



REQUIRED COMPETENCY AREAS, GOALS, AND OBJECTIVES FOR POSTGRADUATE YEAR TWO (PGY2) CLINICAL PHARMACOGENOMICS PHARMACY RESIDENCIES

Introduction

The competency areas, goals, and objectives are to be used in conjunction with the *ASHP Accreditation Standard for Postgraduate Year Two (PGY2) Pharmacy Residency Programs*. The competency areas described herein are required.

The required competency areas and all of the goals and objectives they encompass must be included in all programs. Programs may add one or more required additional competency areas from the elective competency area choices to meet program-specific needs. Programs selecting an additional competency area are not required to include all of the goals and objectives in that competency area. In addition to the potential additional competency areas described in this document, programs are free to create their own unique competency areas with associated goals and objectives based on the specific needs of their program. Each of the objectives associated with the goals encompassed by the program's selected program competency areas (required and additional) must be taught and evaluated at least once during the residency year. Elective competency area(s) may also be selected for specific residents when creating their residency development plan.

Each of the objectives listed in this document has been classified according to educational taxonomy (cognitive, affective, or psychomotor) and level of learning. An explanation of the taxonomies is available elsewhere.¹

Competency areas for PGY1 residencies are available on the ASHP website. PGY2 competency areas, goals, and objectives in clinical pharmacogenomics pharmacy are differentiated from those from PGY1 by specialization and the expectation of PGY2 residents for greater work competence and proficiency.

Definitions

Competency Areas: Categories of the residency graduates' capabilities.
Competency areas are classified into one of three categories:

Required: Four competency areas are required (all programs must include them and all their associated goals and objectives).

¹Anderson, L. W. and Krathwohl, D. R., et al (Eds.) (2001) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon. Boston, MA (Pearson Education Group).

Additional (for program): Competency area(s) that residency programs may choose to use (in addition to the four required areas) to meet program-specific program needs. Additional competency areas also include those developed by individual programs.

Elective (for specific residents): Competency area(s) or specific goals and objectives within the competency area(s) selected optionally for specific resident(s).

Educational Goals (Goal): Broad statement of abilities.

Educational Objectives: Observable, measurable statements describing what residents will be able to do as a result of participating in the residency program.

Criteria: Examples that describe competent performance of educational objectives. Since the criteria are examples, they are not all required but are intended to be used to give feedback to residents on how well they are doing and how they can improve on the skill described in educational objectives while they engage in an activity.

Activities: The Standard requires that learning activities be specified for each educational objective in learning experience descriptions. Activities are what residents will do to learn and practice the skills described in objectives. Activities are the answer to the question, “What can residents do in the context of this learning experience that will provide the kind of experiences necessary to achieve the educational objective?” (compare and contrast activities with criteria by referring to the definition of criteria immediately above). Specified activities should match the Bloom’s Taxonomy learning level stated in parentheses before each objective.

Example:

Objective R1.1.2: (Applying) Interact effectively with patients, family members, and caregivers.

Learning activity: Provide education to patients regarding proper medication use and administration, adherence, and possible adverse drug effects for all new medications initiated during clinic appointments.

Criteria:

- Interactions are respectful and collaborative.
- Uses effective communication skills.
- Shows empathy.
- Empowers patients to take responsibility for their health.
- Demonstrates cultural competence.

Competency Area R1: Patient Care

(See the appendix for additional specific requirements.)

Goal R1.1: In collaboration with the health care team, provide comprehensive medication management to patients following a consistent patient care process.

Objective R1.1.1: (Applying) Interact effectively with health care teams to manage patients' medication therapy.

Criteria:

- Interactions are cooperative, collaborative, communicative, and respectful.
- Demonstrates skills in consensus building, negotiation, and conflict management.
- Demonstrates advocacy for the patient.
- Effectively contributes pharmacotherapy knowledge and patient care skills as an essential member of the healthcare team.

Objective R1.1.2: (Applying) Interact effectively with patients, family members, and caregivers.

Criteria:

- Interactions are respectful and collaborative.
- Maintains accuracy and confidentiality of patients' protected health information.
- Uses effective (e.g., clear, concise, accurate) communication skills.
- Shows empathy.
- Empowers patients, family members, and caregivers regarding the patient's well-being and health outcomes.
- Demonstrates cultural competence.
- Communicates with family members to obtain patient information when patients are unable to provide the information.
- Communicates with patient and family about pharmacogenomic testing and initiation and changes of patient therapies.
- Demonstrates advocacy for caregivers.
- Effectively communicates to patients the importance of the clinical pharmacogenomics specialist's role in his/her care.

Objective R1.1.3: (Analyzing) Collect information that the clinical pharmacogenomics specialist will need to recommend safe and effective medication therapy.

Criteria:

- Collection/organization methods are efficient and effective.
- Collects relevant information about medication therapy, including:
 - History of present illness.
 - Relevant health data that may include past medical history, health and wellness information, biometric test results, and physical assessment findings.
 - Social history.
 - Medication history, including prescription, non-prescription, illicit, recreational, and non-traditional therapies; other dietary supplements; immunizations, allergies and family history, as applicable.
 - Patient assessment (examples include, but are not limited to, physiologic monitoring, laboratory values, microbiology results, diagnostic imaging, procedural results, and scoring systems (e.g., RASS, CAM-ICU)).

- Relevant pharmacogenomic data (genotype or phenotype), if available.
- Adverse drug reactions.
- Medication adherence and persistence.
 - Patient lifestyle habits, preferences and beliefs, health and functional goals, and socioeconomic factors that affect access to medications and other aspects of care.
- Sources of information are the most reliable sources available, including electronic, face-to-face, and others.
- Recording system is functional for subsequent problem solving and decision making.
- Clarifies information as needed.
- Displays understanding of limitations of information in health records.
- Poses appropriate questions as needed.

Objective R1.1.4: (Analyzing) Analyze and assess information on which to base safe and effective medication therapy.

Criteria:

- Includes accurate assessment of patient's:
 - Health and functional status.
 - Risk factors (benefit vs. risk assessment of treatment).
 - Health data.
 - Cultural factors.
 - Health literacy.
 - Access to medications.
 - Immunization status.
 - Need for preventive care and other services, when appropriate.
 - Other aspects of care, as applicable.
- Identifies medication therapy problems, including:
 - Lack of indication for medication.
 - Medical conditions for which there is no medication prescribed.
 - Medication prescribed or continued inappropriately for a particular medical condition.
 - Suboptimal medication regimen (e.g., dose, dosage form, duration, schedule, route of administration, method of administration).
 - Medication toxicity requiring medication therapy modifications.
 - Abnormal lab values requiring medication therapy modifications.
 - Therapeutic duplication.
 - Adverse drug or device-related events or the potential for such events.
 - Clinically significant drug–drug, drug–disease, drug–nutrient, drug–genotype, interaction, drug–laboratory test interaction, or the potential for such interactions.
 - Use of harmful social, recreational, nonprescription, nontraditional, or other medication therapies.
 - Patient not receiving full benefit of prescribed medication therapy.
 - Problems arising from the financial impact of medication therapy on the patient.
 - Patient lacks understanding of medication therapy.
 - Patient not adhering to medication regimen and root cause (e.g., knowledge, recall, motivation, financial, system).
 - Patient assessment needed.
 - Discrepancy between prescribed medications and established care plan for the patient.
- Prioritize a patient's health care needs.

Objective R1.1.5: (Creating) Design, or redesign, safe and effective patient-centered therapeutic regimens and monitoring plans (care plans).

Criteria:

- Specify evidence-based, measurable, achievable therapeutic goals that include consideration of:
 - Appropriate pharmacogenomic testing.
 - Relevant patient-specific information, including culture and preferences.
 - The goals of other interprofessional team members.
 - The patient's disease state(s).
 - Medication-specific information.
 - Best evidence, including clinical guidelines, and the most recent literature.
 - Ethical, legal, and social issues involved in the patient's care.
 - Quality-of-life issues specific to the patient.
 - End of life issues, when needed.
 - Integration of all the above factors influencing the setting of goals.
 - Designs/redesigns regimens that:
 - Are appropriate for the disease states being treated.
 - Reflect:
 - Clinical experience.
 - The therapeutic goals established for the patient.
 - The patient's and caregiver's specific needs.
 - Consider:
 - Any pertinent pharmacogenomic factors.
 - Best evidence.
 - Pertinent ethical issues.
 - Pharmacoeconomic components (patient, medical, and systems resources).
 - Patient preferences, culture, and/or language differences.
 - Patient-specific factors, including physical, mental, emotional, and financial factors that might impact adherence to the regimen.
 - Drug shortages.
 - Adhere to the health system's medication-use or other policies.
 - Follow applicable ethical standards.
 - Address wellness promotion and lifestyle modification.
 - Support the organization's or patient's insurance formulary.
 - Address medication-related problems and optimize medication therapy.
 - Engage the patient through education, empowerment, and promotion of self-management.
 - Designs/redesigns monitoring plans that:
 - Effectively evaluate achievement of therapeutic goals.
 - Ensure adequate, appropriate, and timely follow-up.
 - Include consideration of pertinent pharmacogenomics factors.
 - Establish parameters that are appropriate measures of therapeutic goal achievement.
 - Reflect consideration of best evidence.
 - Select the most reliable source for each parameter measurement.
 - Have appropriate value ranges selected for the patient.
 - Have parameters that measure efficacy.
 - Have parameters that measure potential adverse drug events.
 - Have parameters that are cost-effective.
 - Have obtainable measurements of the parameters specified.
 - Reflect consideration of compliance.
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- Anticipate future drug-related problems.
- When applicable, reflect preferences and needs of the patient.
- Plan represents the highest level of patient care.

Objective R1.1.6: (Applying) Ensure implementation of therapeutic regimens and monitoring plans (care plans) by taking appropriate follow-up actions.

Criteria:

- Effectively recommends or communicates patients' regimens and associated monitoring plans to relevant members of the health care team.
 - Poses appropriate questions as needed. Recommendation is persuasive.
 - Presentation of recommendation accords patient's right to refuse treatment.
 - If patient refuses treatment, pharmacist exhibits responsible professional behavior.
 - Creates an atmosphere of collaboration.
 - Skillfully defuses negative reactions.
 - Communication conveys expertise.
 - Communication is assertive but not aggressive.
 - Where the patient has been directly involved in the design of the plans, communication reflects previous collaboration appropriately.
- Ensures recommended plan is implemented effectively for the patient, including ensuring that the:
 - Plan represents the highest level of patient care.
 - Therapy corresponds with the recommended regimen.
 - Regimen is initiated at the appropriate time.
 - Patient receives their medication as directed.
 - Medications in situations requiring immediacy are effectively facilitated.
 - Medication orders are clear and concise.
 - Activity complies with the health system's policies and procedures.
 - Tests correspond with the recommended monitoring plan.
 - Tests are ordered and performed at the appropriate time.
- Takes appropriate action based on analysis of monitoring results (redesign regimen and/or monitoring plan if needed).
- Appropriately initiates, modifies, discontinues, or administers medication therapy as authorized.
- Responds appropriately to notifications and alerts in electronic medical records and other information systems that support medication ordering processes (based on factors such as patient weight, age, gender, pharmacogenomic test results, comorbid conditions, drug interactions, renal function, and hepatic function).
- Appropriately reports pharmacogenomics test results in the EHR.
- Provides thorough and accurate education to patients and caregivers, when appropriate, including information on medication therapy, adverse effects, compliance, appropriate use, handling, and medication administration.
- Addresses medication and health-related problems and engages in preventive care strategies, including vaccine administration.
- Schedules follow-up care as needed to achieve goals of therapy.
- Appropriately uses novel strategies within the healthcare system.

Objective R1.1.7: (Applying) Document direct patient care activities appropriately in the medical record, or where appropriate.

Criteria:

- Accurately and concisely communicates drug therapy recommendations to healthcare professionals representing different disciplines, including the use of clinical decision support.
- Appropriately documents patient/caregiver communication and all relevant direct patient care activities in a timely manner.

Objective R1.1.8: (Applying) Demonstrate responsibility to patients for patient outcomes.

Criteria:

- Gives priority to patient care activities.
- Routinely ensures all steps of the medication management process.
- Assumes responsibility for medication therapy outcomes.
- Actively works to identify the potential for significant medication-related problems.
- Actively pursues all significant existing and potential medication-related problems until satisfactory resolution is obtained.
- Ensures appropriate transitions of care.
- Communicates with patients and family members/caregivers about their medication therapy and pharmacogenomics test results.
- Determines barriers to patient compliance and makes appropriate adjustments.

Goal R1.2: Ensure continuity of care during patient transitions between care settings.

Objective R1.2.1: (Applying) Manage transitions of care effectively.

Criteria:

- Participates in thorough medication reconciliation when necessary.
- When appropriate, follows up on identified drug-related problems, additional monitoring, and education in a timely and caring manner.
- Provides accurate, pertinent, and timely follow-up information when patients transfer to another facility, level of care, pharmacist, or provider, as appropriate.
- Takes appropriate and effective steps to help avoid unnecessary hospital admissions and/or readmissions.
- Provides appropriate information to other pharmacists in transitions to mitigate medication therapy problems.

Competency Area R2: Advancing Practice and Improving Patient Care

Goal R2.1: Demonstrate ability to manage formulary and medication-use processes, as applicable to the organization.

Objective R2.1.1: (Creating) Prepare or revise a drug class review, monograph, treatment guideline, or protocol related to pharmacogenomics, including proposals for medication-safety technology improvements.

Criteria:

- Displays objectivity.
- Effectively synthesizes information from the available literature.
- Applies evidenced-based principles.
- Consults relevant sources.
- Considers medication-use safety and resource utilization.

- Uses the appropriate format.
- Effectively communicates any changes in medication formulary, medication usage, or other procedures to appropriate parties.
- Demonstrates appropriate assertiveness and timeliness in presenting pharmacy concerns, solutions, and interests to internal and external stakeholders.
- When appropriate, may include proposals for medication-safety technology improvements.

Objective R2.1.2: (Applying) Participate in the review of medication event reporting and monitoring related to pharmacogenomics.

Criteria:

- Effectively uses currently available technology and automation that supports a safe medication-use process.
- Appropriately and accurately determines, investigates, reports, tracks, and trends adverse drug events, medication errors, and efficacy concerns using accepted institutional resources and programs.

Objective R2.1.3: (Analyzing) Identify opportunities for improvement of the medication-use system related to pharmacogenomics.

Criteria:

- Identifies problems and opportunities for improvement and analyzes relevant background data.
- Evaluates data generated by health information technology or automated systems to identify opportunities for improvement.
- Utilizes best practices to identify opportunities for improvements.
- When needed, makes medication-use policy recommendations based on a review of practice standards, guidelines, and other evidence (e.g., National Quality Measures, Institute for Safe Medication Practices alerts, Joint Commission sentinel alerts).

Goal R2.2: Demonstrate ability to conduct a quality improvement or research project with appropriate mentorship/guidance.

Ideally, objectives R2.2.1-R2.2.6 will be addressed through residents working on one quality improvement or research project; however, if this is not possible, all objectives must be addressed by the end of the residency year and can be addressed through work on more than one initiative.

Objective R2.2.1 (Analyzing) Identify and/or demonstrate understanding of specific project topic to improve pharmacogenomics practice or for a topic for advancing the pharmacy profession.

Criteria:

- Appropriately identifies or understands problems and opportunities for improvement or research projects.
- Conducts a comprehensive literature search for drug-gene pair associations and draws appropriate conclusions.
- Determines an appropriate research question or topic for a practice-related project of significance to patient care that can realistically be addressed in the desired time frame.
- Uses best practices or evidence-based principles to identify opportunities for improvements.
- Accurately evaluates or assists in the evaluation of data generated by health information technology or automated systems to identify opportunities for improvement.

Objective R2.2.2: (Creating) Develop a plan or research protocol for a practice quality improvement or research project related to pharmacogenomics or for a topic for advancing the pharmacy profession.

Criteria:

- Develops specific aims, selects an appropriate study design, and develops study methods to answer the research question(s).
- Applies safety design practices (e.g., standardization, simplification, human factors training, lean principles, FOCUS-PDCA, other process improvement or research methodologies) appropriately and accurately.
- Plan for improvement includes appropriate reviews and approvals required by department or organization and addresses the concerns of all stakeholders.
- Applies evidence-based and/or basic pharmacoeconomic principles, if needed.
- Develops a feasible design for a prospective or retrospective clinical or outcomes analysis project that considers who or what will be affected by the project.
- Identifies and obtains necessary approvals, (e.g., IRB, quality review board, funding) and responds promptly to feedback or reviews for a practice-related project.
- Acts in accordance with the ethics of research on human subjects, if applicable.
- Implements the project as specified in its design.
- Plan design is practical to implement and is expected to remedy or minimize the identified challenge or deficiency.

Objective R2.2.3: (Evaluating) Collect and evaluate data for a practice quality improvement or research project related to pharmacogenomics or for a topic for advancing the pharmacy profession.

Criteria:

- Collects the appropriate types of data as required by project design.
- Uses appropriate electronic data and information from internal information databases, external online databases, appropriate Internet resources, and other sources of decision support, as applicable.
- Uses appropriate methods for analyzing data in a prospective and retrospective clinical, humanistic, and/or economic outcomes analysis.
- Develops and follows an appropriate research or project timeline.
- Correctly identifies need for additional modifications or changes to the project.
- Applies results of a prospective or retrospective clinical, humanistic, and/or economic outcomes analysis to internal business decisions and modifications to a customer's formulary or benefit design as appropriate.
- Uses continuous quality improvement (CQI) principles to assess the success of the implemented change, if applicable.
- Considers the impact of the limitations of the project or research design on the interpretation of results.
- Accurately and appropriately develops plan to address opportunities for additional changes.

Objective R2.2.4: (Applying) Implement quality improvement or research project to improve pharmacogenomics practice or for a topic for advancing the pharmacy profession.

Criteria:

- Plan is based on appropriate data.
- Effectively presents plan (e.g., accurately recommends or contributes to recommendation for operational change, formulary addition or deletion, implementation of medication guideline or restriction, or treatment protocol implementation) to appropriate audience.

- Demonstrates appropriate assertiveness in presenting pharmacy concerns, solutions, and interests to external stakeholders.
- Gains necessary commitment and approval for implementation.
- Follows established timeline and milestones.
- Effectively communicates any changes in medication formulary, medication usage, or other procedures to appropriate parties.
- Outcome of change is evaluated accurately and fully.

Objective R2.2.5: (Evaluating) Assess changes or need to make changes to pharmacogenomics practice or for a topic related to advancing the pharmacy profession.

Criteria:

- Evaluate data and/or outcome of project accurately and fully.
- Includes operational, clinical, economic, and humanistic outcomes of patient care, if applicable.
- Uses continuous quality improvement (CQI) principles to assess the success of the implemented change, if applicable.
- Correctly identifies need for additional modifications or changes based on outcome.
- Accurately assesses the impact of the project, including its sustainability (if applicable).
- Accurately and appropriately develops plan to address opportunities for additional changes.

Objective R2.2.6: (Creating) Effectively develop and present, orally and in writing, a final project or research report suitable for publication related to pharmacogenomics or for a topic for advancing the pharmacy profession at a local, regional, or national conference (the presentation may be virtual).

Criteria:

- Outcome of change is reported accurately to appropriate stakeholder(s) and policy-making bodies according to departmental or organizational processes.
- Report includes implications for changes to or improvement in pharmacy practice.
- Report uses an accepted manuscript style suitable for publication in the professional literature.
- Oral presentations to appropriate audiences within the department and organization or to external audiences use effective communication and presentation skills and tools (e.g., handouts, slides) to convey points successfully.

Competency Area R3: Leadership and Management

Goal R3.1: Demonstrate leadership skills for successful self-development.

Objective R3.1.1: (Applying) Demonstrate personal, interpersonal, and teamwork skills critical for effective leadership.

Criteria:

- Demonstrates efficient time management.
- Manages conflict effectively.
- Demonstrates effective negotiation skills.
- Demonstrates ability to lead interprofessional teams.
- Uses effective communication skills and styles.
- Demonstrates understanding of perspectives of various health care professionals.
- Effectively expresses benefits of personal profession-wide leadership and advocacy.

- Effectively provides leadership in patient care related services, including interprofessional pharmacogenomics implementation teams.

Objective R3.1.2: (Applying) Apply a process of ongoing self-evaluation and personal performance improvement.

Criteria:

- Accurately summarizes own strengths and areas for improvement (in knowledge, values, qualities, skills, and behaviors).
- Effectively uses a self-evaluation process for developing professional direction, goals, and plans.
- Effectively engages in self-evaluation of progress on specified goals and plans.
- Demonstrates ability to use and incorporate constructive feedback from others.
- Effectively uses principles of continuous professional development (CPD) planning (reflect, plan, act, evaluate, record/review).

Goal R3.2: Demonstrate management skills.

Objective R3.2.1: (Applying) Contribute to pharmacogenomics or pharmacy departmental management.

Criteria:

- Helps identify and define significant departmental needs.
 - Manpower/staffing.
 - Staff scheduling and contingencies.
 - Staff qualifications.
 - Assesses and develops educational opportunities for pharmacogenomics service line staff.
- Helps develop plans that address departmental needs.
 - Orientation.
 - Training and supervision.
 - Effectively participate in, or evaluate, strategic plan.
- Participates effectively on committees or informal work groups to complete group projects, tasks, or goals.
- Participates effectively in implementing changes, using change management and quality improvement best practices and tools, consistent with team, departmental, and organizational goals.

Objective R3.2.2: (Applying) Manage one's own pharmacogenomics practice effectively.

Criteria:

- Review and interpret the most recent primary literature to advance one's pharmacotherapy knowledge.
- Evaluate clinical practice activities for potential contributions to scholarship.
- Accurately assesses successes and areas for improvement (e.g., a need for staffing projects or education) in managing one's own practice.
- Makes accurate, criteria-based assessments of one's own ability to perform practice tasks.
- Regularly integrates new learning into subsequent performances of a task until expectations are met.
- Routinely seeks applicable learning opportunities when performance does not meet expectations.
- Demonstrates effective workload and time-management skills.
- Assumes responsibility for personal work quality and improvement.

- Is well prepared to fulfill responsibilities (e.g., patient care, projects, management, meetings).
- Sets and meets realistic goals and timelines.
- Demonstrates awareness of own values, motivations, and emotions.
- Demonstrates enthusiasm, self-motivation, and a “can-do” approach.
- Strives to maintain a healthy work–life balance.
- Works collaboratively within the organization’s political and decision-making structure.
- Demonstrates pride in and commitment to the profession through appearance, personal conduct, planning to pursue board certification.
- Demonstrates pride in and commitment to pharmacogenomics through membership in professional organizations related to pharmacogenomics.
- Demonstrates personal commitment to and adheres to organizational and departmental policies and procedures.

Competency Area R4: Teaching, Education, and Dissemination of Knowledge

Goal R4.1: Provide effective medication and practice-related education to patients, caregivers, health care professionals, students, and the public (individuals and groups).

Objective R4.1.1: (Applying) Design effective educational activities related to pharmacogenomics.

Criteria:

- Accurately defines educational needs, including learning styles, with regard to target audience (e.g., individual versus group) and learning level (e.g., health care professional versus patient, student versus PGY1 resident).
- Selects topics of significance to pharmacogenomics pharmacy as outlined in the appendix.
- Defines educational objectives that are specific, measurable, at a relevant learning level (e.g., applying, creating, evaluating), and address the audiences’ defined learning needs.
- Plans use of teaching strategies that match learner needs, including active learning (e.g., patient cases, polling).
- Selects content that is relevant, thorough, evidence based (using primary literature where appropriate), timely and reflects best practices.
- Includes accurate citations and relevant references and adheres to applicable copyright laws.

Objective R4.1.2: (Applying) Use effective presentation and teaching skills to deliver education related to pharmacogenomics.

Criteria:

- Demonstrates rapport with learners.
- Captures and maintains learner/audience interest throughout the presentation.
- Implements planned teaching strategies effectively.
- Effectively facilitates audience participation, active learning, and engagement in various settings (e.g., small or large group, distance learning).
- Presents at appropriate rate and volume and without exhibiting poor speaker habits (e.g., excessive use of “um” and other interjections).
- Body language, movement, and expressions enhance presentations.
- Summarizes important points at appropriate times throughout presentations.
- Transitions smoothly between concepts.
- Effectively uses audio-visual aids and handouts to support learning activities.

Objective R4.1.3: (Applying) Use effective written communication to disseminate knowledge related to pharmacogenomics.

Criteria:

- Writes in a manner that is easily understandable and free of errors.
- Demonstrates thorough understanding of the topic.
- Notes appropriate citations and references.
- Includes critical evaluation of the literature and knowledge advancements or a summary of what is currently known on the topic.
- Develops and uses tables, graphs, and figures to enhance reader's understanding of the topic when appropriate.
- Writes at a level appropriate for the target readership (e.g., physicians, pharmacists, other health care professionals, patients, the public).
- Creates one's own work and does not engage in plagiarism.

Objective R4.1.4: (Applying) Appropriately assess effectiveness of education related to pharmacogenomics.

Criteria:

- Selects assessment method (e.g., written or verbal assessment or self-assessment questions, case with case-based questions, learner demonstration of new skill) that matches activity.
- Provides timely, constructive, and criteria-based feedback to learner.
- If used, assessment questions are written in a clear, concise format that reflects best practices for test item construction.
- Determines how well learning objectives were met.
- Plans for follow-up educational activities to enhance or support learning and (if applicable) ensure that goals were met.
- Identifies ways to improve education-related skills.
- Obtains, reviews, and applies feedback from learners and others to improve effectiveness as an educator.

Goal R4.2: Effectively employ appropriate preceptor roles when engaged in teaching students, pharmacy technicians, or fellow health care professionals in pharmacogenomics.

Objective R4.2.1: (Analyzing) When engaged in teaching related to pharmacogenomics, select a preceptor role that meets learners' educational needs.

Criteria:

- Identifies which preceptor role is applicable for the situation (e.g., direct instruction, modeling, coaching, facilitating).
 - Selects direct instruction when learners need background content.
 - Selects modeling when learners have sufficient background knowledge to understand the skill being modeled.
 - Selects coaching when learners are prepared to perform a skill under supervision.
 - Selects facilitating when learners have performed a skill satisfactorily under supervision.

Objective R4.2.2: (Applying) Effectively employ preceptor roles, as appropriate, when instructing, modeling, coaching, or facilitating skills related to pharmacogenomics.

Criteria:

- Accurately assesses the learner’s skill level to determine the appropriate preceptor role for providing practice-based teaching.
- Instructs students, technicians, or others as appropriate.
- Models skills, including “thinking out loud,” so learners can “observe” critical-thinking skills.
- Coaches, including effective use of verbal guidance, feedback, and questioning, as needed.
- Facilitates, when appropriate, by allowing learner independence and using indirect monitoring of performance.

Competency Area R5: Pharmacogenomics Resource

Goal R5.1: Establish oneself as an organizational expert in the implementation of pharmacogenomics.

Objective R5.1.1: (Applying) Demonstrate proficiency with the concepts utilized in the practice of pharmacogenomics.

Criteria:

- Demonstrates understanding of nomenclature utilized in the practice of pharmacogenomics.
- Uses appropriate sources of information (e.g., literature, guidelines, standards-setting organizations, professional associations) for the implementation of pharmacogenomics.

Objective R5.1.2: (Creating) Develop a strategy for earning credibility within the organization to be an authoritative resource on pharmacogenomics.

Criteria:

- Uses effective strategies to build credibility (e.g., providing educational seminars, participation on committees).

ELECTIVE COMPETENCY AREAS, GOALS, AND OBJECTIVES FOR POSTGRADUATE YEAR TWO (PGY2) PHARMACOGENOMICS PHARMACY RESIDENCIES

Competency Area E1: Academia

Goal E1.1: Demonstrate understanding of key elements of the academic environment and faculty roles within it.

Objective E1.1.1: (Understanding) Demonstrates understanding of key elements of the academic environment and faculty roles within it.

Criteria:

- Accurately describes variations in the expectations of different colleges/schools of pharmacy for teaching, practice, research, and service, including public versus private colleges/schools of pharmacy and relationships between scholarly activity and teaching, practice, research and service.
- Accurately describes the academic environment, including how the decisions by university and college administration impact the faculty and how outside forces (e.g., change in the profession, funding source, accreditation requirements) impact administrator and faculty roles.
- Accurately described faculty roles and responsibilities.
- Accurately describes the types and ranks of faculty appointments, including the various types of appointments (e.g., non-tenure, tenure-track, and tenured faculty), various ranks of faculty (e.g., instructor, assistant professor, associate professor, full professor), and the role and implications of part-time and adjunct faculty as schools continue to expand and faculty shortages occur, and promotion and tenure process for each type of appointment, including types of activities that are considered in the promotion process and for tenure.
- Accurately explains the role and influence of faculty in the academic environment, including faculty in governance structure (e.g., the faculty senate, committee service) and faculty related to teaching, practice, research, and service roles (e.g., curriculum development and committee service).
- Accurately identifies resources available to help develop academic skills, including the role of academic-related professional organizations (e.g., AACP) and other resources to help develop teaching skills and a teaching philosophy.
- Accurately identifies and describes ways that faculty maintain balance in their roles.
- Accurately describes typical affiliation agreements between a college of pharmacy and a practice site (e.g., health system, hospital, clinic, retail pharmacy).

Goal E1.2: Exercise case-based and other teaching skills essential to pharmacy faculty.

Objective E1.2.1: (Applying) Develop and deliver cases for workshops and exercises for laboratory experiences.

Criteria:

- Identifies the appropriate level of case-based teachings for small group instruction.
- Identifies appropriate exercises for laboratory experiences.
- Provides appropriate and timely feedback to improve performance.

Objective E1.2.2: (Evaluating) Compare and contrast methods to prevent and respond to academic and profession dishonesty and adhere to copyright laws.

Criteria:

- Accurately evaluates physical and attitudinal methods to prevent academic dishonesty.
- Accurately describes methods of responding to incidents of academic dishonesty.
- Accurately explains the role of academic honor committees in cases of academic dishonesty.
- Identifies examples and methods to address unprofessional behavior in learners.
- Accurately describes copyright regulations as related to reproducing materials for teaching purposes.
- Accurately describes copyright regulations as related to linking and citing on-line materials.

Goal E1.3: Develops and practices a philosophy of teaching.

Objective E1.3.1: (Creating) Develop or update a teaching philosophy statement.

Criteria:

- Teaching philosophy includes:
 - Self-reflection on personal beliefs about teaching and learning;
 - Identification of attitudes, values, and beliefs about teaching and learning; and,
 - Illustrates personal beliefs on practice and how these beliefs and experiences are incorporated in a classroom or experiential setting with trainees.
 - If updating, reflect on how one's philosophy has changed.

Objective E1.3.2: (Creating) Prepare a practice-based teaching activity.

Criteria:

- Develops learning objectives using active verbs and measurable outcomes.
- Plans teaching strategies appropriate for the learning objectives.
- Uses materials that are appropriate for the target audience.
- Organizes teaching materials logically.
- Plans relevant assessment techniques.
- When used, develops examination questions that are logical, well-written, and test the learners' knowledge rather than their test-taking abilities.
- Participates in a systematic evaluation of assessment strategies (e.g., post-exam statistical analysis) when appropriate.
- Ensures activity is consistent with learning objectives in course syllabus.

Objective E1.3.3: (Applying) Deliver a practice-based educational activity, including didactic or experiential teaching, or facilitation.

Criteria:

- Incorporates at least one active learning strategy in didactic experiences appropriate for the topic.
- Uses effective skills in facilitating small and large groups.
- For experiential activities:
 - Organizes student activities (e.g., student calendar).
 - Effectively facilitates topic discussions and learning activities within the allotted time.
 - Effectively develops and evaluates learner assignments (e.g., journal clubs, presentations, SOAP notes).
 - Effectively assesses student performance.
 - Provides constructive feedback.

Objective E1.3.4: (Creating) Effectively document one's teaching philosophy, skills, and experiences in a teaching portfolio.

Criteria:

- Portfolio includes:
 - A statement describing one's teaching philosophy.
 - Curriculum vitae.
 - Teaching materials including slides and other handouts for each teaching experience.
 - Documented self-reflections on one's teaching experiences and skills, including strengths, areas for improvement, and plans for working on the areas for improvement.
 - Peer/faculty evaluations.
 - Student/learner evaluations.

Competency Area E2: Initiating a Clinical Pharmacogenomics Pharmacy-Related Service

Goal E2.1: Develop a proposal for a new clinical pharmacogenomics pharmacy-related service.

Objective E2.1.1: (Creating) Write a proposal for a clinical pharmacogenomics pharmacy-related service.

Criteria:

- Proposal meets a perceived need of the health system and its patients.
- Proposal is clear and persuasive.
- Effectively employs clinical, humanistic, and economic outcome strategies to justify clinical pharmacogenomics pharmacy services, as applicable.
- Appropriately documents outcomes of clinical pharmacogenomics pharmacy services.

Objective E2.1.2: (Creating) Present a proposal for a new clinical pharmacogenomics pharmacy-related service.

Criteria:

- Identifies appropriate concerned entities as audience for presentation.
- Uses effective presentation skills.

Objective E2.1.3: (Applying) Implement a clinical pharmacogenomics pharmacy-related service.

Criteria:

- Identifies appropriate strategies for implementing the new service.
- Effectively employs selected strategies for implementing the new service.

Objective E2.1.4: (Applying) Appraise a new clinical pharmacogenomics pharmacy service.

Criteria:

- Accurately evaluates adequacy of the new service in meeting the stated goals.

Competency Area E3: Medication-Use Evaluations

Goal E3.1: Lead a medication-use evaluation related to pharmacogenomics.

Objective E3.1.2 (Evaluating) Lead a medication-use evaluation related to pharmacogenomics.

Criteria:

- Uses evidence-based principles to develop criteria for use.
- Demonstrates a systematic approach to gathering data.
- Accurately analyzes data gathered.
- Demonstrates appropriate confidence and assertiveness in presenting pharmacy concerns, solutions, and interests to internal and external stakeholders.
- Implements approved changes, as applicable.

Approved by the ASHP Commission on Credentialing on March 3, 2018. Endorsed by the ASHP Board of Directors on April 12, 2018. Developed by the ASHP Commission on Credentialing in collaboration with the American College of Clinical Pharmacy (ACCP).

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The effective date for implementation of these educational outcomes, goals and objectives is July 1, 2018.

PGY2 Clinical Pharmacogenomics Appendix

Core Areas or Types of Patient Care Experiences

It is expected that all postgraduate year two (PGY2) clinical pharmacogenomics residents will acquire new knowledge, skills, and experience related to the application of pharmacogenomic testing to the care of patients with various disease states. The primary method for residents to achieve patient care competence in a precision medicine approach to drug therapy management is to have sufficient experience in a) interpreting raw laboratory results; b) assigning phenotype based on genotype; c) reporting and interpreting pharmacogenomic results in a patient’s electronic health record; d) evaluating and interpreting pharmacogenomics literature; and e) implementing clinical informatics based on pharmacogenomic results. Residents will be actively involved in providing clinical pharmacogenomics services to patients and will participate in various activities that promote the clinical implementation of pharmacogenomics.

The following areas of emphasis are essential for clinical pharmacogenomics residents to develop expertise in the clinical implementation of pharmacogenomics. Residents are required to have direct patient care experience in the 3 following content areas: oncology, gastrointestinal (GI), and pain management. Other content areas may be covered if applicable to the program’s patient population. A minimum of 1 additional content area must be covered with direct patient care experience, as indicated in the lower portion of Table 1. Residents are required to have direct patient care experience for topics listed in the first column, “**Required – Direct Patient Care Experience**”. Topics in the second column, “**Required – Case-Based Application Acceptable**”, may be covered by direct patient care or by case-based application through didactic discussion, reading assignments, case presentations, and/or written assignments. This list is not all-inclusive, but reflects content that would provide an adequate foundation for PGY2 clinical pharmacogenomics residency graduates.

Table 1. Clinical content areas for a PGY2 Clinical Pharmacogenomics residency

REQUIRED Content Areas		
Content Area	Direct Patient Care Experience Required	Case-Based Application Acceptable
GI Pharmacogenomics	<ul style="list-style-type: none"> • <i>CYP2C19</i>- proton pump inhibitors • <i>CYP2D6</i>- ondansetron • <i>TPMT</i>- thiopurines 	
Oncology Pharmacogenomics	<ul style="list-style-type: none"> • <i>CYP2D6</i>- ondansetron • <i>TPMT</i>- thiopurines 	<ul style="list-style-type: none"> • <i>CYP2D6</i>- tamoxifen • <i>DPYD</i>- 5-fluorouracil, capecitabine • <i>G6PD</i>- rasburicase • <i>UGT1A1</i>- irinotecan
Pain Pharmacogenomics	<ul style="list-style-type: none"> • <i>CYP2C19</i>, <i>CYP2D6</i>- tricyclic antidepressants (TCAs) • <i>CYP2D6</i>- codeine, tramadol, hydrocodone, oxycodone 	

All of the Content Areas below must be covered with at least Case-Based Application, with a minimum of 1 Content Area with Direct Patient Care Experience.		
Content Area	Direct Patient Care Experience	Case-Based Application Acceptable
Cardiology Pharmacogenomics		<ul style="list-style-type: none"> • <i>CYP2C19</i>- clopidogrel • <i>CYP2C9, VKORC1, CYP4F2</i>- warfarin • <i>SLCO1B1</i>- simvastatin
Infectious Disease Pharmacogenomics	<ul style="list-style-type: none"> • <i>CYP2C19</i>- voriconazole • <i>HLA-B*57:01</i>- abacavir 	<ul style="list-style-type: none"> • <i>IFNL3</i>- PEG interferon alpha • <i>UGT1A1</i>- atazanavir
Neurology Pharmacogenomics		<ul style="list-style-type: none"> • <i>CYP2C9, HLA-B*15:02</i>- phenytoin • <i>HLA-B*15:02, HLA-A*31:01</i>- carbamazepine/oxcarbazepine
Psychiatry Pharmacogenomics	<ul style="list-style-type: none"> • <i>CYP2C19, CYP2D6</i>- tricyclic antidepressants (TCAs) • <i>CYP2C19, CYP2D6</i>- selective serotonin reuptake inhibitors (SSRIs) 	
Transplant Pharmacogenomics		<ul style="list-style-type: none"> • <i>CYP3A5</i>- tacrolimus
Other clinical areas		<ul style="list-style-type: none"> • <i>CFTR</i>- ivacaftor • <i>HLA-B*58:01</i>- allopurinol

Table 2. Pharmacogenomics principles to be covered in a PGY2 Clinical Pharmacogenomics residency

PRINCIPLES	REQUIRED	ELECTIVE
Genetics	<ul style="list-style-type: none"> • Basic principles of genetics • Basic principles of genetic testing 	
Pharmacokinetics and pharmacodynamics	<ul style="list-style-type: none"> • Absorption, distribution, metabolism, excretion • Cytochrome P-450 (CYP) and non-CYP enzyme systems • Drug transporters 	
Clinical implementation of pharmacogenomics	<ul style="list-style-type: none"> • Implementation science • Ethical, legal, and social issues of pharmacogenomic testing 	<ul style="list-style-type: none"> • Various patient care models for pharmacogenomics • Reimbursement for pharmacogenomic testing
Clinical informatics	<ul style="list-style-type: none"> • Clinical decision support 	

<p>Analysis, interpretation, and application of clinical pharmacogenomics literature</p>	<ul style="list-style-type: none"> • Use of evidence-based pharmacogenomics resources (e.g., CPIC guidelines [https://cpicpgx.org/], Pharmacogenomics Knowledge Base [https://www.pharmgkb.org/]). • Knowledge of key landmark events in the evolution of clinical pharmacogenomics implementation and findings from key publications that document the association of clinical pharmacogenomic testing with favorable health care outcomes. 	
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The Clinical Pharmacogenomics Appendix was recommended by the ASHP Commission on Credentialing on August 12, 2018 and approved by the ASHP Board of Directors on September 28, 2018.

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