

Award: Reed Williams Award for Excellence in Innovation in Surgical Education

Basic Information

Your name

Priti Parikh

Your title:

Professor, Vice-Chair of Research Education and Professional Development

Your institution:

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Email:

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Your innovation:

Research Curriculum and Milestones

Other team members:

- Mary McCarthy, MD
- Randy Woods, MD

When did you implement this innovation (what year)?

2013

Short Essays

What is the problem that is being addressed by this innovation? Why is the innovation important? How does the innovation build on previously existing knowledge or technology? What is the intended audience for this innovation?

Through technological developments and increases in evidence-based practice for care delivery, research has become the foundation of future medical practice. The ACGME, therefore, included research training and requirements in surgery residency and mandated resident participation in scholarly activity. While this may not be difficult for large academic programs, it could become a daunting task for community hospital-based programs or even hybrid; e.g., a community hospital-based program with university-affiliated program, such as ours. Often, the residents, who matched into or prefer community-based programs do not have much research experience prior to joining the program. So their needs of research education and training could be different from those with such background. Further, surgery faculty, including voluntary faculty, in such programs might not have enough training and time to mentor residents closely on research projects. Recent literature provides some guidelines, reward programs, and/or research curriculum outside general surgery specialty, however, it lacks assessment plans, which is essential for continuous quality improvement and sustainability. Further, challenges of community programs are different and not optimally discussed in the literature. To prepare our residents for research and to improve their experiences and potential interest, we needed, and thus, developed a novel "structured research curriculum and milestones" (SCRM). The SCRM includes essential components of teaching, mentoring, and evaluating our learners. It enables not only residents, but also faculty members in mentoring residents and assessing their progress. We believe that SCRM could easily be used by other residency programs, including community-based programs, hybrid programs, and even academic programs, to get their residents started and stay engaged in research and scholarly activities that could promote these programs further on local, regional, and national stage.

Please describe the innovation and how it was developed and implemented. What background work, including perhaps a needs assessment, was done? How were all relevant stakeholders involved?

In accordance with the ACGME that requires surgery residency programs to "establish and maintain an environment of inquiry and scholarship with an active research component," we launched a 'structured research curriculum and milestones (SRCM)' at our institution. The SRCM was developed based on the program needs, research competence of residents, and literature available in the area. The department and residency program leadership, along with senior residents were also consulted to learn more about our residents' needs and support/training they would require accomplishing their goal of scholarly activities. The feedback included that research education and mentoring was most important prior to require residents to conduct research. The SRCM, therefore, includes: (i) research seminar for resident preparedness to provide basic understanding of research and how to jumpstart the process that is now mandatory for all incoming residents, (ii) research meetings to provide residents a platform to discuss different ideas and their next steps every month, (iii) research mentoring by dedicated faculty, and (iv) annual milestones that convert research and publication into smaller and manageable tasks for residents. The curriculum and milestones were approved by the residency competency committee that included program directors and associate directors, department chair, and resident and faculty representatives.

Please describe the research design for measuring the effectiveness of the innovation.

We used quasi-experimental design assessing the impact of research curriculum and milestones on resident research in a pre-post research study. The total research output of residents, medical students, and faculty was obtained during a five-year pre-study period (2007-2011) and a five-year post-study period (2013-2017); the SRCM was implemented in 2013. Data

were obtained from the departmental and online research databases. Research output was classified as publications (peer-reviewed journal articles and book chapters), presentations (poster and podium at local/regional/national/international meetings), and grant submissions. Each project that contained multiple general surgery residents was counted only once towards the total number of publications, presentation, and grants. Criteria developed by International Committee of Medical Journal Editors (ICMJE) were used to determine the authorship of each individual including medical students on both presentations and publications. The type and number of faculty, resident research background, number of residents, the number of preselection publications and other resident demographics did not change significantly over the years during the study period to avoid any confounding variables. Though the focus of this innovation was on resident research productivity, secondary effects of the research curriculum were also assessed, specifically research productivity of faculty and medical students in our department. The data were analyzed using independent samples t-test.

What were the results of the innovation? What was the impact?

Overall, implementation of SCRM became a foundation for improved collaboration among residents, faculty, and students leading to a cultural shift in our program. Specifically, according to the feedback we received from our residents, SCRM prepared them for research during residency and beyond. Moreover, our annual milestones divided a research project into small, yet specific tasks. This gave them clear direction, made their research project more manageable, and enhanced their overall experience and interest in staying engaged in the research project. This had a domino effect; it provided increased incentive for faculty surgeons to pursue research projects in our program and led to more opportunities for medical students to get involved, leading to increased research productivity of medical students. These changes have resulted in a cultural shift towards a more scholarly environment in our program. Further, our curriculum and milestones stimulated interests in, and our collaboration with, other programs as well (please see strengths section for details).

Below we describe specific results, which were published in *The American Journal of Surgery* by Dr. Parikh and colleagues. Please note that the data are from the publication in 2019, but the numbers have only improved since then:

- o Before the implementation of research curriculum, there were a total of 15 resident presentations compared to 123 in the five years after the implementation, representing a significant increase of 820%. Also, publications by residents increased from 22 to 35 (a 59% increase);

- o Medical student presentations increased from 2 to 92 (a 4600% increase) and publications increased from 8 to 18 (a 225% increase);

- o Faculty presentations increased from 41 to 200 (increase of 488%) and publications increased from 64 to 83 (a 130% increase); and

- o After implementation, there were four resident projects that annually led to resident research grant submission compared to no submissions before implementation.

The implementation of SCRM has enhanced our collaborations. Since teaching and training of research is similar irrespective of the specialty, other programs, such as OB-GYN, Plastics and Orthopedic Surgery, and Internal Medicine departments at BSOM have shown interest in the SCRM, participated in research seminar, and considered adapting our SCRM to match their years in training. Newer collaborations with Computer Science and Engineering and Biomedical Engineering departments at Wright State University were established resulting in high quality, interdisciplinary, research initiatives. Moreover, with appropriate guidance and mentorship of faculty, our residents and medical students now collaborate with surgeon researchers at Johns Hopkins University, University of Alabama, and Stanford University, to name a few. Looking at such long-term success, our medical school leadership is now considering implementing the SCRM GME-wide. In our medical school showed interest in research seminar and participated as well. with other programs as well.

What are the main strengths and weaknesses of the innovation?

The following are the key strengths of the SRCM:

- 1) Implementation and sustainability: The SRCM is <easy, not much difficult> to implement in an existing residency program. We do suggest speaking with the stakeholders and make appropriate modifications to tailor it to the program's needs. The SRC is highly sustainable (10 years now in our program, published results at the end of 5 years). We do recommend bi-annual review among stakeholders and survey of residents to ensure evolving needs are appropriately accounted for in the SRCM.

- 2) Foundation for a cultural shift: It allowed residents to work closely with faculty and medical students leading to more inter- and intra-departmental collaboration resulting in an enhanced scholarly environment in the program overall. Further, it provided the noteworthy secondary effects on overall departmental research culture, including the changes in medical student and faculty research productivity.

- 3) Improved inter-departmental collaboration: Since teaching and training of research is similar irrespective of the specialty, other surgical and non-surgical programs (e.g., OB-GYN, Plastics and Orthopedic, and Internal Medicine) in our medical school showed interest in research seminar for resident preparedness and participated as well. This led to improved inter-departmental collaboration in our medical school. Moreover, more interdisciplinary research led to our collaboration with faculty in the Department of Computer Science and Engineering, Dept of Biomedical Engineering, and Nursing. The medical school leadership is even considering implementing our research curriculum and milestones GME-wide in our medical school. The milestones will, of course, be adjusted considering difference in number of years in training programs.

- 4) Generalizability: The SRCM can be used by other community-based, hybrid, and/or academic programs (irrespective of program size) to train and assess the research progress of residents. Moreover, mentors can use them to guide residents appropriately.

Weakness: Implementing a research curriculum requires dedicated faculty mentor and/or expert and faculty development

sessions that may require financial investment and resources by the affiliated institution, which may not be available to all programs. We do suggest exploring internal grants or seed grants from local foundations to support such investments.

How have you disseminated the results of this innovation?

This work was presented at the Surgical Education Week, Association for Program Directors (APDS) Annual Meeting, May 3-5, 2018 (Austin, TX) and published in the American Journal of Surgery, please see a complete citation below:

o Harrison LM, Woods RJ, McCarthy MC, Parikh PP. Development and implementation of a sustainable research curriculum for general surgery residents: A foundation for developing a research culture. Am J Surg. 2020;220(1):105-108.

doi:10.1016/j.amjsurg.2019.09.028

File Uploads:

Please upload a letter of support from a resident, faculty, education administrator, or anyone else with knowledge of the innovation and its impact.

- [Parikh-ASE-Nom-10282022.pdf](#)