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Teamwork at the Bench: Strategies for Collaborative Surgical Science in a Pandemic

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ABSTRACT

The Center for Basic and Translational Science was formed to address the unique challenges faced by surgeon-scientists. Shortly after its inception, COVID-19 upended research workflows at our institution. We discuss how the collaborative Center for Basic and Translational Science framework was adapted to support laboratories during the pandemic by assisting with ramp-down, promoting mentorship and community building, and maintaining research productivity.
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Inception of CBATS

Surgical science is complex and interdisciplinary, increasingly so in the rapidly changing and competitive world of basic science. Calls for increased collaboration are frequent, but difficult to put into practice.1-3 In particular, surgeon-scientists face additional challenges to collaborative work: they have substantial clinical commitments compared with physician-scientists in other disciplines and often encounter a less robust mentoring environment. At the University of Michigan, the Center for Health Outcomes and Policy reaped tangible rewards for health service researchers by intentionally bringing investigators into a creative community focused on shared resources, structured mentorship, and collaborative development of both projects and investigators.4 The Center for Health Outcomes and Policy has developed into a consortium of clinicians, epidemiologists, economists, and sociologists that researches health care quality. Regular interdisciplinary meetings create a dynamic research environment and multiple opportunities for...
sharing expertise. The center has established a track record of extramural funding, leadership development, and academic productivity. A new junior faculty–led initiative, the Center for Basic and Translational Science (CBATS), envisioned the opportunity to bring these collaborative lessons to the basic science community to establish a learning environment and center of excellence.

CBATS is led by clinically active junior faculty surgeon-scientists, the vice chair of research, and coordinated by an institutionally experienced senior scientist. After meeting with stakeholders including department leaders and the chair of surgery, the CBATS faculty leaders were given departmental support to pilot the program, and it has since been incorporated as one of three major research centers in the Department of Surgery. The first step was needs assessment via a town hall attended by over 50 researchers within the department. Scientists identified three main needs: grant review, mentorship at all career levels, and collaboration using shared resources or skill sets.

Early successes of CBATS included establishment of weekly well-attended “research in progress” grant review meetings, where a diverse mix of surgeon-scientists and PhD scientists receive high-quality review and critique of their specific aims’ pages from an average of 20-25 members drawn from acute care, colorectal, pediatric, vascular, thoracic, plastic, trauma, orthopedic, and oral maxillofacial surgery. To date, six R01 proposals, two K08 proposals, and one F32 resubmission proposal have been reviewed. Of these, the F32 was substantially revised after the grant review session and was successfully funded after resubmission. One R01 and one K08 are currently under review by the NIH, and three R01 proposals are planned for submission in upcoming cycles.

In addition, CBATS created multidisciplinary mentorship “launch teams” for CBATS fellows. These teams are composed primarily of faculty and focus on career development for the fellow. Together, launch teams identify short-term and long-term goals that align with the CBATS fellow’s career vision, using faculty support and perspective to augment the

Fig – The organization chart of key CBATS members. (Color version of the figure is available online.)
trainee’s principal mentor. To further provide social connections that may lead to more sustained mentoring relationships, CBATS also held combined educational and social events. Shortly before the COVID-19 pandemic, CBATS members gathered for dinner at a local restaurant for a roundtable discussion on starting up a laboratory. Principal investigators (PIs) who were in early, mid, and late career all joined in the discussion which afforded early career scientists an opportunity to openly discuss common issues faced when establishing a laboratory.

To support and organize this work, we created centralized lists of 133 laboratory personnel including research faculty, CBATS fellows (surgical research residents and postdoctoral fellows), and technical staff across 33 laboratories (Figure). These simple efforts were novel in our otherwise siloed basic research community and unexpectedly proved critical in the laboratory response to the pandemic. By meeting regularly to discuss research in progress and by promoting social as well as professional ties, we hope to foster more collaboration between laboratories.

Barely into its first 3 mo of existence, CBATS faced the stress of the COVID-19 pandemic. While staying true to our mission, we knew we would also need to expand our support and guidance to the basic science community which faced the unprecedented challenge of ramping down research department-wide. We first held a group coaching session to share coping strategies for working in crisis. In addition, we took on the responsibility to facilitate laboratory ramp-down in accordance with central guidelines, to keep our nascent community together and supported, and to maintain academic productivity.

**COVID-19 and laboratory ramp-down**

The first cases of COVID-19 in Michigan were confirmed on March 10, 2020. In accordance with state-level mandates, the university-wide research enterprise was given five business days to ramp down. Guided by the University of Michigan’s Office of the Vice President for Research (OVPR), the first priority was to protect people while safely, but dramatically slowing down research. In practice, this meant strategically reducing laboratory animal populations, destroying perishable experiments such as cell and tissue culture, rapidly pre-

**Focus on the mission**

After accomplishing the ramp-down, CBATS focused on delivering its mission now as a virtual professional network. Our members were physically isolated from colleagues, unable to perform new experiments, jolted from typical routines, and saddled with new burdens at home. We prioritized mentoring vulnerable trainees, maintaining community, and supporting academic productivity. Launch teams swapped to online formats, supporting isolated fellows with group mentorship. Interdisciplinary "research-in-progress" sessions continued weekly on a virtual platform, in some cases with record high attendance. These sessions made it clear that dynamic groups can exist online.

For laboratories that were forced to scale down research experimentation, the focus shifted to preparing grants and manuscripts. To help maintain productivity, we started a writing accountability group, which involved a scheduled two-hour online Zoom meeting, whereby CBATS members signed on to work on projects. Although discussion was minimal, most members kept on their cameras to see their colleagues working on the computer, mimicking a "study hall" atmosphere. These meetings occurred daily and were well attended by researchers from across the department until ramp-up allowed members to return to the laboratory more regularly again. Participants found the routine and solidarity helpful to complete writing assignments and start new work.

Weekly online meetings for technicians limited isolation and complemented the information provided by each laboratory PIs, as well as provide a forum to discuss guidelines that were constantly changing and at times seemingly contradictory. To promote self-education, we posted virtual basic
science sessions, an RNA-seq curriculum, and R programming course to our file-sharing system.

Finally, CBATS helped clinically busy faculty avoid a productivity delay after initiation of ramp-up by proactively completing over 50 documents to date including Institutional Review Board, Institutional Biosafety Committee, and Institutional Animal Care and Use Committee compliance paperwork. New lab staff were assisted in the completion of OSHA-compliant safety training while on lock down, so they could resume immediately after ramp-up began. Ramp-up is being executed in a rolling and stepwise fashion: one new building at a time was chosen every 2 weeks to start the ramp-up process, with laboratories initially starting at 30% capacity. Laboratories then proceed to 45% capacity using shift work to minimize number of personnel in the laboratory at any given time. Currently, our most of the laboratories in our institution are operating at 60% capacity. Every time a laboratory seeks to increase capacity, a new set of compliance documents are needed for approval, and CBATS continues to assist with collating and submitting these forms.

Lessons learned

Surgeon-scientists are challenged by heavy clinical commitments and often lack of mentorship. CBATS was initiated on the belief that investment in community can increase efficiency, promote productivity, and help overcome these challenges. CBATS early efforts to support surgical basic science through regular interdisciplinary gatherings, team mentorship, and shared resources paid unexpected dividends in the COVID-19 crisis. Early frameworks for collaboration allowed for a coordinated ramp-down, continued community building, supported efforts to maintain productivity, and ongoing mentorship of trainees. In retrospect, a more siloed system might have led to time-consuming, inefficient work as CBATS organizational effort was replicated in every individual laboratory. After ramp-down, faculty, staff, and trainees could have become isolated and unproductive. Connection to colleagues and meaningful work were touchstones, and we plan to use technology to bridge the gaps inherent in physically separated laboratories even after COVID-19. As our laboratory infrastructure gradually ramps up in the wake of the pandemic, CBATS resources are again repurposed to support this effort.Moving forward, the lessons of the COVID-19 crisis will encourage us to act as a unique hub for information, to maintain and improve our central resources, to foster group support for writing and grantsmanship, to increase our commitment to trainees, and to continue to support surgeon-scientists as a dynamic community in our department.

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Disclosure

The authors have no conflict of interest to disclose.

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