

# Can a Clinician-Scientist Training Program Develop Academic Orthopaedic Surgeons? One Program's Thirty-Year Experience

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**BACKGROUND:** Clinician-scientist numbers have been stagnant over the past few decades despite awareness of this trend. Interventions attempting to change this problem have been seemingly ineffective, but research residency positions have shown potential benefit.

**OBJECTIVE:** We sought to evaluate the effectiveness of a clinician-scientist training program (CSTP) in an academic orthopedic residency in improving academic productivity and increasing interest in academic careers.

**METHODS:** Resident training records were identified and reviewed for all residents who completed training between 1976 and 2014 ( $n = 329$ ). There were no designated research residents prior to 1984 (pre-CSTP). Between 1984 and 2005, residents self-selected for the program (CSTP-SS). In 2005, residents were selected by program before residency (CSTP-PS). Residents were also grouped by program participation, research vs. clinical residents (RR vs. CR). Data were collected on academic positions and productivity through Internet-based and PubMed search, as well as direct e-mail or phone contact. Variables were then compared based on the time duration and designation.

**RESULTS:** Comparing all RR with CR, RR residents were more likely to enter academic practice after training (RR, 34%; CR, 20%;  $p = 0.0001$ ) and were 4 times more productive based on median publications (RR, 14; CR, 4;  $p < 0.0001$ ). Furthermore, 42% of RR are still active in research compared to 29% of CR ( $p = 0.04$ ), but no

statistical difference in postgraduate academic productivity identified.

**CONCLUSIONS:** The CSTP increased academic productivity during residency for the residents and the program. However, this program did not lead to a clear increase in academic productivity after residency and did not result in more trainees choosing a career as clinician-scientists. (J Surg Ed ■■■■-■■■. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

**KEY WORDS:** Clinician-Scientist, Academic, Research Year, Publications, Orthopaedic Research

**COMPETENCIES:** Medical Knowledge, Patient Care, Systems Based Practice, Practice Based Learning, Interpersonal Skills and communications, Professionalism

## INTRODUCTION

In the changing health care environment, the major focus has been on clinical productivity, and because of this, academic pursuits are likely to receive less attention.<sup>1</sup> In 2002, there were only 58 clinician-scientists, or surgeons who acted as principle investigators in research and received greater than \$100,000 in NIH funding.<sup>2</sup> As medical practice continues to advance and evidence-based medicine directs both research and clinical practice, research will become the major determinant of development in this field. Despite this fact, the overall number of physicians, and particularly surgeons, involved in academic practice has been trending down or at least has plateaued.<sup>3-8</sup>

Evidence-based medicine shifts focus from expert opinion to clinical research and development. In orthopedic surgery, translational research has already had a great impact on

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advancing the field, exemplified by advancements in implant and allograft designs and medical treatments for various orthopedic diseases. In addition, some past therapeutic approaches have been proven ineffective and even harmful with improved understanding of the pathophysiology of orthopedic conditions.<sup>9-11</sup> It is difficult to find a practicing physician who would deny the value and potential effect of translational research on clinical practice; so why are training programs struggling to produce clinician-scientists?

In general, the time commitment of research activity and pressure to produce clinically are major factors affecting academic involvement.<sup>1,12,13</sup> Increasing cost of medical education, lower reimbursements, and the relative uncertainty of financial reward for time invested in research vs. clinical duties are also major contributors to the decline in clinician-scientists.<sup>3,14,15</sup> There may also be a bias that favors PhDs with respect to NIH funding demonstrated by the relative plateau of clinician-scientists in the grant pool despite a large increase in NIH funding for research which has largely gone to PhD applicants.<sup>16,17</sup> Additionally, although musculoskeletal disease is a major source of patient presentation to physicians, current national funding for research does not reflect this trend.<sup>18</sup>

The Accreditation Council for Graduate Medical Education (ACGME) has increased support of research and mandated “scholarly activity” during training but has left specific requirements up to individual institutions.<sup>19</sup> Government programs, private grants, and NIH initiatives have been established to support clinician-scientists and translational research.<sup>4,6,20</sup> Individual institutions have taken strides to improve productivity and numbers in academic medicine in the form of research resident positions and research curricula, which have shown varying results.<sup>21,22</sup> There are few data not only looking at productivity but also comparing different program structures and future practice patterns of the trainees. The purpose of this study was twofold: (1) We sought to assess the efficacy of a formal, structured clinician-scientist training program (CSTP) on academic productivity of trainees during their orthopedic residency training; (2) We further sought to assess the efficacy of this type of program on directing graduates into academic practice positions.

## METHODS

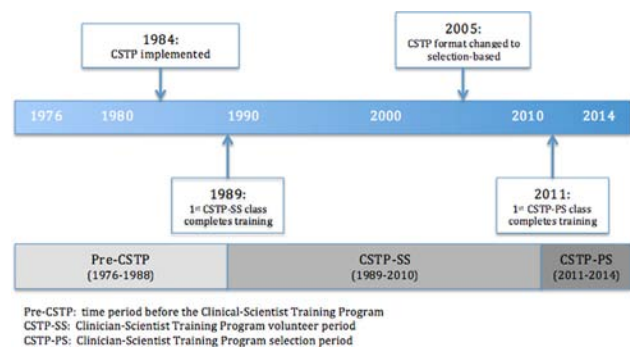
### Study Design and Setting

We retrospectively reviewed 1 program’s experience with a clinician-scientist training program (CSTP) by looking at training records of this urban, academic training program’s residents who started training between 1971 and 2008 and completed training between 1976 and 2014. In 1984, our department established a CSTP to counter the decline in clinician-scientists and relative discrepancy of research experience in orthopedic surgery. Funded by the orthopedic

surgery department, the program was designed to remove 1 to 2 residents from their clinical training to spend a dedicated year in our Musculoskeletal Research Center (MRC) under the direction of MD-PhD and PhD mentors. These CSTP trainees (research residents, “RR”) were relieved from all clinical duties during this time and were only required to attend academic conferences. Mentors were chosen based on staffing and the personal research interests of the resident. One to two RRs have been in place for the past 30 years. Initially, from 1984 to 2004, the program asked residents to choose among themselves “volunteers” after beginning their residency to complete a research-training year. Though these trainees knew that spending an extra year for the program was a chance when they matched into the program, it was not determined who would participate until after training had begun. In 2005, the program design changed and RRs were “selected” before starting their residency from the medical student applicant pool. These residents knew from the time they began training they would be in the CSTP. For the purposes of this report, we will refer to these 2 time durations as CSTP-SS (voluntary or self-selected) and CSTP-PS (program-selected). Given the length of time the program has been in place and the structural change, we are able to evaluate and compare the trainees based on both CSTP involvement and CSTP structure (Fig. 1).

### Study Population

This 38-year time duration (1976-2014) provided a relatively large cohort of residents both before and after implementation of the CSTP in 1984 ( $n = 337$ ). Of this group, 8 residents were excluded from the analysis because they were deceased (5) or unable to be located (3). This cohort was then separated into subgroups based on 2 parameters, time duration, and program participation. Time duration subgroups include residents training before implementation of the CSTP (pre-CSTP, 1976-1988), residents who completed training when residents self-selected after starting residency (CSTP-SS, 1989-2010), and residents



**FIGURE 1.** Timeline of study period showing the year of the Clinician-Scientist Training Program (CSTP) implementation and year that program changed from voluntary to selection-based.

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