

Supplementing Resident Research Funding Through a Partnership With Local Industry

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OBJECTIVE: To develop a model for the supplementation of resident research funding through a resident-hosted clinical immersion with local industry.

DESIGN: Designated research residents hosted multiple groups of engineers and business professionals from local industry in general surgery-focused clinical immersion weeks. The participants in these week-long programs are educated about general surgery and brought to the operating room to observe a variety of surgeries.

SETTING: This study was performed at the University of Minnesota, in Minneapolis, Minnesota, at a tertiary medical center.

PARTICIPANTS: Ten designated research residents hosted general surgery immersion programs. Fifty-seven engineers and business professionals from 5 different local biomedical firms have participated in this program.

RESULTS: General surgery research residents (in collaboration with the University of Minnesota's Institute for Engineering in Medicine) have hosted 9 clinical immersion programs since starting the collaborative in 2015. Immersion participant response to the experiences was very positive. Two full-time resident research positions can be funded annually through participation in this program.

CONCLUSIONS: With decreasing funding available for surgical research, particularly resident research, innovative ways to fund resident research are needed. The general surgery clinical immersion program at the University of Minnesota has proven its value as a supplement for resident research funding and may be a sustainable model for the future. (J Surg Ed ■■■■-■■■. ©2018 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

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COMPETENCIES: Systems-Based Practice, Professionalism, Interpersonal and Communication Skills

INTRODUCTION

General surgery residency programs have a history of sponsoring 1- to 3-year research fellowships within the standard 5 clinical years of general surgery training. Despite increased clinical duties of both staff surgeons and surgery residents,^{1,2} resident research productivity seems to be stable.¹ Surgical research programs have been shown to be helpful in fellowship applications for graduating residents³ and useful in attaining a future career as an academic surgeon.⁴⁻⁷ One study demonstrated that over one-third of surgery residents with dedicated research time become independently funded investigators and academic surgeons.⁸

Resident research programs have also been argued to be critical to the field of surgery and to the development of academic surgeons.⁹ Some argue that the surgeon has a role as both an investigator and clinician; lack of surgical inquiry and research could potentially risk reducing the field to a group of "proceduralists," hired to perform a task and leaving the decision-making to other physicians.²

The cost of surgical research fellowship programs is high, with one estimate of the national cost for salary and benefits alone at \$41.5 million per year.³ Vanderbilt University reported a cost of at least \$520,000 per year to support their research residents not funded by a National Institutes of Health (NIH) T32 grant in 2014⁵ and UCLA medical center reported the cost of a 2-year research fellowship for one resident in 1998 at \$350,000.^{2,4} Although research funding fluctuates, a relatively low percentage of NIH funding is awarded to surgeons¹⁰ and the proportion of surgeon grant awardees has decreased,² which affects surgical residents interested in research.

The University of Minnesota General Surgery Residency Program is an academic program that continues the tradition of surgical research and educating future surgeon/scientists and academic surgeons. While a research fellowship during residency is not compulsory, a substantial portion of residents participate in the program's Surgical Resident Research Program.

Maintaining funding for general surgery resident research programs can be difficult. Our institution has developed a unique model to supplement resident research funding through partnership with a collaborating university institute and local industry.

METHODS

The University of Minnesota Department of Surgery (DOS) partnered with the Institute for Engineering in Medicine (IEM) to establish a clinical exchange with interested professionals associated with local medical device and medical technology industries. The biomedical firms and participants are identified through the IEM. The participants were recruited both through existing relationships between the IEM and the biomedical industry, as well as through the fellows who have graduated from programs within the IEM. These professionals enroll in a week long "clinical immersion" in general surgery. Surgery research residents were integral in developing a general surgery-focused curriculum for these industry professionals (E.A. and C.J.).

The program is coordinated through administrators within the DOS and IEM, but the week long clinical immersion is hosted by general surgery research residents with assistance from general surgery staff and general surgery clinical residents. Two different research residents are assigned to host the immersion participants each day.

Participants are screen through a process similar to other medical observers in the operating room. They are required to complete Health Insurance Portability and Accountability Act (HIPAA) privacy training. The participants complete observer applications that are reviewed and approved by the medical center. The participants are accompanied by a physician at all times and are not allowed independent medical record access.

The participants in the clinical immersion program begin their week by meeting the research residents in the early morning of their first immersion day. The research residents lecture on the basics of becoming a surgery resident, describing briefly: the path to medical school, medical school coursework and rotations, applying to a surgical residency, residency interviews and the match, internship and residency, and options for graduating residents. The participants are also given a description of our medical center and an overview of operations performed by general surgeons. The participants are taken on a tour of the

medical center and time is given for questions and interaction with nursing staff.

A lunch break is arranged every day by the IEM where all general surgery research residents and immersion participants meet for lunch. This is typically a period for information exchange between the research residents and immersion participants. The research residents often present case studies reflective of their clinical years of residency. One lunch period each week is reserved for video presentations that have been previously prepared for surgical conferences. Further teaching sessions have been arranged during lunch to accommodate special interests of the industry professionals (i.e., left ventricular assist device demonstrations).

Most clinical immersion is spent in the operating room. Staff surgeons and clinical residents are preemptively notified of industry observers and agree to allow these observers into their operating rooms during immersion weeks. Each research resident takes 2 to 4 immersion participants into an operating room and is available to explain the details of the operation to the participants. Clinical residents and staff surgeons participating in the case are also actively engaged with immersion participants in the operating room.

In addition to the operating room, immersion participants can request to see other areas of clinical interest. Research residents organize demonstrations and tours in equipment repair, equipment sterilization, supply chain management, anesthesia procedures, nursing and critical care, surgical lectures, and weekly grand rounds. Time in the early morning is frequently spent on clinical rounds with different surgery teams. All time spend during the immersion week is focused on areas of immersion participant interest.

On the last afternoon of immersion, the participants are taken to research institutes within the university that are often partnered with industry and associated with the DOS and IEM, such as the Visible Heart Lab and Medical Devices Center.

Surveys were administered to the participants by the IEM for quality improvement measures after each immersion program was completed.

RESULTS

Since starting the immersion program in 2015, the general surgery research residents have hosted 9 clinical immersion programs. During these nine weeks, the residents have hosted 57 industry professionals from 5 different companies with offices in Minnesota. The annual commitment from the DOS has ranged from 3 to 5 immersion weeks per academic year.

Although our research residents' time is valuable, this program provides significant funding for resident research while requiring minimal time commitment. Regardless of

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