

Establishment of a clinical pharmacy operating room rotation

Abstract

Purpose: An innovative pharmacy operating room rotation provides the clinical training necessary to deliver high-level care to patients in the perioperative setting.

Summary: With the relative prevalence of operating room (OR) pharmacies in the nation and only a handful of pharmacy operating room rotations offered, the need to increase perioperative pharmacy education within our practice is essential. Our academic institution developed an operating room rotation designed to educate pharmacy students on intraoperative medication utilization and procedural terminology while offering direct patient care experience. The rotation addresses the pharmacy education gap in perioperative medication management thereby improving patient safety and quality measures. To date three pharmacy students have completed our institution's OR pharmacy rotation. Subjectively speaking each student provided positive feedback regarding the rotation, its impact, and the education gained from the experience.

Conclusion: The unique, fast-paced, medication-intensive setting of the OR allows students the opportunity to engage in numerous stages of the medication utilization process. The need for further clinical pharmacy involvement in our operating rooms teamed with the positive feedback received from students reinforces the necessity to develop more clinical OR pharmacy rotations. By sharing our methodology in developing an OR pharmacy rotation we are optimistic other institutions will recognize the value and realize the opportunity for a more comprehensive student experience specifically focusing a rotation on the operating room medications and procedures. This knowledge will further our profession and validate our ever growing need for direct pharmacist involvement on multidisciplinary teams in the operating rooms across the country.

Keywords: pharmacy, operating room, clinical rotation, establishment, student rotation, clinical experience

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Abbreviations: OR, operating room; SCIP, surgical care improvement project; SSI, surgical site infection; PACU, post anesthesia care unit

Introduction

Operating room (OR) pharmacies have more than doubled in the past 25 years yet only a handful of clinical OR pharmacy rotations for students exist in the country.¹ The perioperative environment is a medication-intensive setting often overlooked as a training site for pharmacy students and pharmacists alike, and most pharmacists receive little or no training until they begin working in the OR.² Thus there remains a critical need for development of OR rotation experiences for pharmacy students in this subspecialty area of pharmacy practice.

Greater knowledge of intraoperative medication utilization, procedural terminology, and direct perioperative patient observance via rotational experience provides future pharmacists with the necessary background to perform medication substitution, conservation, and literature reviews essential to improving patient safety and quality measures.³ In the current environment of frequent medication shortages, hospital pharmacists equipped with a thorough knowledge of intraoperative medication utilization are necessary to span lapses in critical supplies while maintaining positive patient outcomes.

The emphasis for the creation of an OR pharmacy rotation includes improving student's knowledge of OR related practices through awareness of the full timeline of patient care, exposure to medications exclusive to the perioperative arena, cost containment initiatives, surgical site infection (SSI) reduction initiatives, antibiotic selection and Surgical Care Improvement Project (SCIP) guideline compliance, drug information provision in an acute, high-pressure setting, pain management,⁴ and overall quality patient care.⁵ The overarching purpose of creating additional OR pharmacy rotation opportunities locally and nationally is the eventual improved education of licensed pharmacists through both education given by our students as well as more graduating pharmacy students with a broader knowledge of OR medications and practices due to the preponderant opportunities available to attain an OR pharmacy rotation during their schooling.

Enhanced training of operating room pharmacists, specifically as perioperative consultants, is a consensus recommendation for improving medication safety in the operating room. A culture of safety can be promoted through such practices as allergy verification, dissemination of drug information, facilitation of drug shortages, and quality improvement projects performed by a pharmacist in the operating room setting. An OR satellite pharmacist armed with an expansive knowledge of OR related medications and procedures can advocate for standardized, evidence-based, and safe medication use.⁶

Rotation development

Our objective in the development of a clinical OR pharmacy rotation was to create experiential opportunities and didactic lectures aimed at fulfilling a gap in existing pharmacy training specific to perioperative medication use processes. Further expansion of the student's knowledge base and critical thinking skills were also in scope.

Based on the limited number of dedicated OR pharmacy rotation opportunities available, our institution identified the importance of developing a rotation with primary emphasis on the medications used by anesthesiologists and surgeons during surgical procedures. Placing focus on surgical and procedural areas was crucial given the OR is the most drug-intensive area in the hospital with a vast number of medications administered in a very short period of time.²

We initiated the development process for the OR rotation based on the ASHP Operating Room APPE Student Rotation guidelines. We then reviewed the syllabus and objectives for the post-operative rotation currently provided at our institution. After comparing the two rotation options and reviewing the potential topics provided by ASHP,⁷ it was determined an OR pharmacy rotation would have the capacity to teach lecture topics and provide hands-on education regarding medication topics primarily used in the perioperative environment as detailed in Table 1. Some of the medications listed in Table 1 are also used in other areas of the hospital including intensive care units and emergency departments, therefore discussion of their criteria for initiation and usage in the operating room will carry forward the knowledge of that particular medication when utilized elsewhere.

Table 1 Illustrates medication usage specific to the operating room environment within a hospital system

Medication usage common to the perioperative environment
Analgesia
Antibiotic-loaded bone cement/polymethyl methacrylate (PMMA)
Antifibrinolytic therapy
Bladder instillations (i.e. Cysview®, Mitomycin, Thiotepa, Silver Nitrate, and Formalin)
Cardioplegia
Epidural medication usage
General and regional anesthesia
Inhalational anesthetics
Intraoperative anticoagulation and hemostatic agents
Intraoperative inotropes and vasopressors
Malignant hyperthermia identification and treatment
Multimodal periarticular injections for Orthopedic surgery
Neuromuscular blockade
Ophthalmic block preparations and composition for Ophthalmic surgery
Peripheral nerve blockage/neuraxial anesthesia
Sclerotherapy
Steroid injections for chronic pain as part of an interventional pain clinic
Surgical antibiotic prophylaxis and treatment continuation
Tumescent solutions

Rotation structure

The goal of the rotation experience was to offer substantial exposure to surgical specialties, procedures, and intraoperative medication utilization that directly impacts intraoperative and post-operative care. Focus was maintained on the medications at each point in the process from skin cleansing prior to incision to intraoperative maintenance of physiologic homeostasis,⁸ and lastly multimodal pain control and nausea and vomiting treatment in the post anesthesia care unit (PACU).

Our OR pharmacy preceptors began the process of structuring the rotation by compiling a list of topic discussions, presentations, and projects involving the diverse procedures performed at our large, academic center. Each pharmacist chosen to precept had a vast knowledge of the medications used in the operating room, an average of over ten years of pharmacy experience, and on-the-job OR training followed by several years of OR experience thus increasing the likelihood of successful implementation.

Each student selected to participate in the rotation was scheduled four days a week, ten hours per day, for the duration of five weeks. Verification of student comfort with the high-pace, intense environment of the OR and squeamishness in witnessing surgical procedures was determined before each rotation started. The rotation included specific objectives and activities which needed to be completed prior to completion of the rotation as well as discussion topics relevant to common surgical procedures witnessed during the rotation. Some examples of the objectives and activities to be completed during the rotation are detailed in Table 2.

Each day the student performed literature reviews in preparation of the procedural observation followed by a brief overview of the procedure with the preceptor before the shadowing experience began. The students were expected to discuss the medications utilized to facilitate the surgical intervention with the anesthesia and surgical staff to enrich the student's learning experience. Following the procedure the preceptor reconvened with the student to review the experience, procedure nuance, and discuss the comprehensive medication use in detail. Questions posed by the student were answered or redirected back to the student for further investigation and deferred discussion. The aforementioned educational process allows teaching and overview prior to the procedure and subsequent follow up thereby strengthening the didactic information with a real-time view of how medications are utilized. The continuous experiential and observational opportunities provided with Anesthesiologists, Anesthetists, and Surgeons created a direct connection to the patient experience and framed the discussions with preceptors.

Students partook in direct patient care activities such as anesthesia patient interviews before the operation as well as in evaluating patients for nausea, vomiting and pain control after surgery with PACU nursing staff. They were engaged in order review for allergy history, dose appropriateness, medication selection, and guideline compliance. Students employed weight-based dosing, calculated renal and hepatic dose adjustments, and intervened on necessary allergy substitutions, appropriate local anesthetic selection, and antibiotic selection based on SCIP guidelines.

Near the end of the rotation, students were asked to research a new or expanding surgical topic of their selection for presentation to pharmacy staff. Preceptor evaluation was provided at the midpoint and at completion of the rotational experience.

Table 2 Illustrates objectives and activities to be completed during our pharmacy operating room rotation

1. Conducts a thorough patient-specific medical and medication history

- a. Introduces self to patient and explain services.
- b. Demonstrates a good assessment of a patient's primary language, literacy, and communication ability.
- c. Evaluates a patient's understanding, expectations and concerns about their drug therapy.
- d. Medical and medication history is complete.

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Patient assessment

2. Accurately Assesses Patient-Specific Medical Conditions

- a. Demonstrates understanding of the pathophysiology of common conditions encountered in the ambulatory setting.
- b. Obtains and interprets data from the medical chart (e.g., labs, test results) to assess a patient's medical condition.
- c. Integrates and applies knowledge to assess the current status of each patient-specific condition.
- d. Identifies the goal of therapy for each patient-specific condition.

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Management of specific patients
2. Directly providing care for patients either as the provider or in an interdisciplinary manner
3. Select any two of the following:
 - a. Chart reviews
 - b. Case presentations
 - c. Clinical consults
 - d. Topic discussions

3. Accurately Assesses and Evaluates A Patient's Current Therapy

- a. Demonstrates understanding of the pharmacotherapy of the most common medications used in the patient care setting.
- b. Obtains and interprets data from the medical chart or computer system (e.g., labs, test results) used to objectively assess a patient's therapy.
- c. Applies physical assessment skills as appropriate to assist in evaluating a patient's therapy.
- d. Assesses the current regimen based on drug-specific, patient-specific and disease-specific data.
- e. Assesses administration of medications and any factors which may predispose to missed doses.
- f. Assesses appropriateness of medications and identifies drug-related problems.

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Chart reviews
2. Case presentations
3. Clinical consults
4. Topic discussions
5. Management of specific patients
6. Seeing patients as a member of an interdisciplinary team
7. Attending educational opportunities (e.g., lectures, noon conferences, grand rounds)
8. Medical or pharmacy rounds

Table Continued..

4. Develops Appropriate Patient-Specific Therapeutic Plans

- a. Integrates a specific patient's needs into the decision-making process.
- b. Develops a complete, patient-specific care plan.
 - i. Includes plan for existing therapy, addition of missing therapy, non-pharmacologic therapy, alternative therapy options and future plans for drug therapy.
 - ii. Resolves any drug-related problems.
 - iii. Identifies the correct drug, dose, route, frequency and duration.
- c. Integrates clinical, humanistic and economic data in the development of drug therapy plans.
- d. Justifies the recommendations by providing a patient-specific rationale.
- e. Identifies appropriate patient-specific therapeutic outcomes.
- f. Involves patient and/or caregiver in final decision-making process.

Activities in Which Outcome can be Taught and/or Evaluated:

1. Chart reviews
2. Case presentations
3. Clinical consults
4. Topic discussions
5. Management of specific patients
6. Seeing patients as a member of an interdisciplinary team
7. Attending educational opportunities (e.g., lectures, noon conferences, grand rounds)
8. Medical or pharmacy rounds

5. Appropriately Monitors a Patient's Therapy

- a. Identifies patient-specific, disease-specific and drug-specific monitoring parameters (subjective and objective).
- b. Establishes correct intervals and frequencies for monitoring parameters.
- c. Identifies patient-specific drug-drug, drug-disease, drug-food, drug-herb and herb-herb interactions and monitors accordingly.
- d. Follows up with patient to evaluate if outcomes have been met

Activities in Which Outcome can be Taught and/or Evaluated:

1. Chart reviews
2. Case presentations
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7. Attending educational opportunities (e.g., lectures, noon conferences, grand rounds)
8. Medical or pharmacy rounds

6. Effectively Educates Patients, Patients' Families and health professionals on drug Therapy

- a. When educating patients, includes information on administration, precautions, adverse effects and action to take if adverse effects occur with new therapy or changes in existing therapy.
- b. Determines if patient understands instructions on new medications and changes in existing therapy.
- c. Utilizes references and resources (print, PDA, online, CD-ROM) to respond to patients' and health professionals' information needs.
- d. Designs health professional education appropriate for audience, setting and other constraints.
- e. Provides complete, concise answers to drug therapy questions from health professionals.

Table Continued..

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Making recommendations to physicians and other health professionals
2. Giving lectures/in-services/presentations

7. Effectively Communicates With Patients, Caregivers and Health Professionals

- a. Communicates effectively with patients with significant barriers (literacy, language, hearing or visual impairment, use of interpreters).
 - b. Communicates in a clear, concise and organized manner, both verbally and in writing.
 - c. Documents medication histories and interventions appropriately.
 - d. Writes complete and concise notes in the patient record.
 - e. Provides effective written communication to patients (e.g., medication changes).
 - f. Recommends therapy verbally to health professionals, with confidence and assertiveness.
 - g. Listens effectively.
5. Preparing written responses to requests for information

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Making verbal and written recommendations to physicians and other health professionals
2. Management of specific patients
3. Seeing patients as a member of an interdisciplinary team
4. Giving lectures/in-services/ presentations

8. Accurately Interprets the Medical Literature and Applies Data to Clinical Practice

- a. Conducts appropriate literature searches to find information.
- b. Interprets primary literature.
- c. Understands and applies evidence-based medicine concepts.
- d. Understands and applies basic biostatistical principles.
- e. Demonstrates knowledge of clinical guidelines for common conditions encountered in the patient care setting.

Activities in Which Outcome can be Taught and/or Evaluated:

1. Journal clubs
2. Discussion of clinical studies and guidelines with preceptor
3. Case discussions and presentations
4. Making recommendations to physicians and other health professionals
5. Article reviews

9. Displays Professional Behavior and Work Ethic

- a) Arrives at practice site and meetings on time
- b) Does not ask to leave early unless medically necessary;
when necessary, asks appropriately
- c) Meets deadlines for completion of tasks and finished all work started
- d) Seeks knowledge, asks questions, searches for information, and takes responsibility for his/her own learning
- e) Responds openly and positively to constructive feedback and modifies behavior if necessary
- f) Demonstrates regard for patients, superiors, colleagues, other personnel, and property
- g) Embraces tasks assigned, no matter the level of importance or skill involved
- h) Follows HIPAA regulations
- i) Makes decisions and performs duties in accordance with legal, ethical, social, cultural, economic, and professional guidelines
- j) Adheres to dress code and maintains personal health and good grooming habits as put form by the practice setting

Table Continued..

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Student observation of model pharmacists (role models)
2. Preceptor observation of student

10. Cultural Competency

- a. Respectful of different patient groups and cultural/ ethnic/ religious traditions
- b. Displays an open-minded attitude to cultural perspectives different from his/her own
- c. Applies knowledge of a patient's geographic location, socioeconomic status and environment to their assessment of health care needs, access, and health risk.
- d. Patient – student interactions are conducted at appropriate language and educational levels.
- e. Care plans are designed to appropriately reflect the patient's cultural identity
- f. Patient Care is delivered in a culturally sensitive manner

Activities in Which Outcome Can Be Taught and/or Evaluated:

1. Student interviews conducted via interpreters/ family member care giver/ relay service for the hearing impaired.
2. Preceptor observation of student interactions with patients of different cultural/ ethnic/ geographic/ or religious backgrounds
3. Discussion of particular patient populations regarding: Health care needs, health understanding, barriers to care and stereotypes.

Discussion

To date three pharmacy students have completed our institution's OR pharmacy rotation. Subjectively speaking each student provided positive feedback regarding the rotation, its impact, and the education gained from the experience.

Students chose the OR pharmacy rotation as their acute care rotation, which fulfills the rotation requirement deemed necessary within pharmacy school curriculum.⁹ Based on specific acute care rotation requirements for each individual College of Pharmacy, we tailored the rotation to meet the required objectives set forth by the various schools. Curriculum adjustments occurred frequently to incorporate evolving practice changes, adapt to expanding literature, and to include ongoing OR pharmacy projects.

Two of the three students to date chose to modify their career paths after completing the rotation by opting to practice hospital pharmacy in place of community pharmacy, partly based on their positive experience during the rotation.

Limitations

Unlike other hospital pharmacy subspecialty areas (e.g. ICU and emergency departments) where outcome data demonstrates the positive impact pharmacist involvement has on patient care, the literature detailing the OR pharmacists' contributions is unfortunately lacking, albeit still significant. Much of the literature describing OR pharmacy practice is over 15 years old, including the ASHP Guidelines on Surgery and Anesthesiology Pharmaceutical Services, published in 1999. Despite the deficit in outcome publication and aging guidance references, pharmacists play a key role in SCIP compliance, surgical regulatory compliance, and perioperative quality initiatives at our institution and nationally. Organizations including the Anesthesia Patient Safety Foundation (APSF) support and advocate for pharmacist involvement on multidisciplinary perioperative teams, and the idea of "enhanced training of operating room pharmacist" is noted

in the 2010 APSF Consensus Recommendations.⁶ We agree with this assessment and are compelled to bridge this knowledge gap.

Lessons learned

We have made several adjustments to the rotation since conception including conducting a brief introduction survey to determine the students' interests, their professional goals, as well as any weak clinical areas they would like to focus on during the rotation (e.g. infectious disease topics). The preceptors then tailored each experience to the individual's interests and areas for growth.

One challenge we have faced, which has kept us from expanding our rotation more rapidly, is the lack of dedicated time each of our operating room pharmacists can reserve during the day for educating students on rotation. Our pharmacists are currently given between 15-60 minutes of uninterrupted time to spend teaching our students each day, which can be prohibitive to creating a continuous learning environment. Conversely, observation of the fast-paced, high-pressure, intense working conditions of an operating room pharmacist⁵ is an invaluable experience that is an important factor in determining if the student would someday thrive in this type of working environment.

Conclusion

Taking into account the paucity of dedicated operating room rotations and the lack of publications depicting OR pharmacy rotation offerings, we anticipate increased awareness will expand the number of institutions offering a pharmacy operating room rotation thereby decreasing the knowledge gap of the incoming pharmacists in the workforce. We believe our OR pharmacy rotation is innovative in the sense that very few other institutions in the country have publicized OR rotation availability, and we found no publications of journal articles depicting OR rotations during our literature search.

Our department's goal was to provide a clinical pharmacy operating room rotation designed to educate students in the perioperative

environment and to assist in furthering the education of our pharmacy staff regarding the use of perioperative medications. Thus far the rotation has provided the framework necessary to deliver education to students and improve the perioperative knowledge base of the pharmacists within our department by reviewing journal articles, delivering didactic lectures, and providing the opportunity to shadow the operating room pharmacists. Based on the positive feedback received from students we are expanding our curriculum to offer more rotation opportunities throughout the year to interested student.

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Conflict of interest

The author declares no conflict of interest.

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