

RESEARCH

Using a Modified Delphi with Skills Laboratory Faculty to Define Essential Skills for Pharmacy Graduates

Jeanne E. Frenzel, PharmD, PhD^{a,b} Brandon T. Nuziale, PharmD,^c Courtney L. Bradley, PharmD,^c Jordan M. Ballou, PharmD,^e Kimberley Begley, PharmD,^f Krista L. Donohoe, PharmD,^g Brittany L. Riley, PharmD^h

^a North Dakota State University, Fargo, North Dakota

^b Editorial Board Member, *American Journal of Pharmaceutical Education*, Arlington, Virginia

^c Pacific University, Hillsboro, Oregon

^d High Point University, High Point, North Carolina

^e The University of Mississippi, University, Mississippi

^f Creighton University, Omaha, Nebraska

^g Virginia Commonwealth University, Richmond, Virginia

^h Marshall University, Huntington, West Virginia

Corresponding Author: Jeanne E. Frenzel, North Dakota State University, Fargo, ND. Tel: 701-231-8546. Email: Jeanne.Frenzel@ndsu.edu

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Objective. To define essential skills for graduates needed in the four most common sectors of pharmacy practice as determined by expert pharmacy skills laboratory faculty.

Methods. A three-round Delphi method was used to establish consensus. In the first round, participants were asked what skills were needed by students at entry to practice in community, health-system, ambulatory care, and managed care pharmacy settings. In rounds two and three, participants were asked to rate each skill with a level of importance using a 10-point Likert scale (1 = not important to 10 = very important).

Results. In round one, participants produced a collective list of 289 essential skills. These skill statements were sent to participants in rounds two and three to assign a level of importance. After the third round, participants reached consensus using a mean level of importance for a final list of 69 community pharmacy skills, 47 health-system, 60 ambulatory care, and 15 managed care skills. These skills were then mapped to Entrustable Professional Activities domains for colleges/schools of pharmacy to use as a resource when assessing core competency development in the curriculum.

Conclusion. The Delphi technique identified laboratory focused essential skills graduate pharmacists should have prior to entering community, health-system, ambulatory care, or managed care pharmacy practice. These essential skills can be used to guide curriculum development, develop milestone markers, and help ensure students are practice ready.

Keywords: pharmacy skills, community pharmacy, institutional pharmacy, ambulatory care pharmacy, managed care pharmacy

INTRODUCTION

The Accreditation Council for Pharmacy Education (ACPE) Standards 2016 outline broad categories of clinical sciences as required elements of a professional pharmacy curriculum. These include health information retrieval and evaluation, medication dispensing, distribution and administration, professional communication, and patient assessment.¹ These ACPE standards also direct schools to assess student preparedness prior to progressing onto advanced pharmacy practice experiences (APPEs). The intent is to develop practice-ready graduates who will be successful in the progressive landscape of pharmacy practice.

Skills laboratories are a fundamental component of pharmacy curricula and are a place where students engage in activities that allow them to apply learned concepts and test their knowledge.²⁻⁵ Skills laboratory faculty design and develop experiences based on ACPE standards to ensure that students possess the basic knowledge, skills, and abilities to independently practice pharmacy at the time of graduation. While the ACPE standards are useful, they do not clearly outline the essential skills needed to be taught and assessed in a skills laboratory setting in order to best prepare practice ready graduates.

In 2015, a group of pharmacy skills laboratory faculty surveyed advanced pharmacy practice experience preceptors from across the United States to help determine essential skills needed by pharmacy graduates.⁶ Preceptors

reported that the most essential skill was the ability to communicate both verbally and in a written format. In addition, graduates should be able evaluate patient and prescription information including vital signs and laboratory values and to prepare sterile and nonsterile compounds. The ability to engage in teamwork, work independently, and to exhibit professionalism were also essential.⁶

At the same time, Entrustable Professional Activities (EPAs) for pharmacy graduates were being developed through the work of the 2015-2016 American Association of Colleges of Pharmacy (AACP) Academic Affairs Standing Committee.⁷ The Committee developed six EPA domains further defined by core statements and example supporting skills. Pharmacy graduates are expected to perform all EPA domains unsupervised prior to graduation.⁸ Example supporting skills can be used to assess student performance and pharmacy programs have been encouraged to develop additional supporting skills unique to their program design.⁸

This research builds upon the work of Frenzel et al. and the 2015-2016 AACP Academic Affairs Standing Committee to further define essential skills for pharmacy graduates as determined by pharmacy skills laboratory faculty experts and to develop a list of laboratory focused items that can be used to supplement existing EPA supporting skills.^{6,8} These laboratory focused skills can be used by any faculty, to guide curricula development, develop milestone markers, and ensure students are practice ready; however, skills laboratory faculty may find them particularly useful when developing simulations or objective structured clinical examinations (OSCEs).

METHODS

The Delphi technique is a form of action research used to gather data from a group of experts.⁹⁻¹⁰ It is a qualitative technique used to build consensus through the systematic use of repeated questionnaires.⁹⁻¹⁰ In the health professions literature, the Delphi technique has been used to establish expert consensus regarding competencies specific to student learning, student leadership, and faculty development.¹¹⁻¹⁸

To be considered for the study, participants were to be faculty with primary teaching responsibilities in a pharmacy skills laboratory; a member of the American Association of Colleges of Pharmacy Laboratory Instructors Special Interest Group (SIG); have authored a peer-reviewed publication focused on pharmacy skills education; received an award in pharmacy skills education; presented a mini or special session on pharmacy skills education at the annual AACP meeting; or presented a webinar on behalf of the AACP Laboratory Instructors SIG webinar. Participants were identified as experts if they met four out of six predefined criteria. Criteria development was guided by the literature.^{14,15,19,20}

A national call for participants was sent via email to all members of the AACP Laboratory Instructors SIG. The number of experts needed to facilitate a Delphi technique has not been established, but is typically between 10 to 100 participants.⁹ Fifteen experts were identified and agreed to be a part of the study. Of the fifteen experts, all participants were faculty with primary teaching responsibilities in a pharmacy skills laboratory and a member of the AACP Laboratory Instructors SIG; 11 (73.3%) had authored a peer-reviewed publication focused on pharmacy skills education; 7 (46.7%) had received an award in pharmacy skills education; 10 (66.7%) had presented a mini or special session focused on pharmacy skills education at the annual AACP meeting; and 6 (40%) had presented a webinar on behalf of the AACP Laboratory Instructors SIG. All participants met study criteria and represented 13 colleges/schools of pharmacy, with 6 of 15 (40%) participants from private schools. Locations of colleges/schools were predominantly from Midwest (60%) and Southeast (40%) regions of the United States. For all three rounds of data collection, participants received a link to the study questionnaire in an initial email with three email reminders, approximately one week apart, generated and schedule using Qualtrics. For all rounds, data from participants were collected using Qualtrics (Qualtrics, Provo, UT) and analyzed using Microsoft Excel 2019. This study was approved by the North Dakota State University Institutional Review Board and was conducted by a group of laboratory faculty from seven college/schools of pharmacy located in the West (N=1), Midwest (N=2), and Southeast (N=4) regions of the United States.

An *a priori* condition of three rounds of data collection was set by the research team. During each round of data collection, participants were communicated with privately and on an individual basis to ensure anonymity and to capture information free from the influence of others.^{10,18,20} Participants received feedback during each round of data collection until consensus was reached.⁹ In the first round, open-ended questions were used to gather input on what students need to know and do related to the four most common sectors of pharmacy practice at entry to practice.²¹ Participants were asked to use the American Pharmacist Association vision, "Pharmacists are essential for optimizing medication use and improving patient health," and mission, "To serve society as the profession responsible for the appropriate use of medications, devices, and services to achieve optimal therapeutic outcomes," for the pharmacy profession as guiding principles.²² Participants submitted essential skills for all four practice sectors using Qualtrics and the data was downloaded into Microsoft Excel. Content analysis was performed by four of the study authors to eliminate redundancies

and to separate double barrel responses into individual skills. Unique skills were kept as worded and included in the study directly. Finalized lists of essential skills were sent to the research group for review and comment and no additional changes were made.

In round 2, participants were asked to rate all skills generated from round 1 with a level of importance using a 10-point Likert scale (1 = *not important* to 10 = *very important*). Skills from round 2 were sent to participants with each item statistically summarized to allow participants to compare their responses to those of the collective group. A free-text field was also provided to allow participants to comment as to why a skill should be included or excluded from the final list.

In round 3, participants were, again, asked to rate all skills from rounds 1 and 2 with a level of importance using a 10-point Likert scale (1 = *not important* to 10 = *very important*). All skills were recirculated to allow the experts to think about their initial rating decisions to ensure all skills had an equal chance of achieving the highest importance rating and level of consensus.^{20,23} No skills were eliminated between rounds 1, 2, or 3; however, in round 3 included behind each skill was listed the percent by which faculty experts agreed on the importance of the skill during round 2. Skills that reached 80% consensus or higher were deemed essential skills. Skills that did not meet 80% or above were removed from the finalized list of skills. The essential skills for each practice setting were then mapped to the EPA domains.⁸ Initial mapping of the essential skills to the EPA domains was completed by one member of the research team using AACP EPA supporting skills as a guide and Microsoft Excel for data management and analysis. All members then reviewed the initial map, discussed, and came to consensus to establish a final mapping document.

RESULTS

The Delphi technique was conducted with a panel of expert pharmacy skills laboratory faculty over three rounds to determine essential skills needed by students at entry to practice. Sixteen laboratory faculty applied to take part in the study. Of the 16 faculty, one did not meet study criteria and was not invited to participate in the study. During rounds one and two, 1 of the 15 participants did not respond (RR = 93.3%). In each of these rounds, the non-respondent was unique. In round three, 3 participants did not respond (RR = 80%). In round three, the non-respondents were the same as in rounds one and two, in addition to 1 additional non-respondent.

In round one, participants generated 108 community pharmacy, 68 health-system pharmacy, 83 ambulatory care pharmacy, and 30 managed care pharmacy skill statements. In round 2, participants rated all skills generated during round 1 with a level of importance and these same skills were, again, sent to participants in round 3. Following the third round, participants reached consensus using mean level of importance for 70 community pharmacy skills, 45 health-system skill, 59 ambulatory care skills, and 12 managed care skills. A list of the essential skills as mapped to pharmacy practice setting and the EPA domains can be found in Table 1. The number of essential skills identified by EPA Domain for each pharmacy practice setting is graphically represented in Table 2.

DISCUSSION

Expert pharmacy skills laboratory faculty identified and agreed upon a set of essential skills graduate pharmacists should be able to demonstrate prior to entering practice in community pharmacy, health-system pharmacy, ambulatory care pharmacy, and managed care pharmacy. These laboratory focused essential skills can be used to supplement the published example EPA supporting skills.¹ As personalization of the EPAs has been encouraged, these skills provide a desired degree of specificity for skills laboratory faculty making them especially useful to development of laboratory exercises and skill assessments.^{8,24} Skills laboratory faculty are responsible for ensuring students can apply learned knowledge as they develop skills and develop their professional identity in a safe environment with opportunities to practice, refine, and receive feedback.^{24, 25} Simulations or OSCEs are often used to develop these skills.²⁴ The development of a laboratory focused list of essential skills mapped to EPA domains can be useful to skill laboratory faculty in the development of authentic and robust learning experiences used to guide student progression from level to level.

Most essential skills trended up in percent agreement between rounds two and three; however, a limited number trended down, and two skills were removed completely after round three. Skills that trended down but remained on the final list centered around the consultation of diabetic medications or testing supplies, responding to basic prescription and nonprescription drug information questions, and documenting patient information. Study participants collectively agreed these are essential skills, but also prioritize other skills. The two skills that did not make the final list were complete a drug utilization review (ambulatory care pharmacy) and plan and conduct a medication use evaluation (managed care pharmacy). This may be because these types of skills are important, but difficult for students to practice in a simulated skills laboratory environment in advance of APPE rotations.

Given the large number of essential skills identified in this study, the differential in full consensus (100% agreement) and high consensus (>80% agreement) should be used to prioritize the design of learning and assessment opportunities by

targeting skills with full consensus prior to skills without full consensus. These skills should be foundational to the learning experience of all pharmacy students. In a community pharmacy setting, these skills were to collect patient allergy information, review a patient profile for drug interactions, counsel a patient on a new medication, educate a patient on an inhaler, have working knowledge of top 200/300 drugs, know legal requirements for prescriptions, and act ethically and professionally, upholding HIPAA and following all state and federal laws.

In a health-system pharmacy setting, these skills were to complete a patient profile review to evaluate drug-related problems, review a patient profile for drug-drug interactions, drug-disease interactions, duplicate therapy, complete a patient profile review to plan and implement resolutions to drug-related problems, communicate and collaborate with other health care providers, contact a prescriber, communicate the problem, and given appropriate recommendations, conduct medication education at discharge, use drug information resources, evaluate medication orders for errors and omissions, verify IV medication orders, verify medication orders, and act ethically and professionally, and upholding HIPAA and following all state and federal laws.

In an ambulatory care pharmacy setting, these skills were to collect an accurate medication history, perform medication reconciliation, document a patient encounter, document and report recommendations be a member of interprofessional team, present a patient and plan to another provider, provider communication/teamwork, answer drug information questions from other health care providers, collaborate with prescribers and other health care providers, have a working knowledge of top 200/300 drugs, possess a working knowledge of dosing for chronic medications, and use effective patient communication skills when interviewing, counseling, and educating patients.

In a managed care pharmacy setting, these were to have a working knowledge of top 200/300 drugs, know how and where to look up unknown information, plan and conduct a medication use evaluation, and possess problem-solving and critical thinking skills.

Faculty can use this focused list of skills to tailor their student learning experiences to a specific type of pharmacy practice. Faculty may also find it valuable to concentrate on developing skills found across multiple practice settings such as helping students to develop knowledge of top 200/300 drugs, practice reviewing patient profiles and counseling on medications, and promoting ethical and professional behaviors while upholding HIPAA and following all state and federal laws.

The results of this study support the work of Frenzel et al., as communication, both verbal and written, was mentioned by expert laboratory faculty in almost half (30 out of 62, 48.4%) of the essential skills. It appears that both skills laboratory faculty and preceptors agree that in order to be practice ready students must be able to communicate. Focusing on the development of communication skills is important to student success in the workplace and can be supported by practicing communication focused essential skills in didactic and experiential settings.

This study is not without limitations. First, there was a small number of participants and three participants dropped out between the Delphi rounds. However, high or full consensus still resulted for a majority of the identified essential skills. Nonetheless, there is a risk that the low number of participants could limit generalizability of the results. Additionally, there is the potential for bias to the responses depending on the participants' demographics and pharmacy background. Although the methods did ensure that participants met inclusion criteria demonstrating experience in the skills laboratory setting, other demographic information were not collected to inform our results. Thus, there may be some skills that are under or over-represented in the results depending on the participants pharmacy background. For example, our experts represent schools of pharmacy in both the Midwest and Southeast regions of the United States. Perhaps gaining a more generalizable sample of skills laboratory faculty from other regions may result in differing consensus as to which skills are of highest priority. Skills were mapped to the EPA domains, however, taking a broader look at how they also map to ACPE standards could offer a more complete picture of how the essentials skills identified in this study can prepare students for advanced pharmacy practice experiences.²⁶

Next steps could include reconciliation of the essential skills lists from both the preceptor⁶ and pharmacy skills laboratory faculty groups. This master list could be used as a resource by curriculum committees to prioritize learning opportunities and the allocation of resources for skills laboratories. Additional research could be performed to gain additional perspective regarding essential skills from new graduates.

CONCLUSION

Using the Delphi technique, pharmacy skills laboratory experts identified essential skills that pharmacy graduates should have upon entry to practice within four of the most common pharmacy practice settings. These laboratory focused essential skills can be used by all faculty, but especially skills laboratory faculty, to guide curricula development and ensure students are practice ready. The essential skills were mapped to EPA domains to aid pharmacy programs in showcasing how their students demonstrate they are practice ready.

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Table 1. Skills Needed by Pharmacy Graduates for Four Pharmacy Practice Settings

| Skill | Practice Setting |
|---|------------------|
| Patient Care Provider Domain | |
| SKILL1 Perform all steps of the Pharmacists' Patient Care Process | C, HS, AC |
| SKILL2 Collect a medication list from a patient | C |
| SKILL3 Collect allergy information from a patient | C |
| SKILL4 Collect an accurate medication history from a patient | C, AC |
| SKILL5 Collect health information from a patient | C |
| SKILL6 Use open-ended questions | C |
| SKILL7 Assess a patient's signs and symptoms to determine if they can be treated within scope of practice or require referral | C, AC |
| SKILL8 Evaluate a medication dose for appropriateness | C |
| SKILL9 Identify drug related problems | C, HS, AC |
| SKILL10 Review a patient profile for drug interactions | C, AC |
| SKILL11 Review a patient profile for duplicate therapies | C |
| SKILL12 Review a patient profile for medical condition-medication precautions | C |
| SKILL13 Use SCHOLAR-MAC TO determine appropriate self-care candidates | C, AC |
| SKILL14 Complete a drug utilization review (DUR) | C, HS, AC |
| SKILL15 Prioritize drug-related problems | C, HS |
| SKILL16 Resolve drug-related problems | C, HS |
| SKILL17 Be able to effectively communicate with other pharmacists via telephone | C |
| SKILL18 Be able to effectively communicate with patients via telephone | C, HS, AC |
| SKILL19 Document and report patient information | C, HS, AC |
| SKILL20 Monitor a patient for adverse effects | C, AC |
| Interprofessional Team Member Domain | |
| SKILL1 Be able to effectively communicate with prescribers via telephone | C |
| SKILL2 Effectively communicate with patients | C |
| SKILL3 Effectively communicate with providers* | HS, AC, MC |
| SKILL4 Effectively communicate with pharmacy staff | C |
| SKILL5 Effectively communicate with pharmacy technicians | C |
| Population Health Promoter Domain | |
| SKILL1 Document and report medication errors | C, HS, AC |
| SKILL2 Cultural and gender competency | C |
| SKILL3 Administer a subcutaneous injection | C |
| SKILL4 Administer an intramuscular injection | C |
| Information Master Domain | |
| SKILL1 Counsel a patient on a medication refill | C, AC, MC |
| SKILL2 Counsel a patient on a new medication | C, AC |
| SKILL3 Counsel a patient on an OTC product | C, AC |
| SKILL4 Educate a patient on an inhaler* | |
| SKILL5 Effectively communicate using medical terminology and patient-friendly terms | C |
| SKILL6 Effectively communicate with other pharmacists | C |
| SKILL7 Effectively communicate with the public | C |
| SKILL8 Have a working knowledge of top 200/300 drugs | C, HS, AC, MC |
| SKILL9 Have clinical knowledge of medications commonly dispensed in community settings | C, HS, AC, MC |
| SKILL10 Have clinical knowledge of OTC products | C |
| SKILL11 Have drug information skills | C |
| SKILL12 Have knowledge of disease states patients typically seek to self-treat | C |
| SKILL13 Counsel a patient on a device | C, AC |

| | | |
|---------|--|-----------|
| SKILL14 | Counsel a patient using OBRA '90 | C |
| SKILL15 | Educate a patient on devices* | C, AC |
| SKILL16 | Educate a patient on a glucometer* | C, AC |
| SKILL17 | DM testing supplies counseling | C, AC |
| SKILL18 | Interpret medical literature to answer patient | C |
| SKILL19 | Interpret medical literature to make appropriate recommendations to prescribers | C |
| SKILL20 | Know how and where to look up unknown information | C, MC |
| | Use drug information resources, retrieve and analyze scientific literature to answer | C, HS, AC |
| SKILL21 | questions and make evidence-based recommendations | |
| SKILL22 | Possess problem-solving and critical thinking skills | C, AC, MC |

Practice Manager Domain

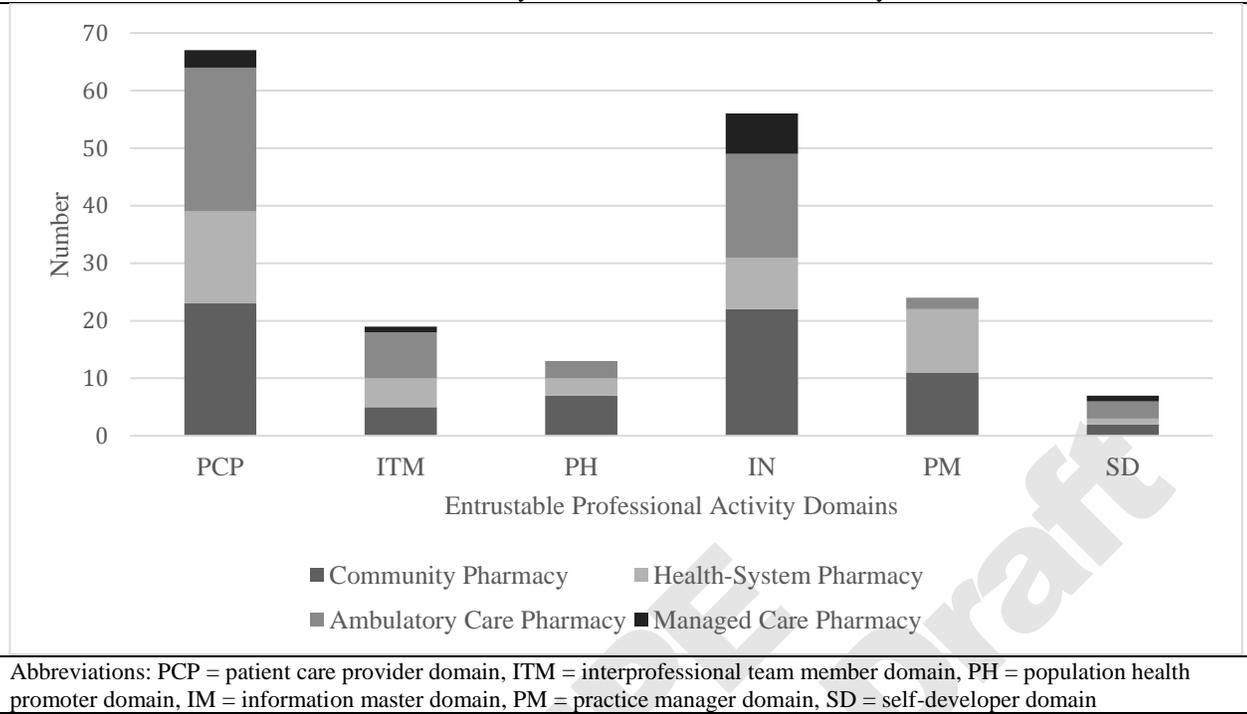
| | | |
|---------|---|-----------|
| SKILL1 | Perform prescription transfers | C |
| SKILL2 | Understand pharmacy practice laws and regulations | C, HS, AC |
| SKILL3 | Oversee dispensing of medications | C |
| SKILL4 | Accurately perform pharmaceutical calculations | C, HS, AC |
| SKILL5 | Evaluate a prescription prior to filling | C |
| SKILL6 | Check a medication prior to dispensing | C, HS |
| SKILL7 | Know the legal requirements for prescriptions | C |
| SKILL8 | Take new prescriptions via telephone | C |
| SKILL9 | Understand basic compounding | C |
| SKILL10 | Know SIG codes | C |

Self Developer Domain

| | | |
|--------|--|-----------|
| SKILL1 | Act ethically and professionally, upholding HIPAA and all state and federal laws | C, HS, AC |
|--------|--|-----------|

Note. C = community pharmacy, HS = health-system pharmacy, AC = ambulatory care pharmacy, MC = managed care pharmacy

Table 2. Number of Essential Skills Identified by Entrustable Professional Activity Domain



Abbreviations: PCP = patient care provider domain, ITM = interprofessional team member domain, PH = population health promoter domain, IM = information master domain, PM = practice manager domain, SD = self-developer domain