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Currents in Pharmacy Teaching and Learning ■ (2015) ■■■■■

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Opinion

# The importance of research during pharmacy residency training<sup>☆</sup>

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## Abstract

Practice-related projects and pharmacy practice research are requirements to complete postgraduate pharmacy residency programs. Many residents will complete residencies without fully developing the skills needed to perform research required for new clinical and academic positions. Many studies have quantified successes and identified characteristics that may be associated with successful resident publication. There are many benefits to gaining research and publication skills during residency training for the resident, preceptor/mentors, and the residency program. Published works have also suggested approaches that can be taken to improve research within a residency program. The aims of this article are to discuss the publication rates of resident research projects, suggest ways to improve residency research, review benefits of residency research, and briefly review research training alternatives.

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**Keywords:** Resident; Research; Publication rates

## Introduction

Pharmacists who possess clinical pharmacotherapy knowledge and research skills are essential to the generation

*Abbreviations:* ACCP, American College of Clinical Pharmacy; ASHP, American Society of Health-Systems Pharmacists; FINER, feasibility, interesting, novel, ethical, relevant; MeRIT, Mentored Research Investigator Training; PBRN, practice-based research network; PharmD, Doctor of Pharmacy; PICO, population, intervention, control, outcome; PGY, postgraduate year; RPD, residency program director

<sup>☆</sup>Funding: This article was supported by Washington University Institute of Clinical and Translational Sciences Grant UL1 TR000448 from the National Center for Advancing Translational Sciences, United States.

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of new knowledge and the practice of clinical pharmacy.<sup>1,2</sup> Developing these pharmacists to advance the pharmacy profession and compete for extramural funding is an important component of the American College of Clinical Pharmacy (ACCP) strategic plan.<sup>3-5</sup> However, limited research education is required in the curriculum of Doctor of Pharmacy (PharmD) degree programs.<sup>6-8</sup> While basics in biostatistics and research design are required, application of these research skills is not.<sup>6-8</sup> Further, longitudinal research experiences are not routinely available to students.<sup>9</sup> Regardless, student participation in a research project is unlikely to develop the research competencies necessary to complete high-quality research. Postgraduate education is often necessary to train pharmacists before entering careers with research expectations. We aim to (1) identify publication rates in residency programs and characteristics that may improve publication success, (2) discuss the importance and benefits of gaining research and publication skills during a residency program, (3) suggest ways to improve residency

<http://dx.doi.org/10.1016/j.cptl.2015.08.018>

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research, and (4) discuss alternative training programs aimed to improve research skills.

### Postgraduate training: Fellowship and residency

Pharmacy internships were established to train pharmacists to become managers of pharmacy services in hospitals.<sup>10</sup> The term internship was officially changed to residency in 1963 when the American Society of Hospital Pharmacists (ASHP) published the first accreditation standards for pharmacy residencies to ensure organized and standardized experiences with focus on clinical practice.<sup>11</sup> Formal research training programs designed for clinical pharmacists, termed fellowships, were first developed in the 1970s.<sup>10</sup> Pharmacy fellowships focused on developing abilities to conduct independent research in a particular area of specialization. In 1987, seven national pharmacy organizations convened to establish definitions of pharmacy residencies and fellowships and to clarify the objectives of these training programs.<sup>10</sup> Residencies were defined as “an organized, directed, postgraduate training program in a defined area of pharmacy practice.” Fellowships were defined as a “directed, highly individualized, postgraduate program designed to prepare the participant to become an independent researcher.”<sup>10</sup>

In 1985, ACCP reported that there were 91 fellowship positions offered by 83 programs in the United States<sup>12</sup> while ASHP reported availability of 184 accredited residency programs.<sup>13</sup> These 267 programs (about one fellowship for every two residencies) were available for 5147 new graduates with Bachelor of Science in Pharmacy degrees and 812 graduates with PharmD degrees.<sup>14</sup> Since that time, national pharmacy organizations advocated more strongly for the completion of residency training, thus setting the expectation that all entry-level pharmacists participating in direct patient-care activities complete residency training.<sup>15–17</sup> Subsequently, the number of available residency positions has expanded. According to the 2014 ASHP Resident Matching Program, 1333 programs offered 3156 residency positions.<sup>18</sup> Interest in residency training continues to outgrow availability as 1614 candidates were unsuccessful in matching with a program in 2014 despite the growing number of residency positions. However, fellowships have not experienced similar growth in numbers or demand. According to ACCP, 54 programs offered 107 fellowship positions in 2014, which is fewer programs than in 1985.<sup>19</sup> Residency positions now outnumber fellowships 29 to 1. This decline may be due to a lack of consistent funding or interest in these programs.<sup>4</sup> Pharmacists are not often required to complete fellowships as a prerequisite for most entry-level clinical or academic positions, even if research is an expectation of the position. Ultimately, one to two years of residency training has become the most common pathway to becoming a pharmacist with research responsibilities. In fact, a survey of ACCP members found that approximately two-thirds of respondents working in positions with heavy research responsibilities did not have

formal research training.<sup>20</sup> While many individuals have been very successful in their research career despite minimal formal training, the question remains about the best way to meet these educational needs of trainees.

### Research requirements during residency

As with PharmD programs, it is unreasonable to expect pharmacists to be prepared to function as independent researchers after completion of residency training, given the limited focus and time dedicated to development of research skills. Residents are required to complete a practice-related project during ASHP-accredited residencies; however, completion of a research project is not a uniform requirement.<sup>21,22</sup> The current standards do not require research training to be provided during the completion of a residency. Residents are expected to present their project outcomes either through preparation of a manuscript or during a residency conference; however, submission of a manuscript to a biomedical journal for publication is not required. Publication rate is a measurable and consistent outcome to assess research training and experience during residency, but there are benefits of resident research outside of publication. Publication of pharmacy resident research projects is low and the number of publications does not appear to be increasing despite the rise in residency positions.<sup>23–28</sup> There is much that can be learned from the current state of resident research, including their publication rate and residency-trained individual's publication contributions to biomedical journals in the ensuing years after residency completion.

### Resident publication success rates

Previous authors have attempted to determine publication success for pharmacy residents. Murphy and Downhour<sup>29</sup> determined publication success based on the results of questionnaires sent to RPDs during the 1999–2000 residency year. Information was collected on 917 resident projects from 278 returned questionnaires (a 62% response rate). Based on the RPD response, 121 projects (13.2%) were published. Using MEDLINE and International Pharmaceutical Abstracts (IPA), McKelvey et al.<sup>24</sup> assessed residency publication success at the Southeastern Residency Conference in years 1981, 1991, and 2001 to assess changes over time. Of the 272 abstracts evaluated, 43 (15.8%) were published. Publication success decreased over time with rates of 20.0% (1981), 15.7% (1991), and 12.5% (2001). An analysis by Olson et al.<sup>23</sup> assessed every third abstract presented at the Western States Conference during 1995, 2000, and 2005 using MEDLINE and EMBASE. A total of 270 abstracts were assessed with an overall publication rate of 6.3% ( $n = 17$ ). The rate of publication appeared to increase in subsequent years analyzed from 4.2% in 1995 to 8.2% in 2005, but still remained low. Publication rates were assessed after presentation at Western States Conference again in 2008 using only MEDLINE.<sup>25</sup> Of the 446

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