Engaging in Collaborative Research: Focus on the Pharmacy Practitioner

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ABSTRACT

Research offers an opportunity for investigators to explore unanswered questions, highlight best practices, and engage in collaboration. Clinical research can engage health care professionals to identify treatments or procedures to enhance patient care, quality of life, and outcomes. Research may also include experiences in a unique practice site or teaching methodology of trainees, staff, or patients. The goal of research is to improve individual patient care via dissemination of knowledge through publications. This article aims to highlight the importance of pharmacist-led research in the academic or community medical center and the need for resident-based research and mentorship for the integration of collaborative research and achievement of organizational goals.

Key Words—clinical research, collaborative research, mentorship, pharmacist-led research

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Research offers an opportunity for investigators to explore unanswered questions, highlight best practices, and engage in collaboration. Clinical research can engage health care professionals to identify treatments or procedures to enhance patient care, quality of life, and outcomes. Research may also include experiences in a unique practice site or teaching methodology of trainees, staff, or patients. Ultimately, the goal of research is to improve individual patient care via dissemination of knowledge through publications. Publications can range from abstracts and oral presentations to articles that highlight best practices and areas for improvement.

Although research is recognized as an important function of a clinical pharmacist, according to a survey performed by the American College of Clinical Pharmacy (ACCP) Research Affairs Committee, only 46.7% of respondents had at least one published

original research article.^{1,2} Clinical pharmacists in research-intensive or academic positions reported more publications and grant awards than practitioners in the clinical setting.² Pharmacists who engage in collaborative research improve their chances of publication through increased access to high-impact research opportunities as compared with pharmacists with individual or single department research efforts.² Similarly, pharmacist integration into interprofessional research teams is highly desirable in order to achieve desired outcomes.³

To engage in effective research, successful mentors must be identified to provide a foundation for trainees to learn and implement fruitful investigations in their own practice. Additional emphasis should be placed on the importance of interprofessional research groups early in training to enhance collaboration and publication opportunities. We will

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focus on the pharmacist role in the research enterprise of an academic or community medical center (Table 1). Resident-based research effectiveness will be evaluated based on the integration of the pharmacist into collaborative research and the achievement of organizational goals. We will identify organizational collaborative research resources and highlight examples of best practices. Through this exercise, we will create a blueprint for successful criteria that are needed for multidisciplinary research collaboration.

DEFINING COLLABORATIVE RESEARCH

US Department of Health and Human Services Office of Research Integrity (HHS ORI) states that collaboration in academic research is “an equal partnership between two academic faculty members who are pursuing mutually interesting and beneficial research.”⁴ However, it points out that collaborative research can take many forms, ranging from this classic picture to situations as simple as one researcher using another researcher’s equipment or databases.⁴ Collaborators often have different stature and funding status and are from different organizations. Projects may include research staff and trainees of various levels from postgraduate fellows to undergraduate students. Collaborative research is not limited to the academic setting but also extends into the community sector.

Collaborative research can be broadly categorized as intra- or interinstitutional. As the names imply, intrainstitutional research takes place within a single institution whereas interinstitutional research involves multiple institutions. HHS ORI illustrates intrainstitutional research as 2 research groups in different departments of the same institution working together with efforts divided equally between the 2 groups.⁴ From a pharmacy perspective, this could

mean a hospital’s departments of pharmacy and medicine putting forth equal contributions to solve a research query that crosses disciplines. This example could illustrate pharmacy-driven research if the project was led by pharmacy with medicine providing expertise on a single aspect. Collaboration may also extend to practitioners in other disciplines, including nurses, hospital administrators, microbiologists, or statisticians. Additionally, there can be collaborations within the pharmacy department itself. For example, a seasoned clinical specialist may look to junior practitioners, staff pharmacists, technicians, or trainees for assistance with data collection on a large project. This is practitioner-driven research, but there is also trainee-driven research. For instance, a student, resident, or fellow may develop a research question and then seek the expertise and mentorship of a veteran researcher to accomplish his or her goals. Examples of interinstitutional collaborative research include a researcher from a private company working with the research group of an academic faculty member or a postgraduate resident traveling to an outside institution several times over the course of a year to learn a new research technique.⁴ Another example of interinstitutional collaboration is the application of a research study protocol between multiple and geographically diverse hospitals.

INITIATING INSTITUTIONAL RESEARCH

In 1981, the US Department of Health and Human Services (DHHS) developed regulations to protect human research subjects and defined research as “a systematic investigation... designed to develop or contribute to generalizable knowledge.”⁵ The US Food and Drug Administration used the term *clinical investigation* to confer the same research definition. Quality improvement/quality assurance (QI/QA) and

Table 1. Focus on the pharmacist practitioner for collaborative research

1. Pharmacists at an academic or community medical center or within a health system (that may include retail) take the lead.
2. Create the team: interpharmacy collaboration, intrapharmacy collaboration, committee for research, and individuals.
3. Recruit mentors to aid in the research process.
4. Introduce a research agenda for the team to foster ideas.
5. Delineate roles of physicians, nurses, and other health care professionals as necessary stakeholders.
6. Become familiar with the best practices of pharmacy and other disciplines.
7. Utilize information technology (IT) colleagues to advance data procurement.
8. Seek out pharmacy trainees to improve efficiencies.
9. Understand and become an expert on the research process (IRB, HIPPA requirements, your IT support team).
10. Be attentive to barriers to multidisciplinary research.

Note: HIPPA = Health Insurance Portability and Accountability Act of 1996; IRB = institutional review board.

medication use evaluations may resemble clinical research; however QI/QA work is distinctive because it occurs as part of usual care and/or focuses on measuring the impact of a system or process change that has been demonstrated to be effective.^{6,7}

Institutional Review Boards

In conjunction with the identification of potential collaborators, investigators should prepare the research protocol for Institutional Review Board (IRB) submission. IRB approval is a necessary step in the research process. The IRB is a body of academic and community members that oversees research and clinical investigation at an organization. The primary goal of the IRB is to ensure protection of human subjects in research, including patient safety, patient rights, ethical conduct, and confidentiality of patient data. Although the general goals of all IRBs are similar, the exact conduct and interpretation of necessary regulations fluctuate between each institution's IRB. Pharmacists participating in research should identify the regulatory standards of their institution's IRB. Each IRB may have its own minimum training for clinical researchers, which can entail a combination of online training modules and live presentations. Many times, access to the IRB submission system is only granted to individuals who have completed the necessary training.

IRB Processes

Once all IRB research training is completed, the first step in gaining IRB approval is to determine which review category is appropriate for submission. Generally, there are 3 categories for IRB submission: exempt, expedited, and full review. Classification in these categories is determined by the nature of the research, level of potential risk, type of studied population, and data collected. Exempt status signifies research that is of substantially low risk for which further and subsequent review by an IRB is not necessary. Although the DHHS provides definitions for research that qualifies for exemption from IRB review, each IRB may interpret the categories of exemption slightly differently. As such, the Office of Human Research Protection recommends that investigators submit all protocols for IRB review and not make the assumption that a research protocol is exempt from IRB review.⁵ An expedited review is a protocol of sufficiently low risk that it typically only requires review by a member of the IRB or the chair of the committee. If the reviewer of the protocol has additional points of uncertainty, he/she may request

a full board review. A full review usually entails a quorum of 5 voting members.

Although there are inherent burdens associated with complying with IRB standards and review, researchers should view IRB oversight as an opportunity to improve their research protocol.^{8,9} Indeed, the goals of a clinical researcher and an IRB are similar; their ultimate concern is to protect patients and optimize their care. Researchers who want to minimize the time, resources, and frustrations associated with interacting with the IRB should strive to become familiar with their respective IRB's standards and processes. In addition, open communication with the IRB about areas of uncertainty may further reduce the time and effort associated with the submission process. National IRB benchmarking evaluations demonstrated that the average time from protocol submission to initial approval for a full-board review project was 47.5 days.¹⁰ However, about one third of that time is due to delays in investigator responses or errors and omissions associated with the submission.¹⁰ Therefore, investigators should follow all the necessary steps during submission and respond to IRB requests in a timely manner.

The IRB determines institution-specific rules governing QI/QA work versus research, and it should always be consulted prior to beginning work. Clinical research funding in the United States has grown rapidly in the past 20 years, reaching \$117 billion dollars in 2012.¹¹ This increases the work of research oversight by the IRB. The resultant backload and delays in research approval can be frustrating to researchers. At the University of Wisconsin, the health sciences IRB has developed an online tool that facilitates the determination of QI/QA work. This best practice has reduced the backload of IRB work and hastened the initiation of QI/QA work by pharmacy, nursing, and medical investigators. Research protocols and proposals are still reviewed by the IRB and may be assigned the status of exempt, expedited, or full IRB review.

It is important to understand how a project will be viewed by a local IRB. To understand the research status, it is important to determine what committees need to review or contribute to a project. A project initiated in a medication safety or quality committee may have a greater likelihood of being assigned a QI/QA designation. Involving local leaders and content experts will help the principal investigator place the project into context for the IRB. It may be important for the lead project pharmacist to have a physician champion, especially if lab monitoring or radiography is vital to study completion. Involving a

physician champion in these situations can help overcome billing and procedure ordering obstacles. Identification of current researchers can improve efficiency, as there may already be a process or protocol in place to simplify consent or sample acquisition. Although an IRB may require evaluation of research or QI/QA work, funding and learner status are 2 characteristics that may influence the final decision. Small, unfunded student or resident projects are more likely to qualify as QI/QA research.

PHARMACIST-LED RESEARCH: TIME COMMITMENTS, SKILLS, AND FUNDING OPPORTUNITIES

One of the bigger challenges facing a busy pharmacy clinician, whose practice centers primarily on patient care and education, is the ability to dedicate time to interdisciplinary research and contributions to the literature. The responsibilities and time commitments should first be defined and separated during the planning phases of a project. A candid evaluation of the available time commitment and skill sets of the team members may help determine the feasibility of the project.

There is an ongoing need not only to showcase and have pharmacists at the forefront, but also to have them work collaboratively with medical physicians and nursing colleagues to foster future projects. A major concept in initiating an interdisciplinary research program led by a pharmacist or with a pharmacy agenda is to first bring forth a research plan that creates a forum for dialogue. This can take the form of meeting to discuss investigation goals and identify key clinical disciplines. A forum can quickly overcome preconceived notions of research bias on team contributions. The relationships built between physicians, nurses, and pharmacists should not be overlooked, because each specialty can offer tremendous insight. The junior pharmacy practitioner may need to seek out senior mentors either within the pharmacy ranks (departmental level or college of pharmacy) or outside of the department. Senior-level practitioners who are physicians can provide the mentoring needed in research design and methods. Pharmacist-led research may also evolve organically from a committee level in which ideas can be vetted and discussed.

With clinical pharmacists involved in residency training at both academic and community-practice settings, the collaboration with residents and medical/surgical trainees can be key to data collection in different facets of a bigger research agenda. Data collection may entail medical chart review or electronic

data capture. An investment should be made to forge relationships with the data analytics personnel within the institution's information technology (IT) pharmacy team for electronic data pulls. IT resources offer advantages by improving research productivity and allowing for ease of data collection. Larger academic medical centers may have electronic health records, which can facilitate timely data procurement from data warehouses. An IT collaborative can also aid the prospective pharmacy researcher in standardizing definitions for data collection, which can translate to less confusion when results are analyzed. This can save time and resources when a researcher prepares the numbers needed for patient care studies and other factors that can ascertain the magnitude of the study.

Another important factor for discussion, once roles/responsibilities are delineated, includes identifying funding sources and the potential need to offset clinical time. This is a key point, especially when working with practitioners on a tenure track with colleges of pharmacy, nursing, and medicine. The time and effort of each participant needs to be integrated into the budget preparations. This process can require the transfer of funds from various grant sources into cost centers that are embedded within departments of pharmacy. Overlooking this step can be one of the biggest barriers to a successful research partnership and interdisciplinary collaboration.

It may be necessary for clinical pharmacists to carve out protected time for research, since direct and indirect patient care responsibilities generally take precedence over other activities. The possibility and feasibility of protected time should be discussed early in the planning process. Clinical pharmacists should discuss this with their managers and justify their protected time by explaining how this research would assist the institution, advance pharmacy practice, and build relationships between collaborator departments. In addition, pharmacists may seek assistance from trainees to maximize their efficiency. Strategies that can be used to engage these trainees include collaboration on quality or cost-improvement committees (physicians), pharmacy resident or fellow projects, or pharmacist-physician collaborative efforts to help support the research agenda of the physician.

DEVELOPING A RESEARCH CULTURE: PHARMACISTS TAKING THE LEAD

Developing a culture of research is essential to institutions that want to pursue collaborative research. Culture is defined as a system of widely shared and strongly held values.¹² It reflects the personality of

each institution and distinguishes one from the other. Creating a research culture involves reconfiguring the hearts, minds, and values of individuals.¹³ A culture of research is not just a group of individuals who understand the importance of research, but it is a supportive framework in which research is expected, discussed, produced, and valued.¹⁴

Creating a culture of research entails implementing certain factors. It is crucial to have effective leadership that establishes clear institutional research goals and expectations for researchers. Administrators can demonstrate support for research by including research culture development as an item on relevant committees while aligning all levels of the institution with the research culture development strategy.¹² Administrators can make research an expectation of employment by adjusting job descriptions to include statements of research expectations or by making promotions through the clinical or academic ladder. Because certain pharmacists may have minimal research experience, training and mentoring may be required. Therefore, it is essential for the institution to allocate resources for pharmacist training and support. By integrating students and residents in the different aspects of research projects, the institution can contribute to the development of their research skills.

Identification of barriers and the potential strategies to address such obstacles is crucial to the development of a research culture. When higher level administration places a low priority on research, there are certain countermeasures that may be helpful. For example, a research plan can be developed and implemented with measurable metrics such as research funding, publications, and national presentations. In addition, a demonstration of costs savings that are associated with implementation of research results may further convince administration of the importance of research. If pharmacy staff and faculty do not have the required knowledge and skills in research design and conduct, then training in research design, methodology, grant and manuscript writing, and submission is essential and may aid in forming culture. Additionally, providing mentorship programs and encouraging collaborative research may counteract the deficiency in research knowledge. In pharmacy departments with residency training, the importance of research expertise and participation as a way to satisfy regulatory minimum preceptor qualifications may be cited as further rationale for developing a research program. For appropriate research collaboration to occur, there should be a

sufficient number of investigators with whom to collaborate. This may be problematic in small institutions or universities. To counter this barrier, it is key to recruit with an aim to building a core based on the research strengths of the institution. Furthermore, in establishing collaborative efforts, it may help to take note of other institutions' priority research areas.¹⁵

Best practices for creating a culture of research at an institution are multifold. Adjusting job descriptions, allocating resources to training and support, integrating students and residents, and providing mentorship opportunities are some of the ways to make this initiative successful. Creating a new culture will not happen overnight. Realistically, it may take years to develop and, once established, will require much effort to maintain.

Creating the Team

Interinstitutional and intrainstitutional research teams can include physicians, doctors of pharmacy, nurses, PhD candidates, and statisticians in the core group. Interinstitutional teams may include pharmacy and medical personnel, depending on the focus and topic of research. The addition of allied health professionals (faculty and students) may introduce a new dimension to intrainstitutional research and can provide diversity to collaborative efforts. Research teams can deploy private or pharmaceutical team support, depending on the funding sources. It can be challenging for the core team to include trainees (fellows, residents, and/or students), because of the duration of training programs, the allocation of grants only to principal investigators, and longer term initiatives that require answers to optimize institutional and patient outcomes. The commitment of primary investigators to solidify collaborators in training demonstrates the importance of both the training and the future recruitment of these learners.

Interpharmacy Collaboration

The pharmacy team efforts in interdisciplinary research can take the form of clinical questions being answered among groups within a single pharmacotherapy practice area (eg, ambulatory care, cardiology, infectious diseases, and family medicine). There are excellent examples of collaborative research that is individually led with pharmacists as key stakeholders (Dr. Barry Carter at the University of Iowa, Drs. Larry Danziger and Keith Rodvold at the University of Illinois at Chicago, Dr. Kerry LaPlante at the University of Rhode Island, and Dr. Michael Rybak at Wayne State University). Other areas of practice

that are conducive to having pharmacists as principal investigators include transplant, critical care, pediatrics, and the behavioral sciences.

Committee for Research

Academic medical centers have the infrastructure that supports pharmacy-led research. Duke University Hospital, for example, has a Pharmacy Research Committee that serves as a scientific advisory committee designed to enhance pharmacy staff, residents, and student knowledge. This committee oversees and guides research activities and helps to identify extra-departmental research support resources. Other academic institutions have pharmacist-led committees that provide oversight, although some of these may be more college-based than hospital-based.

Overcoming Barriers to Pharmacist-Led Research

The barriers to pharmacy-led research are different from those to process improvement and quality research in which many pharmacists currently participate. The more common continuous quality improvement and medication safety involvement is of shorter duration and narrower focus. This is different from research that has a component of extramural funding that may encompass multiple departments. The pharmacist must first map a scope for timelines so that both institutional and professional goals can be met. He or she must be well organized, conciliatory, and an excellent communicator/diplomat with medicine, nursing, and allied health colleagues. The pharmacy researcher may benefit from having previous project management experience. Again, the “experienced” pharmacist may be in a more beneficial position if he or she also has the backing from either residency or fellowship training. The whole IRB process can be a major barrier to pharmacists who intend to work on collaborative research endeavors. There is a greater degree of IRB scrutiny associated with multiple submissions. The pharmacist should engage team members with varied experiences and familiarity with the local IRB, so as to best navigate federal regulatory and Health Insurance Portability and Accountability Act of 1996 (HIPAA) compliance laws. HIPAA and database maintenance requirements can be challenging for the novice researcher, and these again can be overcome through collaboration. If the pharmacist practices in a community-based setting where research may not be identified as part of the culture, it might be helpful for him or her to collaborate with physicians, nurses, and allied health professionals.

Best Practice in Action

For showcasing best practices in collaborative research, the Medical University of South Carolina Departments of Surgery, Medicine, and Pharmacy provide an excellent example. This program is the largest and most diverse center in South Carolina for providing transplants in all major organs for both adults and pediatric patients. The group is heterogeneous and draws upon a talent base from transplant nephrology and surgery as its core group; the Department of Pharmacy contributes 4 adult and 1 pediatric full-time clinical pharmacy specialists, 2 full-time researchers (one within the department of surgery), 2 PGY2 transplant residents, and 2 full-time pharmacists who have roles as a quality director/coordinator. Research is not necessarily the primary focus of this group, but evidence over the last 4 years has noted high rates of poster/oral presentations at the American Transplant Congress (21 in 2013, 13 in 2014, and 10 in 2015) and a highly successful publication rate ranging from 10 manuscripts published in 2013, 4 in 2014, and 2 in 2015 (with 6 in progress). The academic and patient-centered achievements of this team are attributable to the buy-in of a culture of collaboration.

RESEARCH PROCESS

Identification and development of research questions is one of the most crucial steps in the research process, and it sets the direction for the rest of the research project. Clinicians should spend considerable effort in identifying and refining areas where further knowledge is necessary. When identifying areas of knowledge deficit, pharmacists should consider topics of conflicting clinical practice or suboptimal outcomes. In refining a research question, it is important to appreciate what previous investigations have demonstrated in order to identify knowledge gaps and logical subsequent questions generated from previous research.¹⁶

Once a refined research area is identified, the acronym PICO (population/patients, intervention, comparison, outcomes) is one way to frame a specific experiment.¹⁷ These 4 elements of a research question should be as precise and detailed as possible. When a specific, precise, and well-defined research question is developed, the viability and applicability of the project should be evaluated using the FINER acronym (feasible, interesting, novel, ethical, and relevant to clinical practice).¹⁸ Part of the assessment for feasibility should entail a sample size calculation to establish the minimum number of samples necessary

to determine a clinically significant difference in the primary outcome. It is beyond the scope of this article to review the methods for power calculations; however, basic primers on the topic exist.^{19,20} Frequently, this step would also quantify the amount of time and effort necessary to complete the research project.

After deciding on a feasible and clinically applicable research question, the remainder of research design involves selection of appropriate research and statistical methods. The American College of Clinical Pharmacy (ACCP) has defined clinical pharmacy research as “studies of human subjects, including surveys, cross-sectional studies, case-series, case-control studies, cohort studies, first-in-human studies, proof-of-principle projects and all phases of clinical trials.”²² However, pharmacy research is also likely to include methods that involve basic pharmaceutical sciences and practice-based research in areas such as pharmacoeconomics, medication safety, and quality metrics. Hence, the concept of “pharmacy research” methods is broad and complex. The selection of the research method largely depends on the research question that was posed and the feasibility of the design.

At this stage of the process, the selection of collaborative research partners is equally important. Solving complex scientific problems or engineering new patient care techniques often requires a team of researchers with diverse backgrounds. The merging of different fields of study allows for discoveries that otherwise may be impossible for a single researcher. The recognition of the link between research collaboration and the importance of discovery has led many research funding and academic institutions to encourage the development of collaborative multidisciplinary teams.^{21,22} As such, pharmacists developing research questions should evaluate what additional disciplines should be involved. Furthermore, pharmacists should evaluate what unique skill sets and perspectives they can bring to a multidisciplinary research team. These may include pharmacology, pharmacokinetics, drug delivery, pharmacodynamics, and pharmacogenomics. Multidisciplinary collaboration can occur within the confines of a single academic institution; however, there may also be the need to establish multicenter research networks.

ENHANCING COLLABORATIVE RESEARCH PRODUCTIVITY

Improving collaborative research productivity depends on individuals but it also requires support at an institutional level. To enhance research productivity, it is essential to select and recruit individuals who

are trained and expected to engage in collaborative research. The institution must have a research culture with similar values and goals.²³ This can promote innovation and positive interactions and can contribute to the construction of research questions and plans. Mentorship between newer and established practitioners increases research productivity. Due to the collaborative nature of research, it is important to have mentors both within and outside of the profession. Individuals with limited research experience can learn by participating. Varying levels of experience and expertise allow collaborative research groups to vary their approach on the topic being researched to enhance the end product. Refer to **Table 1** for key elements of pharmacist practitioner collaborative research.

Identification of inclusion and exclusion criteria may be less time consuming if the institution establishes standard coding for more efficient data mining. This may be accomplished by examining research that has already been performed and by setting standard definitions for certain criteria, such as acute kidney injury or chronic kidney disease. Streamlining research methods within an institution can allow for a larger sample size for data extraction and analysis. Furthermore, a departmental review process prior to the initiation of research can allow researchers to refine their research question and methodology. Many institutions require departmental approval prior to the initiation of research and resident research projects in order to incorporate collegial feedback to promote a solid foundation for the proposed research.

The University of Michigan is a great example of system support. The MCubed project facilitates, supports, and encourages interdisciplinary research. This initiative specifies that at least 3 faculty collaborators from at least 2 different campus units come together to form a “cube.” Since it began, 447 cubes have received funding and brought an additional \$33 million in awards to the university.²⁴ Another example is the University of Wisconsin Institute for Clinical and Translational Research (ICTR) Pilot Awards Program.²⁵ This program encourages funding for multidisciplinary research, however the multidisciplinary requirement is dependent on pilot grant type: patient-based clinical research, patient-centered outcomes research, dissemination and implementation research, community engaged research, and discovery and development of novel therapeutics. The dollars awarded depend on the pilot grant type. Membership through ICTR enrolls the researcher in an ambassador program that matches investigators to collaborators.

Another way to enhance research productivity is through professional networks. These may lead to additional collaborations and research opportunities. National and international pharmacy organizations provide various collaboration opportunities. For instance, ACCP offers practice and research networks (PRNs) for practitioners with mutual practice and research interests to engage in professional interaction and networking.²⁶ Furthermore, ACCP offers a Practice Based Research Network (PBRN) that brings practitioners and researchers together to collaborate on common research interests in order to provide reliable and valid data.

The experience of one noteworthy collaborative research group is documented by a level 1 trauma center engaged in interdisciplinary research. The Trauma Interdisciplinary Group for Research (TIGR) encouraged the creation of a research culture in their institution and provided education and support for those with less research training. Multiple colleges, including pharmacy, were included in this group. This collaboration led to an approximately 400% increase in abstracts, publications, and investigator-initiated proposals as well as new sources for collaboration.²⁷

At the University of Illinois at Chicago, College of Pharmacy, a time-off service request (full- or part-time) may be initiated to provide a clinical pharmacist with 4-week intervals up to a maximum of 12-weeks in order to pursue a scholarly activity once a year. A request must outline the anticipated scholarly activity to be completed, the time needed, the anticipated deliverable, and who will be covering the pharmacist's job responsibilities. A progress report is required at each 4-week interval and may be extended based on the progress or completion of the deliverable activity.

MENTORSHIP

Another essential element that should be available in institutions aspiring to collaborate in research is mentorship. A mentor is defined as a trusted counselor or guide or someone who teaches or gives help and advice to a less experienced person for the purpose of promoting that person's professional and personal development.²⁸ In addition to devoting time to the mentee, a good mentor has adequate professional experience, professional successes, a good reputation, and a history of professional involvement.²⁹ In the educational setting, mentors may be easily identified, but employers in the workplace may not always provide a formal mentorship program for new employees

or those who seek professional growth. Although new pharmacy graduates, residents, and developing practitioners may have a wealth of information, much value may be added from a senior pharmacist who has been working in the profession for many years and is willing to serve as a mentor. For example, practitioners who want to develop collaborative research activities may have the basic drug therapy and disease state management knowledge, but they may lack experience in setting up protocols or communicating with physicians, nurses, and other practitioners. Discussions with the mentor about experiences that worked well and ideas or practices that failed can be a valuable learning opportunity.

Mentorship does not have to be limited to one individual. Several mentorship experiences may be valuable in providing growth in the different components of personal and professional development.³⁰ For example, one mentor may be able to promote networking opportunities in the area of the mentee's specialty, while another mentor may help develop the mentee's leadership skills. Committee mentorship is an excellent means of collaborating and using intra- and interprofessional communication skills for the purpose of achieving an intended goal. Good communication begins with respect for other coworkers and a willingness to be a team player. Collaboration across institutions is another mentorship experience that will help the mentee develop his or her skills. Understanding the other site's philosophy, values, mission, and current patient care activities will help mentees learn what is important to individuals from other institutions and other areas of the country in terms of research. This partnership involves assessing the needs and goals of different institutions and working collaboratively to develop a plan of action while monitoring and assessing progress.³¹ Non-pharmacy mentors may also serve a significant role with pharmacy mentees. Developing collaborative working relationships with non-pharmacy personnel is vital to the success of pharmacy practice. One study described the developing pharmacist and physician relationship from the early stages of collaboration to the final stage when both groups were committed to the professional relationship.³² Three main exchange characteristics guided the progress between the stages.³³ Role specification, when the pharmacist and physician understood each other's role in the patient care process, was crucial. The other exchange characteristics, trustworthiness and relationship initiation by the pharmacist, affected pharmacist and physician collaboration.

Mentorship tools and programs are available to help mentors and mentees. ASHP Connect and the ACCP have valuable programs that help identify mentors.^{34,35} The Commissioned Corps of the US Public Health Service – Pharmacist Professional Advisory Committee has an excellent website that includes mentoring tools, forms, and training.³⁶ State and national pharmacy organizations as well as certain universities may also have tools available.

Barriers in establishing a productive mentor-mentee relationship may be defensiveness or premature assumptions, judgments based on cultural differences or interpersonal relationships, a lack of mutual respect and trust, and insecurities with both parties as to what their role or contribution could be.

Best practices to promote collaboration through mentorship entail a program in which written procedures are documented and analyzed for improvement. For the mentorship program to be successful, the following should take place: clear and open communication of perspectives, awareness of and ability to openly discuss differences, implementation of strategies for addressing challenges as they arise, and high standards of ethics and professionalism.³⁷ Furthermore, for these programs to be truly effective, they should show significant skill development. Mentoring to achieve collaboration among colleagues and other health care professionals is vital to the profession.

SHOWCASING RESEARCH: THE FINAL STEP

Once research has been completed, the investigators should be encouraged to share their findings. Based on the intended audiences, investigators may choose to showcase research at committee/hospital meetings, as an oral or paper poster abstract at local, state, regional, national, or international meetings, and/or as a published manuscript. This can provide additional means of collaboration through networking with other investigators with similar research interests. To maximize the time devoted to the research process, a written review suitable for publication should be considered, if not already performed, based on findings after the initial literature evaluation. This is another way to assist in focusing the research idea and question.

Investigators of completed research should pursue an oral or paper poster abstract presentation in order to disseminate research findings to a wider audience. According to available data, ASHP had an acceptance rate of 84% for submitted abstracts

for poster presentation.^{38,39} Conversely, the American Academy of Pediatrics Section on Surgery had an acceptance rate of 49% between 2010 and 2013 and the International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention had an average acceptance rate of 35% between 2007 and 2013.^{40,41} In 2016, the American Society of Clinical Oncology had a 42% acceptance rate for presentation as well as a 48% epublication-only acceptance rate.⁴² It is important to determine the best venue and organization through which to disseminate the research of the study group in order to optimize the acceptance of the research. Funding to attend conferences may be an obstacle, but some organizations offer travel grants and awards to assist members. For example, the Society for Critical Care Medicine offers its non-physician members complimentary registration for the primary author of an abstract presentation.

Although the manuscript preparation process may be daunting, collaborative efforts can assist in reducing the burden on a single individual and the work can evenly be distributed throughout the research team. Oftentimes, investigators may not pursue publication because they fear manuscript rejection or they do not believe that their idea is unique or applicable outside of their institutional setting. Abstracts presented at conferences should be pursued for manuscript publication, because the data collection and analysis have already been completed. Out of 2,000 abstracts presented in 2005 at the ACCP Spring and Annual Meetings, APhA Annual Meeting, and ASHP Summer and Midyear Clinical Meetings, only 384 (19.8%) were published and 98.4% of the published manuscripts were indexed in PubMed on average 16.8 months after presentation.⁴³ If a submission is initially rejected, the research group should examine the peer-reviewers' comments and use them to modify and enhance their manuscript for submission to another journal. If modifications are requested, a collaborative research group may divide the responsibilities so that editing is not left to one investigator. When journals request a revised submission, the chances of acceptance are generally favorable upon resubmission. A best practice to encourage the publication process is to identify a committee or individuals willing to review manuscripts prior to submission to identify any issues or reasons that the manuscript would not meet publishing standards. This is an ideal task for trainees or junior faculty.

CONCLUSION

Although time is often cited as a barrier to research and publication, intrainstitutional and interinstitutional collaborative efforts can enhance research productivity. Creating a research culture at an institution is essential in promoting research activities. Pharmacists should play a key role in initiating and conducting research at an academic or community medical center. Individuals interested in initiating research who do not have experience should seek out a mentor and/or additional avenues for training to assist them in refining their research skills. Exposing trainees to collaborative research can serve as a platform for engaging them in collaborative research throughout their career.

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