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How We Do It: A Multicenter National Experience of Virtual Vascular Surgery Rotations

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Abstract

Objective- To describe the development and implementation of virtual vascular surgery rotations among 6 integrated vascular surgery programs.

Design- A collaborative teleconference retrospectively discussing 6 independently developed virtual vascular surgery rotations to make a framework for future use.

Setting- University of California Davis initiated a joint teleconference among the various integrated vascular surgery programs.

Participants- Vascular surgery faculty and residents from 6 programs participated in the teleconferences and drafting of a framework for building a virtual vascular surgery rotation.

Results- Four specific domains were identified in discussing the framework to build a virtual vascular surgery rotation: planning, development, curriculum, and feedback. Each domain has specific aspects in making a virtual rotation that has applicability to other surgical rotations that seek to do the same.

Conclusion- Virtual vascular surgery rotations are feasible and important; these electives can be established and implemented successfully with appropriate planning and consideration. This work hopes to help programs navigate this new space in education by making it more transparent and highlighting potential pitfalls.

Key words: virtual rotations, education, vascular surgery, COVID-19, medical students

Introduction

In March of 2020, the rapid worldwide spread of the SARS-COV-2 virus, also known as COVID 19, resulted in the cessation of travel for people around the world. Due to the wide variability of responses and exposures among medical schools based on location, the Association for American Medical Colleges (AAMC) recommended that remote rotations be limited, and many US medical schools shut down visiting medical student rotations.¹

Away rotations serve a crucial role in providing experience and education to students prior to starting residencies, but a recent survey of COVID-19's impact on medical student specialty choices found nearly 80% cited "lack of ability to rotate in that specialty" as a major deterrent in selecting a specialty.³ Despite the cancelation of in person rotations some surgical specialties have offset the loss with other opportunities such as virtual workshops, rotations, and webinars.²

Virtual rotations and simulation training has been successful in the past in educating and recruiting surgical trainees, so it is no surprise that the pivot to a virtual platform has found fourth-year medical students that are open and willing to engage with educators virtually.^{4,5,6,7,8,9} This paper focuses on the development and implementation of virtual vascular surgery rotations developed during the SARS-COV-2 pandemic and outlines their essential components.

Methods

This report presents a retrospective consensus derived from multiple communications held between October 13th to October 21st, 2020 by a group of faculty and trainees from programs

who had conducted virtual rotations in 2020. Six integrated vascular surgery programs were represented in the study with locations in the Northeast, Southeast, Midwest, and West regions of the US (Figure 1).

Representatives from the vascular programs with virtual rotations were queried regarding the following domains: 1) planning, 2) development, 3) curriculum, and 4) feedback (Figure 2). All responses were collected and organized by domain; these were reviewed by all authors. Lessons learned and best practices were developed after summarizing all responses by domain.

Results

Planning

During the planning phase, all programs identified external and internal contributing factors that lead them to create a vascular virtual rotation. External factors included the AAMC limitation of travel for “away” rotations, compounded by students at medical schools with limited vascular experiences requesting rotations. Internal factors identified while planning a virtual rotation were faculty interest to teaching virtually, resident availability, and support from various involved departments. These considerations help determine feasibility of a virtual rotation, length of rotation and student volume.

Development

Developing a virtual rotation included 5 elements in a stepwise fashion: team formation, institutional approval, rotation design, curricula organization and recruitment. Once resources

and support were identified in the planning phase, a team was formed to aid in the remaining steps of the development phase. The team was led by teaching faculty and involved other interested faculty, residents, and support staff such as information technology (IT). Institutional approval was required to allow students to obtain credit, so co-development of the curriculum and rotation design was necessary to obtain graduate medical education (GME) and office of medical education (OME) approval as institutions have differing requirements necessary to fulfill a didactic or clinical rotation. A spectrum of curricula was developed that satisfied each institutions requirement for either didactic or clinical credit. (Figure 3) Once approved recruitment consisted of publication on the AAMC's Visiting Student Location Opportunities (VLSO) catalog, Society of Vascular Surgery (SVS) Connect page, social media posts, and direct communication from programs.

Curriculum

Each institution developed its own curriculum with various opportunities that consisted of clinical interactions, didactic sessions, skills workshops, and professional development. Clinical interactions included virtual patient visits, virtual rounding, and livestreaming of OR cases. Didactic sessions consisted of pre-existing sessions as well as newly developed classes for virtual rotations. (Table 1). Skills workshops allowed for one-on-one sessions with residents and attendings, on a range of skills. (Table 2) Professional development was also offered on some rotations to help with curriculum vitae editing, presentation skills, and mock virtual interviews. Emphasis on clinical or didactic experiences dictated what resources were used during the rotation. (Table 3)

Feedback

Student assessment was guided by the curriculum's emphasis. Institutions with clinically heavy rotations (>70%), found the host institution's medical student evaluation forms adequate.

Institutions with more didactic rotations, adjustments had to be made to pre-existing evaluations allowing for more personalized feedback. Emphasis was placed on assignment completion, skills assessment, presentation quality, and formal testing with written quizzes to assess knowledge retention.

Course assessment was done through surveys and exit interviews to determine what activities worked well and what activities need to be changed.

Discussion

In reviewing the use of virtual rotations, some lessons and best practices have been learned. One of the biggest challenges that faced students and faculty was communication. In particular, the larger, more didactic programs found that coordinating last-minute changes was difficult and having a plan in place to mitigate any missed meetings was crucial. A few potential solutions are:

1. Set the schedule in advance and have a no-cancellation policy.
2. Limit the student population to ease communication and coordination.
3. Maintain a central messaging center on an online platform such as Canvas (Salt Lake City, UT).

Another obstacle was General Medical Education requirements for approval of the rotation as either a clinical or didactic rotation for academic credit. The timeframe to completion of authorization varied across programs from five months to as little as four weeks. Regardless of the timeline, significant input from the development team was needed to provide a curriculum, find a secure teleconference platform, obtain adequate support from the IT department for live streaming of operating room cases, and gain legal approval for patient interaction and EMR access.

Although it can be challenging to implement a virtual rotation, programs spending at least two weeks with the virtual students found it to be beneficial in getting to know their prospective applicants. One program director stated that they “never had a more concentrated experience of medical students in my career”. As a result, many of the programs were able to write letters of recommendation for these students.

The cost of a virtual rotation is significantly lower for a medical student versus an in-person experience. This is an important determinant as most medical students applying to competitive surgical specialties perform more than two away rotations during their 4th year, which average \$2,000.¹⁰ The only costs associated with virtual rotations are the application and institution fees, as well as any materials that may be needed. Many programs severely reduced or waived their fees for the initial implementation of virtual rotations.

Future applications, post-pandemic, for virtual rotations could be early vascular surgery exposure in the first two years of medical school. Giving pre-clinical medical students an early

introduction to vascular surgery will assist with making career choices. Other opportunities that these virtual platforms offer include mentorship to both international and domestic medical students that do not have vascular programs at their institutions.

Conclusion

Virtual vascular surgery rotations are feasible and important; these electives can be established and implemented successfully with appropriate planning and consideration. This work hopes to help programs navigate this new space in education by making it more transparent and highlighting potential pitfalls.

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Tables and Figures

Figure 1-Location of participating programs



Figure 2-Domains and design elements in a virtual vascular surgery rotation

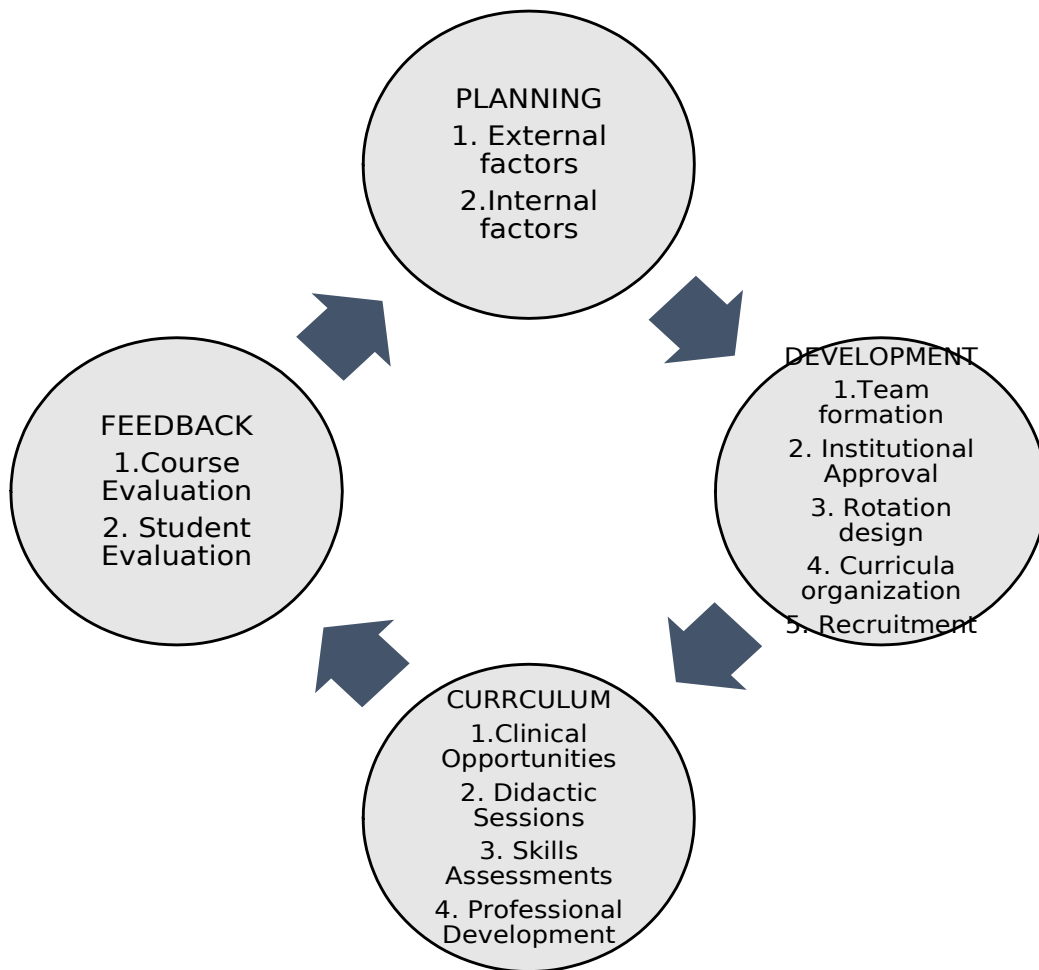


Figure 3- Curriculum development consists of a spectrum of didactic and clinical opportunities with impacts on rotation development.

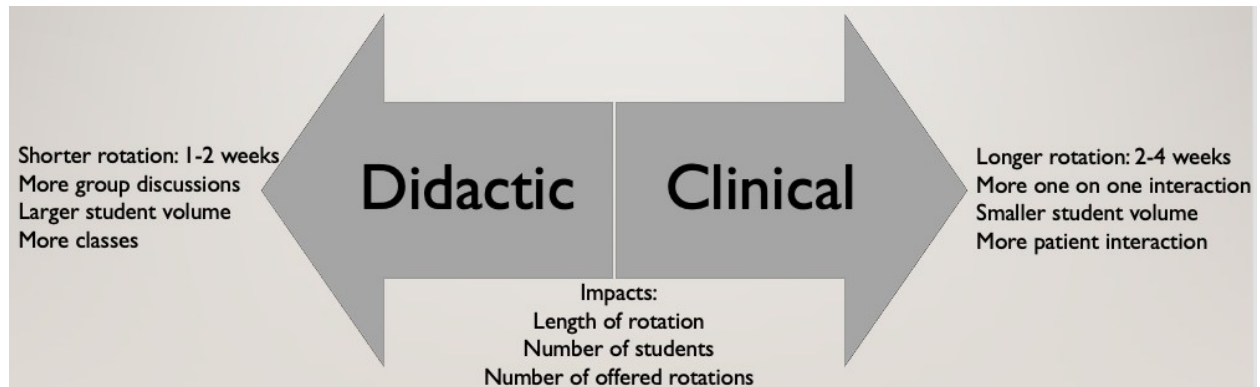


Table 1. Existing Education Experiences and Additional Didactic Opportunities

Pre-Existing	Additional Opportunities
Journal Club	Vascular Foundation Article Reviews
Case Conference	Book Chapter Reviews
Multidisciplinary Rounds	Attending or Resident Lectures
Morbidity and Mortality Conference	Simulated Patient Scenarios
Grand Rounds	Curriculum Vitae Review and Mock Interviews
	Final Presentation on vascular topic or interesting case
	Leadership Development Training Content
	Research Opportunities (i.e.: virtual lab meetings)

Table 2 Types of Skills Assessments for a Virtual Curriculum

Skill	Equipment	Assessment	Availability
Hand tying	String, shoelace, or suture material	Speed and accuracy of 1 and 2 handed knot tying	Readily available resources
Skin Suturing	Needle driver, forceps, suture, suture board, simulated tissue, or animal skin	Hand positioning, instrument tying, proficiency of different knot types	Attainable from school or medical center
Anastomosis Suturing	Castroviejo or other needle driver, suture, forceps, suture board, graft/anastomosis material	Needle placement on vessel, adequacy of suture line, efficiency of motion	May require materials being purchased or sent to student

Table 3 Didactic versus Clinical Curriculum Resources and Experiences

Resources	Didactic Emphasis	Clinical Emphasis
EMR access	Not mandatory	Mandatory
Books, Journals and Articles	Basis of curriculum	Only included if part of regularly scheduled resident didactics
Skills sessions	Included, usually simple for group setting	Included, more one on one and advanced
OR Livestream	Not included	Helped maintain clinical time requirement
Teaching sessions	Daily to 3 times a week	Only included if part of regular resident education

Virtual Rounds	Was included but limited due to lack of EMR access	Daily and was part of mandatory student participation
Virtual Clinic	Not included	Included at least once a week with a dedicated attending
Final Presentation	Included as part of assessment	Included if part of in person student curriculum
Virtual Social Hour	Included	Heavy resident experience with clinical emphasis, typically did not need additional time
Length of rotation	1-4 weeks	2-4 weeks
Number of students per rotation	4-8	1-4
Evaluation	Adaptation to original evaluation due to lack of clinical feedback	Can use original medical student evaluation form