Implementing a Layered Learning Model into Introductory Pharmacy Practice Experience and Advanced Pharmacy Practice Experiences to Minimize Impact on Preceptor Workload

Learning objectives:
After the completion of reading the article, the reader will be able to:

1. Describe the return on investment of the enhanced layered learning model, including Introductory Pharmacy Practice Experience (IPPE) and Advanced Pharmacy Practice Experience (APPE) student integration
2. Identify opportunities for integrative learning at your institution
3. Apply the layered learning practice model into various areas of pharmacy practice

Type of activity: knowledge
Target audience: pharmacists including pharmacy residents

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Location: NCCCP eNewsletter (http://ncccp.net/activities/newsletter/)
Date and schedule: April 1, 2019
ACPE – pharmacist accreditation credit hour: 0.25

The ACPE Universal Activity Number: 0217-9999-19-084-H04-P
For the successful completion, readers should pass a post-test with a score of 70% or higher.
Go to: https://www.surveymonkey.com/r/LayeredLearning to take the post-exam. Pharmacists who pass the post-test with a score of 70% or higher by May 31, 2019 must have a valid NABP e-Profile ID and date of birth on file with ACCP and ACCP will submit credit to NABP. ACCP membership is not required; a free ACCP account can be created at https://www.accp.com/signin/register.aspx

Fee: Members - Free
Non-members - Free

This is a free CE activity with no financial support from an individual or an organization.

The American College of Clinical Pharmacy is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

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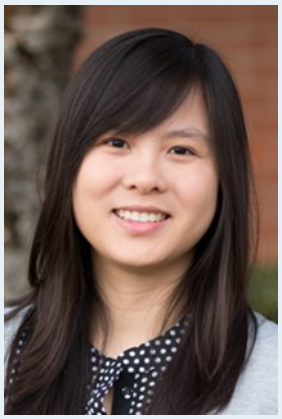
Yvonne Mai, PharmD, MS, BCGP, BCACP

Yvonne Mai earned her doctor of pharmacy from University of the Pacific in 2013, where she also completed a fellowship in pharmacoeconomics, health care outcomes and clinical services. She joined the Pacific faculty in 2015 as Assistant Professor of Pharmacy Practice and Stockton Regional Coordinator.

She was originally drawn to pursue a career in healthcare with a focus on medication management because she wanted to empower and educate the underserved. Her research is focused on health outcomes of pharmacist provided services. She also evaluates innovative services or practice models to improve outcomes in the underserved and Medicare populations.



Implementing a Layered Learning Model into Introductory Pharmacy Practice Experiences (IPPE) and Advanced Pharmacy Practice Experiences (APPE) to Minimize Impact on Preceptor Workload

Yvonne T. Mai and Elaine Law
University of the Pacific, Thomas J. Long School of Pharmacy and Health Sciences

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Background
Healthcare Education has often applied the traditional medical model of active learning with an attending physician, residents, interns, and medical students. In 2010, the University of North Carolina Medical Center (UNC) and UNC hospitals formed a program called the "Partnership in Patient Care" with the goal of enhancing patient care and the education of their students and residents by implementing and formally operationalizing a layered learning practice model (LLPM). The LLPM was based on the modern medical model of active learning. The LLPM focuses on ensuring that every pharmacist on the team has a direct effect on and relationship with the patients and is overseen and led by an attending pharmacist. The attending pharmacist can be a clinical pharmacist specialist, pharmacist in charge, or general practice pharmacist seeking leadership opportunities at the site. An example of an LLPM scheme can be seen in figure 1.[1]

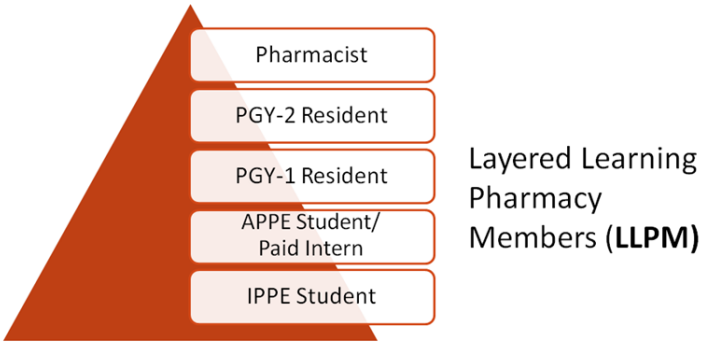
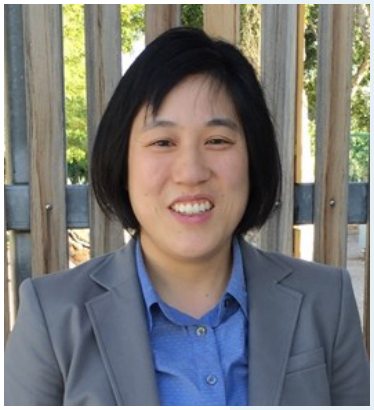


Figure 1: Example of a Pharmacy Layered Learning Practice Model (LLPM)



Elaine Law, PharmD, BCPS, FCSHP

Elaine Law earned her doctor of pharmacy from the University of California, San Francisco in 2008 and completed a PGY1 acute care residency at the University of California, San Francisco Medical Center. Elaine is currently an Assistant Professor of Pharmacy Practice at the University of the Pacific and Regional Coordinator of Experiential Education in the San Jose and Monterey Regions, a role she has worked in since joining UOP in 2015. Past experience includes being the lead clinical pharmacist specializing in Adult General Surgery, Surgical Oncology, and Bariatric Surgery at a the University of California-San Francisco Medical Center for 6 years before transitioning into her current academic position.

She is actively involved with CSHP and ASHP, serving on several committees to advance the practice of pharmacy, particularly focusing on professional development and mentoring students and new practitioner

(continued on page 7)

Implementing a Layered Learning Model into IPPE and APPE

Currently, the LLPM the has been used nationally by several pharmacy programs in multiple hospitals, ambulatory care and academic settings, but has not been universally adopted. Many preceptors still prescribe to the traditional precepting model of one on one (student to clinical preceptor ratio), didactic topic discussions and "card-flipping," a time consuming and rigid process that does not address different learner styles or needs. Therefore, it is time for the profession to re-think this outdated model, particularly with the increase in pharmacy experiences required by the Accreditation Council for Pharmacy Education (ACPE) and the continued expansion of pharmacy programs in the United States and California. The LLPM can also be tailored to each facility. While facilities should be encouraged to use the template above, they may consider including non-traditional members such as physicians, nurses, and pharmacy technicians who can play critical roles in the learner-preceptor relationship.

ACPE requires a minimum of 150 hours of Introductory Pharmacy Practice Experiences (IPPEs) prior to the Advanced Pharmacy Practice Experiences (APPEs). IPPEs can take on different forms depending on the institution, but they must be completed early in the curriculum, usually during or shortly after the first year. IPPEs serve as an introduction to orient students to a variety of different practice settings. For example, IPPEs are an opportunity for students to get them familiar with the workflow and layout of dispensing areas, patient counseling, clinical monitoring per pharmacy protocols, or working on medication therapy management (MTM). Student activities usually associated with IPPEs include obtaining medication histories and medication reconciliation, introduction into hospital operations, and collecting medication use/adherence information. APPEs must consist of at least 36 weeks (1440 hours) of with four required areas (Internal Medicine, Ambulatory Care, Community Pharmacy Practice, and Hospital/Institutional Practice).[2] Students on APPEs are expected to perform at a higher level, applying the knowledge gained by completing their didactic courses. APPE students should function and work on tasks parallel to the pharmacist, acting as true pharmacist extenders.

Expansion of these experience requirements have led to concerns and challenges from pharmacy school experiential programs to find and maintain sites at an appropriate capacity, and to find enough preceptors to accommodate the increased pharmacy student load. According to the Bureau of Labor Statistics as of May 2017, there are 29,860 registered pharmacists in the state of California.[3] The California Health Care Foundation addresses specifically the areas of practice, with the most recent data coming from 2015, which concludes that most California pharmacists (46%) practice in the retail setting, with 34% and 13% practicing in hospital and ambulatory care, respectively, required APPE rotations for all students as mentioned previously. Despite this immense wealth of pharmacists practicing in diverse areas in California challenges and misconceptions about precepting exist. Particularly preceptors finding it challenging to integrate students into their workflow, the perception that student teaching takes extra time, and the fact that most preceptors are volunteering their time to precept.

Another challenge to preceptor load outside of the APPE and IPPE requirements is increased pharmacy school enrollment in the United States. In California in particularly, the growth of pharmacy programs has increased significantly in the last 10 years. There are now 13 pharmacy schools in California, and in 2016, there were a total of 4,499 students enrolled in pharmacy programs. Figure 2 shows the total Pharm.D.

pharmacists. She is currently in her final year of a three-year elected term as a Board of Directors for the California Society of Health System Pharmacists and has previously helped shape policy development as a state Delegate to the American Society of Health System Pharmacists.

enrollment in California from 1990-2016 using data compiled by the American Association of Colleges of Pharmacy (AACP). The opening of each pharmacy school is denoted by the image of a University.[4] All these challenges and changes to the pharmacy education landscape makes integrating and embracing the LLPM more vital.

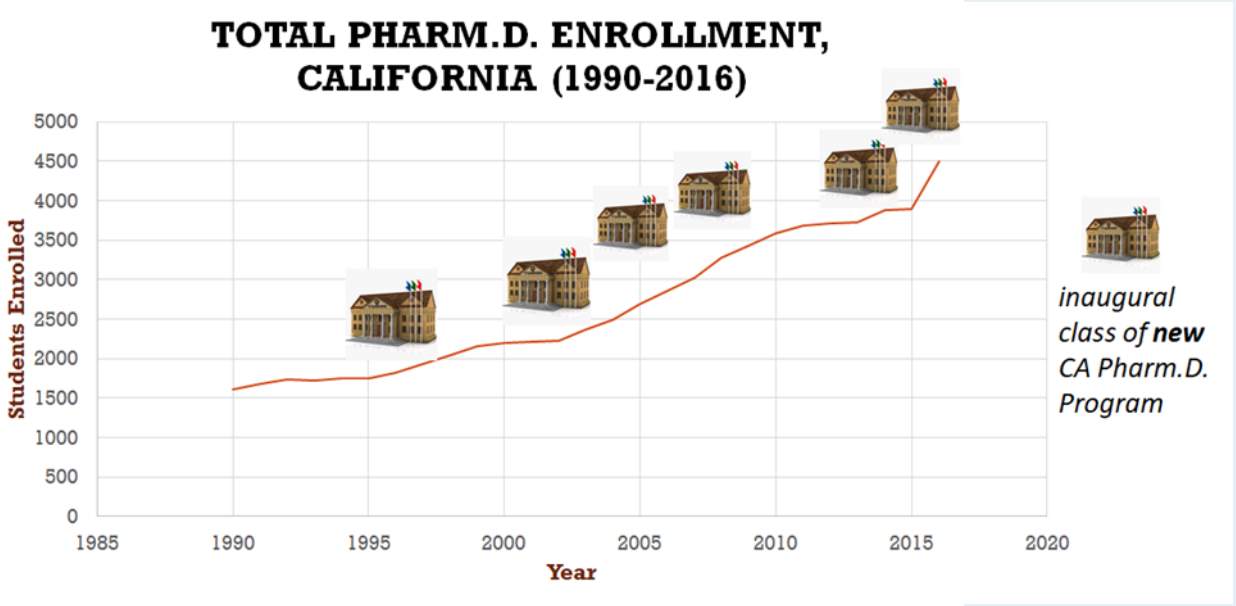


Figure 2: Growth of Total Pharm.D. Enrollment, California (1990-2016)

What is the Evidence: The Case for Layered Learning

University of North Carolina (UNC) – Academic Setting

UNC was one of the first to pioneer LLPM into pharmacy practice. As a follow up, they sought to study the effect of LLPM on a hematology and oncology service. In this practice model they describe the LLPM team being led by a Clinical Pharmacist Hematology/Oncology Specialist, followed by a General Practice Clinical Pharmacist, a Post Graduate Year 2 (PGY2) Resident, Post Graduate Year 1 (PGY1) Resident, and an APPE student on a 4-week rotation schedule. Pharmacists on this service already provided basic drug information consultations, order verification, and pharmacokinetic evaluations, and they wanted to use the LLPM to expand services. One of the primary outcomes sought to find the frequency of pharmacy team encounters at discharge that they defined as the "discharge capture rate" through medication reconciliation and counseling. Secondary outcomes were eight clearly defined medication-related problems (MRPs) that had meaningful interventions from LLPM team members. The eight MRPS were (1) unnecessary drug, (2) additional therapy needed, (3) ineffective drug, (4) dosage too low, (5) adverse drug reaction, (6) dosage too high, (7) noncompliance, and (8) other. During the study period, 120 patients were admitted to the hematology and oncology service with a mean number of prescriptions at discharge of 11. The discharge capture rate was 51% and the overall mean face time spent per patient was 21.3minutes. The mean MRPs per patient were 1.26 and 2.1, for the hematology and oncology services, respectively. It was noted that the APPE student contributed to 30% of all completed medication reconciliations, making a strong case in support of the contributions APPE students can make to patient care.[5]

Implementing a Layered Learning Model into IPPE and APPE

University Hospitals Geauga Medical Center – Non-academic Setting
A study of LLPM was conducted at the University Hospitals Geauga Medical Center, a 139-bed rural community hospital in Ohio with a small pharmacy residency program (two PGY1s) at the time of the trial. There was an increase in patient satisfaction scores and a decrease in drug expenditures with the LLPM on a general medicine service. The team included an attending clinical staff pharmacist, two PGY1 residents, and an APPE student. The primary outcome was the difference in mean total drug cost per discharge on cases with a pharmacy representative versus no pharmacy representative. Secondary outcomes were drug expenditures associated with eight specified diagnoses and patient satisfaction scores for the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) for a time period coinciding with the study. The HCAHPS satisfaction items analyzed were percent of patients giving an "always" response on "receipt of medication education," "receipt of education about medication indication," and receipt of education about medication adverse effects. Patient cases that had a pharmacy LLPM member had a significantly lower mean total drug cost/discharge compared to those in the control group ($161.52 compared to $210.15 in the control group ($p<00.1$). Patient satisfaction scores were higher in the pharmacy LLPM group for all three questions and were statistically significant ($p<0.001$).[6]

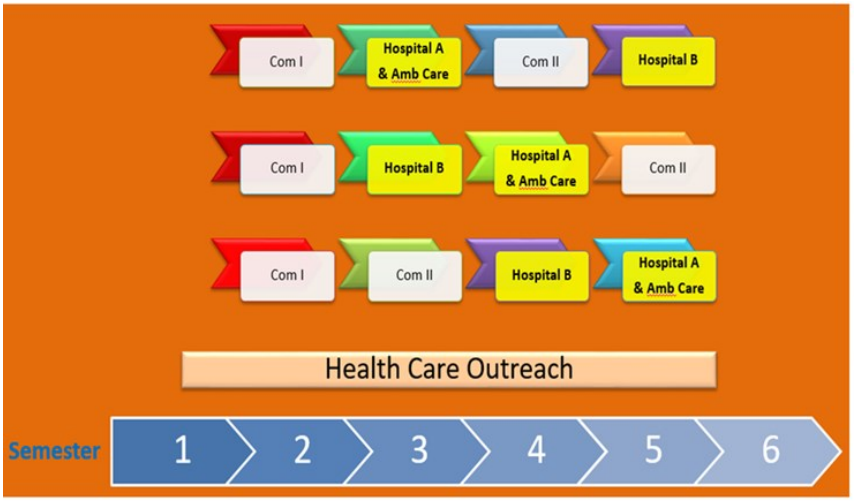
Advantages and Benefits of the LLPM
From the examples above, it illustrates that the layer learning practice model is flexible and feasible in a variety of different practice settings, and in academic or community hospital settings of various sizes and that it allows pharmacists and pharmacist extenders to contribute more thoroughly in the care of patients even with various staffing resource availability. In an interview of 25 "attending pharmacists" at UNC acute and ambulatory care settings, enhanced pharmacy services provided by the LLPM were seen particularly in acquiring medication histories, better medication reconciliation during transitions of care, assisting with medication access at discharge and providing thorough documentation of pharmacy interventions and patient encounters in the medical record.[7]

In addition to cost savings and being able to provide more comprehensive care to patients, the LLPM benefits the learners: students can teach each other through leading journal clubs or topic discussions; Residents who are part of the LLPM can gain valuable teaching and leadership skills as they learn to manage their time and patient care activities, be active participants in the evaluation and feedback process for students, and provide mentorship. The positive outcomes demonstrated by the studies in these institutions led University of the Pacific to devise a strategy to integrate the LLPM to their curriculum structure.

Experience from the University of the Pacific: Operationalizing the Layered Learning Model

University of the Pacific Experiential Structure
The University of the Pacific (UOP), Thomas J. Long School of Pharmacy and Health Sciences has facilitated operationalization of various layered learning models at selected partner sites. To better understand integration of LLPM within the UOP curriculum, the IPPE and APPE program structure at UOP is described in Figures 3 and 4. UOP is an accelerated three-year program with a total of six IPPEs completed during the first two years from Semester II to VI, amounting to a total of 315 hours. In their

third year, students advance to APPEs. As illustrated in Figure 4, APPEs at UOP consist of six rotations, each six weeks long, and are completed over nine months. The APPE program within UOP is decentralized, with a designated faculty Regional Coordinator at each of 14 rotation regions in California. The Regional Coordinator schedules rotation placements and organizes weekly and biweekly conference meetings. Students select a preferred APPE region during Semester II and have the opportunity to connect with their Regional Coordinator shortly thereafter.



Course	Hours
Community I	80
Community II	80
Hospital A	50
Hospital B	50
Ambulatory Care	30
Health Care Outreach	25

Figure 3: University of the Pacific IPPE curriculum

2018-2019	Fall 1	Fall 2	Fall 3	Break	Spring 1	Spring 2	Spring 3
Dates	8/20-9/28	10/1-11/9	11/12-12/21	12/22-1/6	1/7-2/15	2/18-3/29	4/1-5/10

Rotations		
Internal Medicine	Community Practice	Elective I
Ambulatory Care	Hospital Practice	Elective II

Figure 4: University of the Pacific APPE rotation and schedule (sample dates)

Enhancing IPPE/APPE Integration

Having the same learners assigned to a single site for multiple learning experiences (e.g. IPPE, volunteer, APPE) allow the learners to progress in activities, offers optimal integration of IPPE and APPE. IPPE students can continue learning and providing services to an institution after completion of their hours by acting as research assistants (RA), clinical volunteers, or paid interns, depending on the opportunities and policies

Implementing a Layered Learning Model into IPPE and APPE

of the site. In these roles, students can participate in activities such as conducting medication reconciliation or discharge counseling, and data collection for research or medication use evaluation (MUE projects). The students continue their training at the same site for Hospital APPE and/or other APPEs. The hub model for assigning student pharmacists minimizes the amount of time required for trainees to become acclimated to the practice environment during APPE training and maximizes the amount of time spent on clinical and operational services. APPE students can develop additional skills by assisting in the orientation and training of new IPPE students. For example, IPPE students can initially shadow an APPE student to observe how certain responsibilities or tasks are completed. Figures 5 and 6 provide examples of the task progression for a trainee in these three roles.

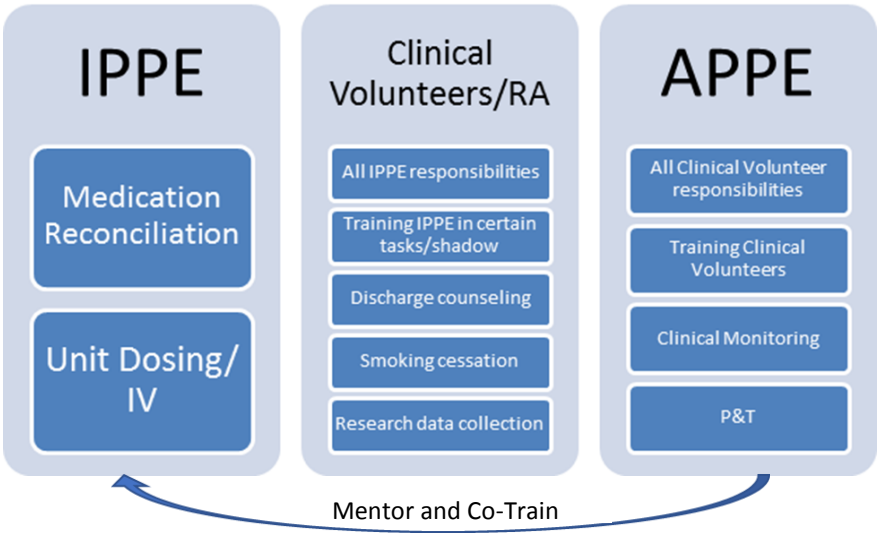


Figure 5: Example division of activities assigned to different levels of learners in hospital practice utilized at the University of the Pacific

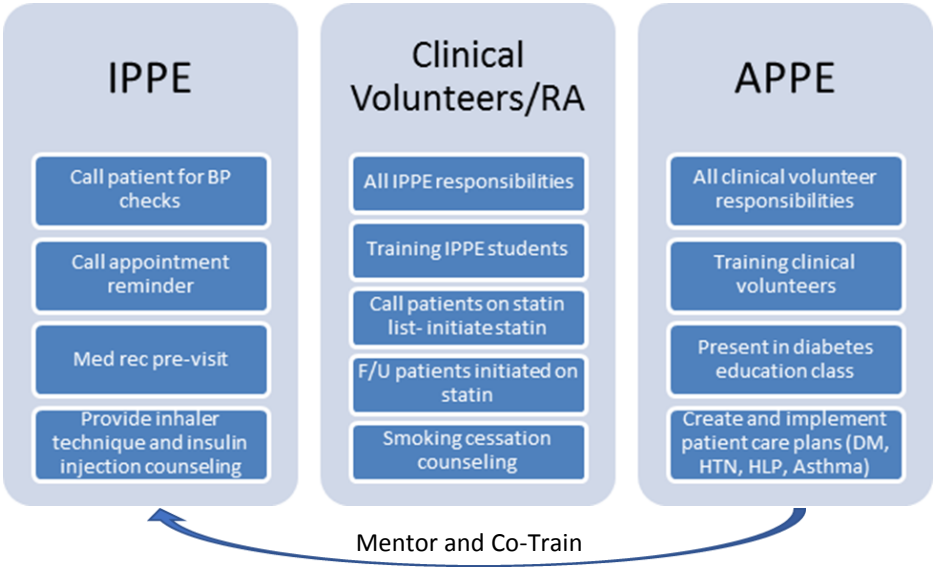


Figure 6: Example division of activities assigned to different levels of learners in ambulatory care practice utilized at the University of the Pacific

Implementing a Layered Learning Model into IPPE and APPE

Integrating Trainees into Research and Quality Improvement

As illustrated in figure 5, IPPE and APPE trainees can assist in MUEs or longitudinal research or quality improvement projects. For institutions with a residency program, pairing the pharmacy student with a resident to collaborate on a research project is an effective approach. This collaboration allows students to sharpen their investigative and technical writing skills while providing residents the opportunity to develop their precepting skills, and obtain assistance on their research projects. At a UOP-partnered institution where this was piloted, pharmacy students transitioned into project assistants following completion of their IPPEs. Depending on the policies and preference of the institution, the position can be paid or voluntary. Set expectations of number of hours on and off site should be established in advance of the rotation. Depending on the nature of the project and desire of the research team, the students can assist with a literature search, study protocol drafting, data collection, and research abstract/poster generation. Each activity requires adequate training and oversight provided by the resident. During this process, the residents oversee the students' activities after determining task delegation with their major project adviser. After the residents present their project internally and at a residency conference such as the Western States Conference, the students assist in submitting the project for poster presentation at a major state or national conference such as California Society of Health-Systems Pharmacists (CSHP) Seminar or American Society of Health-Systems Pharmacists (ASHP) Midyear meetings. Students can be assigned multiple rotations at the same institution when they progress to APPEs and concomitantly complete longitudinal experiences at the site, including participation in the Pharmacy and Therapeutics Committee, medication safety, or drug information. These longitudinal experiences in conjunction with the primary APPE provide the opportunity to further develop their ability to synthesize recommendations from literature evaluation, manage multiple projects, and written communication skills. During this time, APPE students can also assist in training the incoming research students with specific skills such as navigating the electronic health record.

Interdisciplinary Training

As mentioned previously, other healthcare professionals can also play critical roles in the LLPM. In certain facilities, these other professionals can enrich the learning experience of trainees by sharing their expert knowledge and skills. This makes trainees more well-rounded and aware of the contributions of various healthcare team members, leading to a holistic approach to patient care. These non-traditional members of the LLPM may play essential roles in facilities with limited pharmacist preceptors or time. Collaborating with other professions is also a fruitful approach to generating new research ideas.

Assessing Needs and Addressing Challenges

Challenges remain in successfully implementing the layered learning model and may vary based on the facility's services. Common roadblocks include lack of leadership support and scarcity of resources, variability in preceptor teaching ability or comfort, diversity, varied practice activities, and differing preceptor expectations. Discussion of the past studies demonstrating the clinical and economic benefit of the LLPM can assist with obtaining leadership support. Regarding the remaining roadblocks, there are three main components essential to successful development of an integrated

Implementing a Layered Learning Model into IPPE and APPE

experiential education at any site: sufficient training, effective communication, and frequent reassessment of the program. With this model, learners, such as APPE students, PGY1 and PGY2 residents are more involved with precepting responsibilities and appropriate preparation is needed for these individuals to participate in a dual role of learner and educator. Training involves both instructing the trainee on the various responsibilities and providing sufficient preceptor development for each team member so the expectations can be aligned. Partnering with local Schools of Pharmacy can help decrease training workload. Additionally, recorded presentations or online modules can be efficient training modalities. Platforms such as a Google Drive, Sharepoint, or internal shared drives may also be used to facilitate effective communication and exchange of information such as scheduling and documentation of student progress.

Use of strategic planning tools can help identify potential challenges. The SWOT (strengths, weakness, opportunities and threats) and TOWS (threats, opportunities, weaknesses, and strengths) analysis can be used to assess how the LLPM can be implemented at selected facilities. The SWOT analysis organizes an institution's strengths, weaknesses, opportunities, and threats into a matrix for analysis. Strengths include areas that the institution does well or better than similar organizations while weakness are areas that require improvement. Opportunities include areas of expansion and threats are factors that can hurt the organization or services provided. The TOWS approach further uses this information to identify organizational strategies to minimize threats and capitalize on opportunities. There are four sections: strengths-opportunities, weaknesses-opportunities, strengths-threats, and weaknesses-threats. Both tools are inexpensive and simple methods to organize information and devise a plan to further develop the organization. It can also aid in the periodic reassessment of services like the LLPM. A worksheet of both a SWOT and TOWS analysis are included in Appendix A. An example SWOT analysis can be found on APhA website (https://www.pharmacist.com/sites/default/files/files/mtm_swot_analysis.pdf) and Chapter 5 of the book Essentials of Strategic Planning in Healthcare by Jeffery Harrison can be referenced for further details on strategic analyses.[8,9]

Conclusion

The evidence and our experience at the University of the Pacific indicate that the LLPM is an effective model to enhance student learning on IPPEs and APPEs, to decrease preceptor workload, and to provide teaching and leadership experience to students and residents. We encourage healthcare systems to be creative with members of the LLPM as they can include pharmacy technician and non-pharmacy members such as nurses and physicians. An LLPM is a valuable tool to demonstrate the value of precepting and mentorship to learners, transitioning them into the educator role. As the pharmacy profession continues to grow and expand, challenges in implementation of LLPM into practice include leadership support (from both pharmacy and non-pharmacy leaders), expanded resources and staff, and education of staff and learners regarding their roles in health professions education.

Implementing a Layered Learning Model into IPPE and APPE

Post Program Assessment Test

1. Evidence has shown that the LLPM allows the pharmacy team to be more involved in patient care. Which of the following are examples described by the University of North Carolina on their hematology/oncology service as pharmacy related interventions:
    A. Identifying adverse drug reactions
    B. Improving medication noncompliance
    C. Making dosage change recommendations
    D. All of the above

2. You are Director of Pharmacy at a small 150 bed rural hospital without pharmacy residents and you have been asked to accept second year IPPE students. You would like to expand medication reconciliation in the emergency room and look into appropriate use of propofol in the ICU. What activities would be appropriate to assign this IPPE student after adequate training.

    A. Create a workflow document for implementing a pharmacy run medication reconciliation program
    B. Assess propofol use in the ICU through a medication use evaluation project
    C. Work with the pharmacy technician to run Pyxis audits on propofol usage
    D. All of the above

3. Individuals that can be part of the layered learning model are:

    A. Director of Pharmacy
    B. Liver transplant clinical pharmacist
    C. Third year inpatient intern pharmacist
    D. Pharmacy technician
    E. All of the above

4. Which of the following tools can help identify opportunities and strategies to implement LLPM at your facility?

    A. SWOT
    B. Six Sigma
    C. TOWS
    D. A and C

5. Your facility is a 300-bed county hospital with an active ER, ICU, and CICU. Your hospital is decentralized and has two ER pharmacist shifts covering 20 hours of each day. You would like to have your PGY-1 residents and APPE students rotate through the ED. The pharmacists are concerned about workload, their patient care activities, and how they would integrate effective teaching. How would you address these potential barriers?

    A. Develop APPE activities align with ED patient care activities such as medication reconciliation and refilling crash cart trays
    B. Utilize the LLPM with the PGY-1 resident as the primary preceptor for the APPE student

Go to: https://www.surveymonkey.com/r/LayeredLearning to take the post-exam.

C. Partner with professional organization or University to develop preceptor training workshop
D. All of the above

6. Which of the following are demonstrated benefits of the LLPM?
   A. Reduced drug costs
   B. Increased work load
   C. Higher patient satisfaction
   D. A and C

7. The following are all components of the TOWS analysis EXCEPT:

   A. Strengths
   B. Threats
   C. Weaknesses
   D. Opportunities
   E. All of the above are components

8. True or false: In the LLPM model, learners, such as APPE students, PGY1 and PGY2 residents require appropriate preparation to participate in a dual role of learner and educator; and this represents both an opportunity and a threat to the program.
   True
   False

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Implementing a Layered Learning Model into IPPE and APPE

APPENDIX A

Utilizing SWOT and TOWS analysis to brainstorm a layered learning model at your practice site

Matrix 1: SWOT
Use the SWOT analysis matrix below to help assess the strengths, weaknesses, opportunities, and threats your organization

Implementing a Layered Learning Model into IPPE and APPE

Matrix 2: TOWS

Use the TOWS analysis matrix below to brainstorm strategies to capitalize on strengths and minimize weaknesses

Internal Factors / External Factors	S	W
O	**SO Strategy** Use strengths to maximize opportunities	**WO Strategy** Minimize weakness by taking advantage of opportunities
T	**ST Strategy** Use strengths to minimize threats	**WT Strategy** Minimize weaknesses and avoid threats