

Valdez C.A., Thompson D., Ulrich H., *et al*. (2006) A comparison of pharmacy students' confidence and test performance. *American Journal of Pharmacy Education*, **70**, Article 76.