Layered Learning/Utilization of Students and Residents as Pharmacy Extenders: Panel of Experts
Spencer Pummel, Pharm.D., BCPS
Christina Graham, Pharm.D., BCPS
Linda Radke, Pharm.D., BCPS, FASHP
Jill T Robke, Pharm.D., BCPS, FASHP

Objectives
- Be able to describe the concepts of layered learning and practicing at the top of one's license.
- Explain concepts used to overcome challenges faced in using students and residents in a wide variety of practice situations/settings.
- Discuss how some of these principles might be applied to more effectively use students/residents in your practice setting.

Teaching Pharmacy Students/Residents – Pre-2010
- Restricted to big teaching medical centers
- Students are passive observers in a clinical pharmacist-centric practice model
- Learning is primarily through lecture/discussion
- Residents are "super-students" and staffing is a necessary evil
- Teaching activities are of little value; a luxury when viewed from an organizational standpoint
- Schools of pharmacy engaged in rapid expansion of capacity; leads to students foraging for rotation sites
Pharmacy Practice Model Initiative

- Key recommendations from 2010 PPMI
  - Many unmet patient care needs
  - Optimal practice models will support pharmacists as direct patient care providers.
  - We need to insure all pharmacy personnel are functioning at "the top of their license" including pharmacy students/residents
  - Pharmacy students/residents must become care extenders

Teaching Pharmacy Students/Residents Post 2010
AJHP 2011;68;2016;73;456 and 2016;73:e603

- Students/residents are pharmacist extenders through providing direct patient care
- Layered learning helps increase our capacity
- Nontraditional practice sites accommodate increasing numbers of students/residents
- Teaching and residency programs become a reflection of the organization's practice model
- Staffing becomes an integral part of the practice experience

Pillars of a Practice Model

<table>
<thead>
<tr>
<th>Technology</th>
<th>Technical Staff</th>
<th>Pharmacists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automated dispensing systems</td>
<td>Pharmacy technicians</td>
<td>Preceptors</td>
</tr>
<tr>
<td>Computer systems</td>
<td>Student interns</td>
<td>Staff</td>
</tr>
<tr>
<td>Other systems</td>
<td>Other support staff</td>
<td>PGY2 residents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PGY1 residents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student interns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>APPE rotation students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IPPE rotation students</td>
</tr>
</tbody>
</table>
Examples of Innovation

- Pharmacy student rotations on non-traditional rotations – Spencer Pummel
- Career development for paid interns – Christina Graham
- Incorporating students/residents into a rural healthcare setting – Linda Radke
- Integrating students (experiential and employee) into a health system’s pharmacy practice model – Jill Robke
Saint Luke’s Hospital
- 400 bed tertiary care hospital located in Kansas City, MO
- Research and academic institution
- Services include
  - Critical Care
  - Neurology and Neurosurgery
  - Cardiology and Cardiac Surgery
  - Nephrology and Renal Transplant
  - Neonatology
  - Oncology
  - Inpatient rehab

Pharmacy Staff
- Clinical Decentralized Pharmacists
  - 1 intensive care units: Nephrology, Cardiology, Pulmonary, Emergency Department, Oncology
  - 6 PGY1 residents
  - 1 PGY2 Health System Pharmacy Practice Administration
  - 1 PGY2 Critical Care
  - 42 APPE rotations (4 Schools of Pharmacy)
  - 17 IPPE rotations

Overnight Staff
- Pharmacists (4 FTE)
  - 12 hour shifts: 7 on, 7 off
  - 3 residency trained
  - 3 board certified pharmacotherapy specialists
  - 2 residency teaching certificates
  - Active in department operations, department research and advancement
- Technicians (6 FTE)
  - Experienced group
  - All nationally certified
  - Viewed as experts by their Saint Luke’s peers
**Why not take IPPE students overnight?**
- Experienced and residency trained pharmacists
- Experienced pharmacy technicians
- Extensive operational and clinical activities
- Time for projects to advance our department’s mission

- Hours 8 PM to 7 AM
- All 12 hour shifts
- No overlap with students from other shifts
- Number of students to take
- Integration into workflow
- Inexperienced preceptors

**Are we starting from scratch?**
- Established residency and student programs
- Great resources, including other experienced preceptors that assisted us with:
  - Recruitment
  - Orientation/administrative activities
  - Project ideas/organization
  - Topic discussion ideas
  - Basic curriculum provided by school
Example Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Triage phone calls</td>
</tr>
<tr>
<td>2000</td>
<td>Complete assigned tasks from workbook</td>
</tr>
<tr>
<td>2000</td>
<td>Work on presentation/research project</td>
</tr>
<tr>
<td>2000</td>
<td>Check sterile IV batch production</td>
</tr>
<tr>
<td>2200</td>
<td>Order verification</td>
</tr>
<tr>
<td>2200</td>
<td>Review completed tasks from student workbook</td>
</tr>
<tr>
<td>0000</td>
<td>Shadowing</td>
</tr>
<tr>
<td>0100</td>
<td>Work with technician staff</td>
</tr>
<tr>
<td>0100</td>
<td>‐ Sterile Compounding</td>
</tr>
<tr>
<td>0100</td>
<td>‐ Non-sterile compounding</td>
</tr>
<tr>
<td>0100</td>
<td>‐ ADC restock</td>
</tr>
<tr>
<td>0100</td>
<td>‐ Central pharmacy automation</td>
</tr>
<tr>
<td>0100</td>
<td>‐ Unit dose packaging</td>
</tr>
<tr>
<td>0500</td>
<td>Order verification</td>
</tr>
<tr>
<td>0500</td>
<td>Topic discussion</td>
</tr>
</tbody>
</table>

Did we satisfy the needs of the students?

- Flexible learning
  - Shadowing, topic discussions, presentations, operational and clinical functions
- Common feedback from students included:
  - Higher percentage of time with preceptor than their day shift counterparts
  - Appreciated individualized rotation structure
  - Still able to work their paid intern job
  - Rotation completion in 2 weeks

Did we satisfy the needs of the department?

- Department quality improvement
- Data collection for Alaris pump integration research
- Completion of technical work
- Engage evening/night staff in learning opportunities
- Positive perception of pharmacy and hospital staff
Can we improve the experience next year?

- Enhance our practice site and student resources
- Increase patient interaction
- Increase face-to-face interaction with other hospital providers
- Prepare projects, quality improvement in advance
- Precept posters at professional meetings
- More students

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Clinical Intern Program
Christina R. Graham, PharmD, BCPS
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Personal Experience

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LMH Overview

- 173-bed not-for-profit community hospital
  - Average Census: 100 patients
  - 10 bed ICU
  - 27 bed emergency department
  - 13+ Ambulatory Clinics
- Main Pharmacy
  - 24:1 pharmacist to patient ratio or less
  - Accommodates personalized patient-centered care
  - 24/7 pharmacist service
    - Including code blue/trauma/stroke response
- Health System Pharmacy
  - Employee (Self-Insured) & Meds 2 Beds Service
  - Transitions of Care
- Oncology Satellite

Create More Internships!

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Never give up on what you really want to do. The person with the big dreams is more powerful than one with all the facts.

-Albert Einstein
When building pharmacy practice models for health systems, forethought should be given to how students will be incorporated as productive members of the pharmacy team. Students should not simply be layered on top of existing operations without clearly defining how they will contribute to the work of the pharmacy department.

LMH Clinical Intern Program Mission

To provide clinical interns with a solid foundation in health-system pharmacy that fosters the development of a student into a pharmacist who values patient-centered care.
### LMH Teaching Program

- **Residency**
  - 2 PGY1 Pharmacy Residents
  - 9th Year
- **Clinical Intern Program**
  - 14 employed interns
  - >20 years
- **APPE/IPPE Rotation Site for KU**
  - General Hospital
  - Inpatient Clinical
  - Ambulatory Care
  - Emergency Medicine (New in 2017)
- **International Rotation Site**
  - Thon Kaen University (Thailand)

### LMH Structure

- **P1**: Mentor P1 Interns
  - Technical competencies
  - Understand Health-system Pharmacy Operations
  - Professional Involvement
  - Encouraged
- **P2**: Mentor P1 Interns
  - Technical & Clinical Responsibilities
  - One Intern Positioned as "Chief Clinical Intern"
- **P3**: Mentor P1 & P2 Interns
  - Technical & Clinical Responsibilities
  - One Intern Positioned as "Chief Clinical Intern"
- **P4**: Mentor P1, P2, P3 Interns
  - Clinical & Some Technical Responsibilities
  - Residency Preparation

### Clinical Intern Coverage

- **Monday through Friday**
  - 1 clinical – 6 to 10 PM
  - 2 technical – 3:30 to 6:30 and 3:30-10:30 PM
- **Weekends**
  - 1 clinical – 3:30 AM
  - 3 technical – 3:30, 8:30 to 5:00, 11:30 to 8:30
- **Extras**
  - Projects: Operations or Clinical
  - Cover full time technicians
Technician Stability

- Clinical Intern coverage
  - Evenings
  - Weekends
  - Holidays
  - Self-sustained schedule
    - Chief Intern responsible vs. Chief Technician

- Full-time Technician Hours
  - Monday - Friday
  - No evenings
  - No weekends
  - No holidays (unless volunteer)
  - Vacation Coverage

Challenges

- Yearly Turnover
- Limited Availability
- Other Internships
- Balance
- Location
Benefits

Application of Clinical Knowledge
- Med History & Reconciliation
- Consults
- Patient Education
- Code Response Support

Career Preparation
- Process Improvement Projects
- Leadership
- Conflict Resolution
- Mentorship
"As a faculty member at University of Southern California, I work closely with hundreds of students each year. I ask them about their internship experiences and have been shocked to learn that none of their internships are even half as advanced as the LMH clinical intern program. LMH is at the cutting edge of clinical pharmacy."
Clinical Intern – Class of 2009

"My time at LMH helped to shape the clinician that I am. My love for patient care and developing a relationship with the patient started as a clinical intern at LMH."

Clinical Intern – Class of 2013

“Sometimes, looking back, I feel like I learned more about medications and treatment at LMH than from pharmacy school. It was having the chance to apply what was being taught to us that really had an impact on my learning. The experiences I gained prepared me, beyond my imagination, for a PGY1 residency.”

Future Directions

"Celebrate what you accomplish BUT raise the bar each time you succeed.”

-Mia Hamm
Clinical Intern Program
Christina R. Graham, PharmD, BCPS
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The Salina Regional Experience: Incorporating students and residents in a Rural Health Care Setting
Linda Y. Radke, Pharm.D., BCPS, FASHP
Pharmacy Clinical Coordinator
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Salina Regional Health Center

- 239 staffed inpatient beds
- 18 bed Critical Care Unit (ICU)
- 26 bed Emergency Department (ED)
- 24/7 pharmacist services (including code blue/trauma response)
  - 17.0 FTE pharmacists
  - 15.8 FTE pharmacy technicians
  - 2 PGY1 pharmacist residents (5th year)

Clinical pharmacist positions include:
- Critical Care, Internal Medicine, Cardiology, and Emergency Department, Ambulatory Care Clinic, Oncology Clinic

Salina, Kansas

Location Strengths

- Salina Family Health Care: 15 family practice physician residents
- KU School of Medicine: 8 students/class
- KWU School of Nursing
- Successful Hospitalist and Intensivist Model for Inpatients
- Innovative Cardiovascular Surgery Program
- Infectious Disease Physician
- SRHC Foundation Support
- Pharmacy Residency Program
Location Challenges

• KU School of Pharmacy Students:
  – Lawrence Campus: 139 miles away
  – Wichita Campus: 88 miles away
  – Paid student interns a limited opportunity
• Local accommodations for students during rotations
• Pharmacy space for students and residents
• Trained Preceptors: students and residents

Preceptor Development

• Prior to initiation of residency program
• Active participation of current pharmacists
  – ACLS certification
  – Clinical Ladders opportunities and bonus
  – Specialty training
  – BCBS financial support
• Recruitment of trained and supportive pharmacists
• Clinical shift model change
  – Growing pains committee
  – Strategic planning

Pharmacy Space

Office for residents

Conference Room Remodel
Success Story highlight:
New Advanced Hospital and Cardiology Student Rotations

- Preceptor Maggie Hitzeman, Critical Care Pharmacist
- Two month block rotation: Advanced Hospital and Acute Care Cardiology
  - Cardiovascular Surgery Collaborative Rounds
- First 2 students piloted expanded student roles during November rotation
- Student Interventions documented in Quantifi software

Success Story highlight:
Student interventions

<table>
<thead>
<tr>
<th>November 2016</th>
<th>Student 1: Advanced hospital rotation</th>
<th>Student 2: Cardiology rotation</th>
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</thead>
<tbody>
<tr>
<td>Total interventions documented</td>
<td>46</td>
<td>30</td>
</tr>
<tr>
<td>Patient med histories</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>Cardiology rounding</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Patient education/ discharge counseling</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Heart failure follow-up phone call</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>
Pharmacist Role with Heart Failure Patients

- 2013 AHA/ACC Heart Failure Guidelines:
  - Optimize HF pharmacotherapy
  - Provide HF education
  - Address barriers to care
  - After discharge: follow-up visit in 7-14 days
  - Telephone follow-up within 3 days of discharge
- SRHC Pharmacist Role:
  - Education prior to discharge
  - Zone chart and bathroom scales
  - Follow-up phone call

Student Impact Documented:
Pharmacy Role with Heart Failure patients

<table>
<thead>
<tr>
<th></th>
<th>FY14-FY15 Q1</th>
<th>FY16</th>
<th>FY17 Q1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up phone call</td>
<td>65%</td>
<td>77%</td>
<td>76%</td>
</tr>
<tr>
<td>Received education</td>
<td>25%</td>
<td>43%</td>
<td>56%</td>
</tr>
<tr>
<td>prior to discharge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received free</td>
<td>21%</td>
<td>30%</td>
<td>27%</td>
</tr>
<tr>
<td>bathroom scales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readmission rate</td>
<td>17.5% (FY14)</td>
<td>19%</td>
<td>11.9%</td>
</tr>
</tbody>
</table>

Current State and Future Plans

- Year round student rotations: opportunities
- Specialty student rotations: ED, ICU, Cardiology
- Teaching certificate program for residents
- Pursue block scheduling for students
- Approved FY17: Outpatient pharmacy in main hospital: meds to beds, MTM
- Ambulatory care and transitions of care?
- Growth of residency program?
Thank you from the Land of Oz!

October 6, 2016 Photo courtesy of Tom Bell, former editor-in-chief of the Salina Post and current SRHC employee. View from the Niles Road overpass on Interstate Highway 70, looking south.

Leveraging Students as Pharmacist Extenders in a Health System

Jill True Robke PharmD, BCPS, FASHP
Clinical Specialist, Experiential Coordinator

Layered Learning

Pharmacist

Resident(s)

Student(s)

Patient care capacity

Saint Luke’s Health System
The Best Place to Get Care and the Best Place to Give Care

Our Metro Hospitals
• Saint Luke’s Hospital- Kansas City, MO
• Saint Luke’s North- Barry Road NKC and Smithville, MO
• Saint Luke’s South- Overland Park, KS
• Saint Luke’s East- Lee’s Summit, MO

Our Regional and Specialty Hospitals
• Crittenton Children’s Center - Lee’s Summit, MO
• Wright Memorial - Trenton, MO
• Anderson County Hospital- Garnett, KS
• Saint Luke’s Cushing Hospital- Leavenworth, KS
• Hedrick Medical Center- Chillicothe, MO
• Saint Luke’s Hospice House-KC, MO

Saint Luke’s Health System Department of Pharmacy
• Patient-centered integrated practice model
• Epic electronic medical record (EMR)
• Decentralized distribution model
  – Certified technicians
  – Automated dispensing cabinets
• System Pharmacy and Therapeutics Committee
• System Evidence-based practice teams (EPTs)
• 6 PGY1, 2 PGY2- Critical Care and Administration

Saint Luke’s Health System Department of Pharmacy
• System Collaborative Drug Therapy Management (CDTM) protocols
  – Vancomycin dosing
  – Aminoglycoside dosing
  – Warfarin dosing
  – Renal dosing
  – IV to po
  – Enoxaparin/fondaparinux dosing
  – Therapeutic interchange
Saint Luke’s Health System Department of Pharmacy

- System Clinical Pharmacy User’s Group (SC-PUG)
- Vision: An efficient and standardized workflow, across our health system, that ensures the best possible medication related outcomes
  - Daily clinical essentials
    - Activity, SLHS site, Responsible Party, Expectation, Frequency
  - Consult documentation work-flow
  - Clinical activity training

Saint Luke’s Health System Department of Pharmacy

- System Pharmacy Education Team (S-PET)
- Vision: Ensure the best possible medication related outcomes utilizing student pharmacists as pharmacist extenders
- Develop annual experiential rotation schedule
- System on-boarding process
  - Administrative
  - Clinical skills training
- System student project oversight

Experiential Rotations Offered

- Saint Luke’s Hospital
  - Introductory pharmacy practice experiences (IPPE): days, midnights
  - Advanced pharmacy practice experiences (APPE): days, evenings, weekends
    - Cardiology, general
    - Cardiology critical care/cardiac transplant
    - Or surgery critical care
    - Neurocritical care
    - Neurology/Neurosurgery/Neuroendocrinology
    - Medical/Surgical Critical Care
    - Emergency Medicine

- Saint Luke’s North, South, East
  - IPPE
  - APPE: days, weekends
    - General hospital
    - Acute Care- ICU
APPE Schedule

- Four blocks of 2 or 3 inpatient rotations
  - Block 1: June, July, August
  - Block 2: September, October, November
  - Block 3: January, February
  - Block 4: March, April
- Orientation and training first 2 business days of each block
- Flexible schedule
  - May include 12 hour shifts
    - Clinical practice site 07:15 - 11:00
    - 1 student Monday-Friday 11:00-19:00
    - Assist on PM pharmacist teams
    - Work alongside paid interns
- May include one weekend per rotation
  - 1 student per weekend 08-16
- APPE students determine schedule
- Ensure service hours covered 7 days/week

Stand Alone Rotations

- Pharmacy Administration
- Oncology
  - Inpatient care at SLH
  - 5 outpatient infusion centers across the metro
- Outpatient Pharmacy
  - SLN, SLH
- Specialty Pharmacy
  - Saint Luke’s Advanced Care Pharmacy

Stand Alone Rotations

- May be completed individually or in addition to a block of rotations
- Orientation and training completed by primary preceptor
  - Administrative on-boarding tasks completed as with block students prior to rotation start
**Sample Schedule**

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Month</th>
<th>Student 1</th>
<th>Student 2</th>
<th>Student 3</th>
<th>Student 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>Cardiology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>NICU</td>
<td>Admin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>SLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 2</td>
<td>September</td>
<td>MSTICU</td>
<td>SLHS Specialty RX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>SLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 3</td>
<td>November</td>
<td>ED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>SLN- Outpatient RX</td>
<td>SLN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>CVICU</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 4</td>
<td>March</td>
<td>Oncology</td>
<td></td>
<td>ImPalm</td>
<td>NGICU</td>
</tr>
<tr>
<td>April</td>
<td></td>
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</tr>
</tbody>
</table>

**Benefits of Sharing Students within Health System**

- Consolidate System Orientation and Training day 1 of Block at single site
- Creates/reinforces culture of System Department of Pharmacy
- Opportunity for students to work on System projects
- Educational opportunities for staff
  - Student presentations via webinar to all sites
  - Support for preceptors

**Long and Short of IPPE Rotations**

- Shortage of hospital IPPE rotation sites
- Short window for experiential rotations
- Short preceptors due to summer PTO
- Short space due to training new pharmacists, residents, APPE
- Longer shifts offer opportunity to expand rotations
  - 12 hour shifts 3-4 days per week
  - Midnight rotations
- Leverage layered learning teams
Example IPPE Rotation

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>08-1200</td>
<td>ICU room Tech/Pharmacist</td>
<td>Heart 1 APPE Pharmacist</td>
<td>OFF</td>
<td>MSTDICU PGY2 Pharmacist</td>
<td>OFF</td>
</tr>
<tr>
<td>13-1500</td>
<td>Project Time</td>
<td>Project Time</td>
<td>OFF</td>
<td>Project Time</td>
<td>OFF</td>
</tr>
<tr>
<td>15-2000</td>
<td>Evening Student Pharmacist shift APPE paid intern/PM pharmacist</td>
<td>Evening Student Pharmacist shift APPE paid intern/PM pharmacist</td>
<td>OFF</td>
<td>Evening Student Pharmacist shift APPE paid intern/PM pharmacist</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Advantages of Extended shift/week Rotations

- Reflects hospital pharmacist schedule
- Maximize time with preceptor
- Decreased congestion
- Shift overlap = opportunity to collaborate on group projects with midnight IPPE students, paid interns, PM pharmacists
- Flexible schedule facilitates work-life balance
- Increased pool of preceptors

Advantages of Block Scheduling

- Less orientation and training time
  - More patient care time
- Ability to perform more complex patient care
- Ability to work on more in-depth projects
- Attracts residency bound students
- More time spent with residents
- Opportunity to form relationships with preceptor
- Communication on student progression preceptor to preceptor
Challenges of Block Schedules

- Fear of commitment
- How to accommodate rotations > 4 weeks
- Mastering multiple evaluation systems
  - PharmAcademic, Evaluate, RX Preceptor
- Differing start dates
  - IPPE vs. APPE
- Project requirements from Schools

Are Your Students Indispensable?

- Mission
- Duty
- Essential

Student=Pharmacist Extender=Essential

- Treat them as customers
- Recruit
- Mentor
- Sponsor
- Survey
- CQI
- Preceptor development
Key Take Away

- Optimal practice models not only enable but rely upon learners to work as pharmacist-extenders
- Experiential training in a health system should occur during “normal business hours”
- Viewing learners as customers will ensure demand for your practice site and a reliable supply of pharmacist-extenders