Sample Informatics
APPE Student Rotation

Disclaimer
This Informatics Student Rotation Tool proposes a comprehensive approach, and thus it can/should be pared down accordingly by programs for use.

Rotation Description
The Informatics rotation will help students become familiar with the key principles utilized in hospitals and health systems to improve pharmacy informatics, automation and health information technology. The rotation is designed to expose students to Informatics nomenclature, key principles, tools and available resources. The student will participate in several activities designed to improve the student’s working knowledge and experience with Informatics concepts. The rotation will enable the student to apply knowledge in any pharmacy practice setting to improve technology used to provide patient care.

Goals and Objectives
The preceptor and student should agree on which goals and objectives are appropriate for the rotation based on rotation site, rotation objectives delineated by School/College of Pharmacy, rotation length and student interests. The following are a list of potential goals and objectives:
1. Demonstrate understanding of basic pharmacy informatics principles, standards, and best practices.
2. Describe currently available automated technology for order processing, safe and efficient distribution, dispensing, and administration of medications, documentation of medication administration, electronic surveillance systems for effects monitoring, pharmacy inventory management systems, and emerging technology and automation systems that assist with the medication-use system.
3. Understand the steps necessary for the implementation of a new pharmacy technology and medication use systems.
4. Describe the process of mining, aggregating, analyzing, and interpreting data from clinical information systems to improve patient outcomes.
5. Describe the process of documentation, formal testing procedures for data and transactional verification and/or validation.
6. Explain the principles of decision support as they apply to health care providers making direct patient-care decisions and their effect on medication safety.
7. Describe how informatics and technology relate to patient safety in the medication use process.
8. Describe the flow of orders within the health system and indicate points of potential failure and how technology can enhance patient safety. Observe the workflow of central and decentralized pharmacy operations with regard to technology and informatics, and demonstrate proficiency with using automation in dispensing medications safely.
9. Explain security and patient protections such as access control, data security, data encryption, HIPAA privacy regulations, as well as ethical and legal issues related to the use of information technology in pharmacy practice.
10. Evaluate/Identify opportunities for improving operational efficiencies in order to better serve patient and health professional needs through the application of informatics principles, standards, and best practices.
11. Describe how issues or enhancement requests are identified and communication to the software vendor(s)
12. Communicate effectively and professionally with other clinical informatics staff, both written and verbal
13. Display independent self-learning in the field of pharmacy informatics

Activities
During the course of the rotation, the student should participate in some of the following activities as assigned by preceptor:

1. Watch at least one of the following videos and discuss impressions with the preceptor:
   a. ASHP: What is Pharmacy Informatics
   b. Overview of Safety Recommendations for Medication Management Technology

   Write a reflection after watching each video

2. Complete orientation to organization’s pharmacy operations and clinical activities. The student will spend time (e.g., one week) working with pharmacy technicians in pharmacy operations and working with clinical pharmacists on the nursing units (refer to the sample checklist provided). The student will provide a written summary of daily activities that should include (at a minimum) answers to the following questions:
   a. Describe differences noticed between organization’s practice and practices you have been exposed to previously.
   b. Describe similarities between organization’s practice and practices you have been exposed to previously.
   c. Describe unsafe/risky technology practices you witnessed during periods of observation.
   d. Describe safe technology practices you witnessed during periods of observation.
   e. Provide any suggestions for process improvements to improve health system informatics and automated technology.

3. Explore Computerized Prescriber Order Entry (CPOE) systems for electronic medication ordering integrated with electronic health records (EHRs), pharmacy information systems and clinical decision support tools that bring best practice information and guidelines to clinicians at the time it is needed and rules-based systems for monitoring, evaluating, responding, and reconciling medication-related events and information.

4. Complete a pharmacy informatics-related journal article review and journal club presentation during rotation.

5. Compile a summary of the pharmacy informatics, issues affecting the hospital and potential risk reduction strategies that should be considered for implementation.

6. Review pharmacy informatics resources:
   a. Agency for Healthcare Research and Quality (AHRQ)
   b. American Medical Informatics Association (AMIA)
   c. American Society of Health System Pharmacists (ASHP)
   d. Certification Commission for Healthcare Information Technology (CCHIT)
   e. Healthcare Information and Management Systems Society (HIMSS)
   f. Health Level Seven International
7. Expose the student to the following activities from pharmacists, nurses and IT staff perspective: medication administration, smart pump programming, documentation on (electronic) medication administration record (MAR), use of and issues associated with automated dispensing cabinets (ADCs) and bar code at the point of care (BPOC). The student should note safe practices, unsafe practices, teamwork and communication issues, workflow issues (e.g., distractions and interruptions, missing medications) and opportunities for pharmacy to help improve safety. The student should provide a written summary of the experience and present to pharmacy staff.

8. Read necessary/assigned materials and be prepared to discuss with the preceptor during topic discussions. Prepare and lead at least one topic discussion on a relevant pharmacy informatics related topic.

9. Participate in training sessions with other department staff.

10. Attend all assigned pharmacy and interdisciplinary meetings relative to Informatics, such as:
   a. Clinical Informatics Committee
   b. Clinical Services/Tech Meetings
   c. CPOE Committee
   d. Electronic Health Records Operational Meetings
   e. Formulary Subcommittee
   f. Interdisciplinary Informatics Committees
   g. P & T Committee
   h. Patient Safety Committee
   i. Pharmacy Medication Management meeting
   j. Pharmacy Practice Meeting
   k. Screen Team
   l. Various other meetings as directed

11. Complete other activities as assigned by preceptor.

**Topic Discussions**

As time permits, preceptors should schedule time when they can discuss various topics with the student. Background readings should be provided when available (some suggested readings listed with topics in this section). The student should be expected to lead at least one topic discussion towards the end of the rotation.
## Potential Topics

### Clinical Decision Support Systems


### Computerized Provider Order Entry (CPOE)

#### Guidelines & Statements

- General Principles for Purchase and Safe Use of CPOE Systems (http://www.ashp.org/menu/PracticePolicy/ResourceCenters/PatientSafety/General-Principles-for-Computerized-Prescriber.aspx)
- Landmines and Pitfalls of CPOE (http://www.ashp.org/menu/PracticePolicy/ResourceCenters/PatientSafety/Landmines-and-Pitfalls.aspx)

#### Implementation

- Consensus Recommendations for Basic Monitoring and Evaluation of In-patient Computer-based Provider Order Entry Systems. Dean F. Sittig, Sean M. Thomas, Emily Campbell, et. al. 2007.ITCH.
Post-Implementation & Its Impact


Patient Safety and Medication Errors

**Unintended Consequences of CPOE**


**eHealth Initiatives (Telepharmacy)**

- Telepharmacy at a critical access hospital. Boon A. Am. J. Health Syst. Pharm., Feb 2007; 64: 242 - 244.

**Electronic Health Records & Clinical Documentation**

- AHRQ - Electronic Medical Record

**Informatics and Patient Safety**

- Insights from the sharp end of intravenous medication errors: implications for infusion pump technology (http://qualitiesafety.bmj.com/content/14/2/80.full.pdf+html)


Information Management

HIPAA & Privacy


Information Security


Use of Databases for Data Mining (Medication Use Evaluations, QI/QA projects)

• MUE Toolkit (www.pbm.va.gov/vamedsafe/MUE%20Toolkit.pdf)

• AHRO Tools and Strategies for Qualities Improvement and Patient Safety (www.ahrq.gov/qual/nurseshdbk/docs/HughesR_QMBMP.pdf)

Pharmacy Automation


• ASHP Guidelines on the Safe Use of Automated Medication Storage and Distribution Devices

• ASHP national survey of pharmacy practice in hospital settings: Dispensing and administration 2011 (http://www.ajhp.org/content/69/9/768.full.pdf+html)

• Ensuring the Smart Use of Smart Pumps. (http://www.ppmag.com/download.php?file=documents/V8N3/PPP_0311_SmartPumps.pdf)


• Institute for Safe Medication Practices (ISMP): Effective Approaches to Standardization and Implementation of Smart Pump Technology (http://www.ismp.org/profdevelopment/SmartPumpTechnologyforwebce.pdf)

• Institute for Safe Medication Practices (ISMP): Guidance on the Interdisciplinary Safe Use of Automated Dispensing Cabinets


• Smart Pumps: Advanced Capabilities and Continuous Quality Improvement (http://www.psqh.com/janfeb07/smartpumps.html)

• Transition to new automated dispensing cabinets at two tertiary care hospitals (http://www.ajhp.org/content/68/13/1200.full.pdf+html)
Guidelines and Statements

- ASHP Statement on Bar-Code Verification During Inventory, Preparation, and Dispensing of Medications (http://www.ashp.org/DocLibrary/BestPractices/AutoITStBCVerif.aspx)
- Veterans Affairs Best Practice Recommendations for the Implementation and Use of Bar Code Medication Administration (BCMA)

Pharmacy

- Cost-benefit analysis of a hospital pharmacy bar code solution (http://archinte.ama-assn.org/cgi/content/full/167/8/788)
- Development of a training program for bar-code-assisted medication administration in inpatient pharmacy (http://www.ajhp.org/content/67/19/1592)
- Medication Dispensing Errors and Potential Adverse Drug Events before and after Implementing Bar Code Technology in the Pharmacy (http://www.annals.org/content/145/6/426.abstract)
- Program to improve bar-code print quality (http://www.ajhp.org/content/67/7/511)

Nursing Impact

- Effect of bar-code-assisted medication administration on nurses’ activities in an intensive care unit: a time-motion study (http://www.ajhp.org/content/68/11/1026.full.pdf+html)
- "Nurses Don’t Hate Change":Survey of nurses in a neonatal intensive care unit regarding the implementation, use and effectiveness of a bar code medication administration system (http://www.longwoods.com/content/20981)

General Inpatient Units

- Using a bar-coded medication administration system to prevent medication errors in a community hospital network (http://www.ajhp.org/content/62/24/2619.full.pdf+html)
- Using bar-code technology and medication observation methodology for safer medication administration (http://www.ajhp.org/content/64/5/536.full.pdf+html)

Critical Care Units

- Effect of bar-code-assisted medication administration on medication administration errors and accuracy in multiple patient care areas (http://www.ajhp.org/content/66/13/1202.full.pdf+html)
- Effect of bar-code-assisted medication administration on medication error rates in an adult medical intensive care unit (http://www.ajhp.org/content/66/12/1110.full.pdf+html)
- Risk of adverse drug events in neonates treated with opioids and the effect of a bar-code-assisted medication administration system (http://www.ajhp.org/content/68/1/57.full.pdf+html)

Overcoming Barriers

- Bar Code Medication Administration Technology: Characterization of High-Alert Medication Triggers and Clinical Workarounds (http://www.annals.org/content/144/7/510.full.pdf+html)
- Computerization Can Create Safety Hazards: A Bar-Coding Near Miss (http://www.ajhp.org/content/63/15/1442.full.pdf+html)
- Improving the bar-coded medication administration system at the Department of Veterans Affairs
- Overcoming barriers to the implementation of a pharmacy bar code scanning system for medication dispensing: A case study (http://jamia.bmj.com/content/16/5/645.full.pdf)
- Workarounds to Barcode Medication Administration Systems: Their Occurrences, Causes, and Threats to Patient Safety (http://jamia.bmj.com/content/15/4/408.full.pdf+html)
### Miscellaneous

- Bar-code medication administration system for anesthetics: Effects on documentation and billing ([http://www.ajhp.org/content/65/7/655.full.pdf+html](http://www.ajhp.org/content/65/7/655.full.pdf+html))
- Practical guide to bar coding for patient medication safety ([http://www.ajhp.org/content/60/8/768.full.pdf+html](http://www.ajhp.org/content/60/8/768.full.pdf+html))
- Quality-monitoring program for bar-code-assisted medication administration ([http://www.ajhp.org/content/66/12/1125.full.pdf+html](http://www.ajhp.org/content/66/12/1125.full.pdf+html))
- Severity of medication administration errors detected by a bar-code medication administration system ([http://www.ajhp.org/content/65/17/1661.full.pdf+html](http://www.ajhp.org/content/65/17/1661.full.pdf+html))

### Projects

The student should complete at least one longitudinal informatics project. Preceptor and student should choose a project during the second week of rotation (see example projects listed below). Some projects listed may be more appropriate for students on extended-length (e.g., several months in length) rotations, which should be considered when determining project(s) to be completed. Student should present findings / deliverables to the appropriate audience during the rotation.

#### Potential Projects

1. Complete a specific section of the ISMP Hospital self assessment for the organization. Alternatively, for organizations that complete the assessment yearly, perform a gap analysis based on the most recently completed assessment. Choose 1 or 2 items and develop a plan to achieve the goal.
2. Complete ISMP Medication Safety Self Assessment for Automated Dispensing for the organization. Alternatively, for organizations that complete the assessment yearly, perform a gap analysis based on the most recently completed assessment. Choose 1 or 2 items and develop a plan to achieve the goal.
3. Complete ISMP Medication Safety Self Assessment for Bedside Barcoding Readiness. Alternatively, for organizations that complete the assessment yearly, perform a gap analysis based on the most recently completed assessment. Choose 1 or 2 items and develop a plan to achieve the goal.
4. Interview a potential vendor on a new technology
5. Conduct an evaluation of an Integrated Computerized Pharmacist Intervention Database
6. Constructing project plans for new system implementation
7. Review override reports on two nursing units and make recommendations as to appropriate over-ridable medications.
8. Describe the flow of orders within the pharmacy and indicate points of potential failure and how technology can enhance patient safety. Observe the workflow of central and decentralized pharmacy operations with regard to technology and informatics, and demonstrate proficiency in dispensing medications safely.
9. Demonstrate how to optimize drug storage and usage in automated dispensing cabinets. Perform a cabinet optimization project on at least two different nursing units.
10. Design and implement pilot interventions to change problematic or potentially problematic aspects of the medication-use system with the objective of improving quality.
11. Assist preceptor in development of a pharmacy informatics webinar/podcast with ASHP.
12. Write a summary analysis differentiating “quality” from “safety” to give student a baseline understanding of the key differences between both these concepts/areas of practice.
13. Represent pharmacy informatics concerns in strategic planning for the implementation, use, and maintenance of technology and automation systems.
14. Assist with the development of a business case related to informatics initiatives
15. Identify opportunities for improvement in the organization’s medication-use system by comparing the medication-use system to relevant best practices.
16. Describe and demonstrate the process for doing a compliance audit of patient’s medication charges.
17. Be able to identify a potential gap in patient safety.
18. Assist with designing a yearly pharmacist competency assessment
19. Create and administer a survey to nurses, pharmacists and/or physicians on IT-user satisfaction
20. Evaluate an Integrated Computerized Pharmacist Intervention Database
21. Determine strategies to minimize “alert fatigue” in a pharmacy computer system
22. Assess, design, test and implement a solution for any other informatics issue you’ve seen or heard about that you feel needs to be addressed
23. Assess and help design mobile apps in healthcare, business intelligence applications for pharmacy leaders, and risk management consideration surrounding the electronic medical record
24. Review and analyze reports from the pharmacy system or EHR on medication ordering practices and suggest strategies for improvement

**Evaluation**
- The preceptor will evaluate the student on achievement of the predefined goals and objectives for the rotation. Students will also be asked for any specific personal goals for the rotation.
- Students will also be evaluated on their interactions with pharmacists and pharmacy technicians within the organization’s pharmacy, as well as daily discussions with the preceptor concerning reported pharmacy information, automated technology and discussion topics.
- The evaluation will include an oral mid-point evaluation to assess progress. The preceptor and student will complete a final written evaluation at the conclusion of the rotation according to school of pharmacy criteria.

**Acknowledgements**
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- Aaron Burton, Pharm.D. is a Clinical Pharmacy Specialist of Internal Medicine at St. Luke's University Hospital in Bethlehem, PA. He is also an adjunct clinical professor for Wilkes University School of Pharmacy, University of the Sciences School of Pharmacy, and the Temple University School of Medicine.

The tool content was mainly adapted from the Section of Pharmacy Informatics and Technology (SOPIT) resources. The tool was then reviewed for content inclusion by 2011-2012 SOPIT-SAG on Pharmacy Informatics Education members with the assistance of SOPIT Director Karl Gumpper.
Website Resources

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<td>ASHP: What is Pharmacy Informatics</td>
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| Healthcare Information and Management Systems Society (HIMSS) | www.himss.org/ASP/topics_pharmacyInformatics.asp |

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| Infusion Pump Improvement Initiative | http://www.fda.gov/downloads/MedicalDevices/ProductsandMedicalProcedures/GeneralHospitalDevicesandSupplies/InfusionPumps/UCM206189.pdf |


Last Update June 2012
Pharmacy Informatics Rotation: Orientation Checklist  
(Adapted from Sylvia Thomley, Pharm.D., M.S. – Director IT Clinical Informatics – Sanford Health)

1. Name of the Individual you are interviewing:  
   ________________________________

2. List the technologies that this person manages  
   a. ________________________________  
   b. ________________________________  
   c. ________________________________

3. Pick one of the technologies.  
   a. What is the purpose of this technology? What activities is it used for?  
      ___________________________________________________________________  
      ___________________________________________________________________
   b. Who is the vendor?  
      ___________________________________________________________________
   c. What is the relationship with the vendor?  
      ___________________________________________________________________
   d. What hardware is used? Any specific configuration needed?  
      ___________________________________________________________________
   e. What tasks get done in maintaining the system? How frequently are the tasks done? (Daily vs. weekly vs. monthly vs. semi-annually vs. annually)?  
      ___________________________________________________________________
      ___________________________________________________________________
   f. What is the role of the following individuals in the management or use of the technology?  

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