

**METHODS/STUDY POPULATION:** Duke offers 2 programs to support researchers: Research Navigation and Researcher Onboarding. The services aim to connect researchers to resources, offices, funding opportunities, and other collaborators. The general Research Navigation Service is an on-demand “hotline,” where navigators answer questions from researchers across the institution, helping them understand processes, best practices, and how to locate resources or potential collaborators. Navigators can be reached via the myRESEARCHhome portal, email, or by phone. The researcher onboarding program is a free 1:1 consultative service, focused on the researcher’s individual portfolio, stage of career, and immediate plans in the research arena. The goal is to equip researchers “from the start” to be successful. Researchers are identified via the new faculty hire list, or by referral. Both services are provided by the myRESEARCHnavigators team, who are trained in a variety of research areas, from basic to clinical to social sciences, and are familiar with Duke. **RESULTS/ANTICIPATED RESULTS:** Use of both services has increased substantially over the year. Of the almost 200 faculty members hired into the School of Medicine in 2017, ~75% have taken part in the onboarding program, and 91% have rated the service as 5-stars. The content of the sessions will be described. The Research Navigation service has fielded hundreds of calls since its inception, with topics including Equipment and Facilities (55 requests), Study start up (44 requests), Innovation and Technology (15 requests), and Regulation and Policy (25 requests). Categorization of requests, users of the services, and other information about the programs will be described. **DISCUSSION/SIGNIFICANCE OF IMPACT:** The navigation and onboarding services are proving to be a successful way to increase efficiency and understanding of processes and resources across the institution. Feedback from the users, coupled with high referral rates to the programs, suggests that the program is helping researchers feel better equipped with regard to their research planning, conduct, and analysis.

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### Respiratory therapists’ awareness and intention to use the electronic modified early warning score (eMEWS)

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**OBJECTIVES/SPECIFIC AIMS:** To determine if an educational intervention designed to increase respiratory therapists’ knowledge of the modified early warning score (MEWS) would influence their intention to use the MEWS. **METHODS/STUDY POPULATION:** A web-based self-administered survey based on the constructs of the TAM as well as awareness, attitude, and job-relevance was developed and validated using traditional scale development process and distributed to 75 respiratory therapists (RTs) from the respiratory care department of Rush University Medical Center. RTs were recruited for participation in the study using consecutive sampling. The RTs were then given a training session on the MEWS after which they were again asked to complete the survey. **RESULTS/ANTICIPATED RESULTS:** The response rate to both the pre and post survey was 60 percent. Of the 46 participants recruited to the study, the educational intervention elicited an increase in the MEWS knowledge score in 45 participants compared with the knowledge score prior to the educational intervention. Additionally, there was an increase in the behavioral intention score post intervention in 30 participants compared with the behavioral intention score before the educational intervention. A Wilcoxon signed-rank test determined that there was a statistically significant median increase in MEWS knowledge score (2.0) post educational intervention (4.0) compared with pre-educational intervention (2.0),  $p < 0.0005$ . There was also a statistically significant median increase in behavioral intention score (0.667) pre-educational intervention (4.0) compared with posteducational intervention (3.0),  $p < 0.0005$ . **DISCUSSION/SIGNIFICANCE OF IMPACT:** Numerous studies over the last 4 decades have demonstrated that change in behavioral intention is a good predictor of change in behavior. Consequently, the increase in the respiratory therapists’ behavioral intention score post MEWS education suggests that they may be more inclined to incorporate the MEWS score in their assessment of patients if they are educated about its clinical relevance. Additionally, the study results verified key postulates of the TAM, suggesting that the TAM is an appropriate model for assessing respiratory therapists’ perception and reaction to new systems, and may also help respiratory care managers develop new mechanisms that facilitate respiratory therapists’ adoption of new systems and processes.

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### Selectives: Implementing self-directed collaborative selectives as part of a curriculum for pre-health care professional students

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**OBJECTIVES/SPECIFIC AIMS:** To provide students an opportunity to select health care-oriented course work that reflects both their interests and the increasingly diverse spectrum of health professions education and health care careers. To increase the opportunity for students to enter professional schools and health care professions with enhanced engagement and experience. **METHODS/STUDY POPULATION:** The 4-credit elective (Selective) curriculum is a component of the 38 credit Duke School of Medicine Master of Science in Biomedical Sciences (MBS) program which is completed over 10.5 months. Students work closely with their advisors to choose activities that reflect their interests. Selectives are offered by an array of schools, institutes, and programs within Duke University, including: the School of Medicine, School of Law, Global Health Institute, Bioethics and Science Policy Master Program, Clinical Research Training Program, Center for Documentary Studies, and Medical Informatics. Students may also pursue directed studies in areas such as health policy, or an inter-professional trip to Honduras. In addition to the course-based Selectives, three research practicum options are offered: Community Engagement, Clinical Research (Duke Office of Clinical Research), and a self-selected mentored research experience. Finally, the MBS program offers 2 in-house specific Selectives: Fundamentals of Learning: Theory and Practice, and Planning for Health Professions Education. **RESULTS/ANTICIPATED RESULTS:** The MBS program accepted its first cohort of students in June 2015. Two cohorts have graduated and the third has begun ( $n = 30$ , 2016;  $n = 42$ , 2017;  $n = 43$  enrolled, 2018). Our students come from diverse background with a third from populations historically underrepresented in STEM due to race/ethnicity, and another third underrepresented due to other factors such as low socioeconomic status, first generation to college, LGBTQ, and those from rural and immigrant communities. Thus far, Selective distribution has been: Clinical research practicum (7, 2016; 14, 2017; 9, 2018); Mentored research practicum (2, 2016; 1, 2017); Community engagement practicum (7, 2016; 4, 2017; 5, 2018); Planning for health professions educations (14, 2016; 32, 2017; 33, 2018), Fundamentals of learning: Theory and Practice (7, 2016; 17, 2017; 18, 2018); documentary film (1, 2016); inter-professional trip to Honduras (2, 2016, 2, 2017). Since the implementation of the curriculum, at least 53 of 70 students who have applied (76%) were admitted to health professions or other graduate schools despite having lower initial MCAT and undergraduate GPAs in aggregate than the average of students who matriculate to allopathic medical school programs: 41 to medical schools, 3 to dental school, 2 each to osteopathic and physician assistant schools and 1 each to physical therapy, business school and law school. Eighteen of the 2016 graduates, and 21 of the 2017 graduates work in research for their gap year following graduation, the majority being employed in our institution’s research programs providing a pipeline of trained research assistants and coordinators. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Lessons learned by implementing our curriculum include the following: (1) students are eager to explore different areas of health care; (2) collaboration across schools, centers, departments, institutes, and offices increases our ability to identify common areas of interest; (3) implementing a diverse curriculum can be challenging due to the need for significant organization and planning; (4) the diversity of courses can be a source of confusion when there is a lack of standardization in learner expectations; (5) continued collaboration across, schools, centers, institutes programs, health professions and sections requires a significant amount of time and expertise. However, our programs demonstrate significant positive impacts both on students and at the institutional level. Our program shows that a diverse curriculum leads to a high number of students engaged in pursuing and successfully continuing a health profession education. Institutional benefits include a robust pipeline for a diverse research workforce.

2017

### Sowing the “CEED”s of a more diverse biomedical workforce

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**OBJECTIVES/SPECIFIC AIMS:** The need to diversify the biomedical research workforce is well documented. The Career Education and Enhancement for Health Care Research Diversity (CEED) program at the University of Pittsburgh Institute for Clinical Research Education (ICRE) promotes success and helps seal the “leaky pipeline” for under-represented background (URB) biomedical researchers with a purposefully designed program consisting of a

monthly seminar series, multilevel mentoring, targeted coursework, and networking. **METHODS/STUDY POPULATION:** Over 10 program years, we collected survey data on characteristics of CEED Scholars, such as race, ethnicity, and current position. We created a matched set of URB trainees not enrolled in CEED during that time using propensity score matching in a 1:1 ratio. **RESULTS/ANTICIPATED RESULTS:** Since 2007, CEED has graduated 45 Scholars. Seventy-six percent have been women, 78% have been non-White, and 33% have been Hispanic/Latino. Scholars include 20 M.D.s and 25 Ph.D.s. Twenty-eight CEED Scholars were matched to non-CEED URB students. Compared with matched URB students, CEED graduates had a higher mean number of peer-reviewed publications (9.25 vs. 5.89;  $p < 0.0001$ ) were more likely to hold an assistant professor position (54% vs. 14%;  $p = 0.004$ ) and be in the tenure stream (32% vs. 7%;  $p = 0.04$ ), respectively. There were no differences in Career Development Awards ( $p = 0.42$ ) or Research Project Grants ( $p = 0.24$ ). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Programs that support URB researchers can help expand and diversify the biomedical research workforce. CEED has been successful despite the challenges of a small demographic pool. Further efforts are needed to assist URB researchers to obtain grant awards.

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### Teaching rigor, reproducibility, and transparency using gamification

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**OBJECTIVES/SPECIFIC AIMS:** The objectives for the Rigor, Reproducibility, and Transparency course within KAIZEN-Edu was to provide a platform that allows essential training, in a novel and customizable approach, for a large number of students across the multiple institutions within the UAB CCTS Partner Network. Successful implementation across this geographically diverse of partner institutions would serve as proof of concept to future dissemination across the CTSA consortium. **METHODS/STUDY POPULATION:** We used the “build a game” tools within Kaizen-Edu to design the “Rigor and Reproducibility Game.” The games consisted of four modules, with 20 questions designed to test participant knowledge, and edify learners on particular concepts through a multimedia approach (embedded video, text, and hyperlinks to articles) with content provided as questions released over 4 weeks. Researchers from across the UAB CCTS Partner Network developed comprehensive modules for (1) How Scientists Fool Themselves/Scientific Premise, (2) Authentication of Chemical and Biologic Resources and Sex and Other Biologic Variables, (3) Statistical Rigor, and (4) Comprehensive Review. A typical week began with review articles (1–2) sent to each participant. The participants are informed that 5 questions will be released midweek testing the key concepts from the papers. When ready, the participant logs into Kaizen-Edu and starts to answer questions/play the game. Immediately, the articles are opened for reference, followed by a brief 4–5 minute video which reinforces key concepts and then timed questions begin. A typical question is allowed 3 minutes (visible countdown clock). Accurate responses result in the addition of points, with double points awarded for correct answers within the questions time limit. No points are awarded for incorrect answers. After each question, a detailed explanation reviews and reinforces the key concepts. Each participants' points contribute to both their individual score and team scores, which influences their position on the Rigor and Reproducibility game leaderboard. **RESULTS/ANTICIPATED RESULTS:** Within 2017, the Rigor Reproducibility, and Transparency course was conducted 5 times. A total of 126 researchers across 9 institutions were enrolled. A total of 87 enrollees completed the full course, with 80% passing (answering  $\geq 75\%$  of questions correctly) on their first attempt and an additional 20% passing on a second attempt. The distribution of completers across the CCTS Network was UAB = 48, Auburn = 13, Pennington = 10, University of Alabama = 5, Hudson Alpha = 5, Tulane = 4, University of South Alabama = 1, LSU = 2, and Southern Research = 1. Researchers throughout at Partner Institutions represent 46% of the total population trained. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This software based, gamification-enhanced course was broadly accepted with each session fully enrolled, and learners spread almost evenly between our institution and various Partner Network sites. Our pilot proved that gamification was an effective technique to engage users and produced a high pass rate, suggesting that the content both engaged learners and was effectively internalized. Educational interventions, imbued with principles of gamification provide educators powerful tools that use competition and/or collaboration to disseminate knowledge, engage learners with content, and save educator time as created game content can be reused in additional educational sessions. Analyses of the data trail provided by users engaging with such electronic learning tools will provide educators will insights on how to maximize learning, opening the door to an era of educational analytics.

2007

### The clinical research operations program: Educating clinical research staff

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**OBJECTIVES/SPECIFIC AIMS:** The Clinical Research Operations Program is a free educational program designed to educate clinical research personnel on the conduct of clinical research (CR). The participant completes 16 required core sessions (24 h), 4 elective sessions (4 h), and passes the final exam to receive a certification in CR operations at Stanford. Sessions focus on the 9 domains of CR (established by the Joint Task Force for Clinical Trial Competency), such as Ethical & Participant Safety Considerations, Clinical Study Operations, & Data Management/Informatics. **METHODS/STUDY POPULATION:** Sessions are taught by volunteer lecturers. Participants may also attend the sessions without pursuing the certification. The program objective is to provide easy-access education in CR in order to increase regulatory compliance, staff retention, and improve CR at Stanford. The program targets CR coordinators, however, staff, postdocs, fellows, and faculty also participate. **RESULTS/ANTICIPATED RESULTS:** Since the program's launch in January 2017, 119 individuals have enrolled in the certification program. The most represented group is the Department of Medicine. Sessions consistently reach their maximum with a waiting list. Each core session requires that the participant complete an evaluation (Likert scale, 1–5) of the registration process (4.5/5), the class environment (4.6/5), the presented content (4.5/5), and the instructor (4.6/5). Data from these evaluations are positive to date and is used to continually refine the program. **DISCUSSION/SIGNIFICANCE OF IMPACT:** N/A.

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### The leveling of clinical research competencies

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**OBJECTIVES/SPECIFIC AIMS:** Objectives/goals: Describe the process used to develop leveled competencies and associated examples. Discuss the final leveled competencies and their potential use in clinical research professional workforce initiatives. **METHODS/STUDY POPULATION:** The revised JTFCTC Framework 2.0 has 51 competency statements, representing 8 domains. Each competency statement has now been refined to delineate fundamental, skilled or advanced levels of knowledge and capability. Typically, the fundamental level describes the competency for a professional that requires some coaching and oversight, but is able to understand and identify basic concepts. The skilled level of the competency reflects the professional's solid understanding of the competency and use of the information to take action independently in most situations. The advanced level embodies high level thinking, problem solving, and the ability to guide others in the competency. The process for developing both the three levels and examples involved 5 workgroups, each chaired by a content expert and comprising of national/international clinical research experts, including representatives from research sites, professional associations, government, and industry and academic sponsors. **RESULTS/ANTICIPATED RESULTS:** The committee developed 51 specific competencies arrayed across 3 levels and examples of each to demonstrate an appropriate application of the competency. The competencies and examples, and potential utilization, will be described. **DISCUSSION/SIGNIFICANCE OF IMPACT:** The use of competencies in the context of workforce development and training initiatives is helping to create standards for the clinical research profession. These leveled competencies allow for an important refinement to the standards that can be used to enhance the quality and safety of the clinical research enterprise and guide workforce development.

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### The need for an evidence-based CTS specific IDP for early career training and for a long-term and sustainable career in clinical translational sciences

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**OBJECTIVES/SPECIFIC AIMS:** To establish a conceptual framework to develop a CTS-IDP with data analytics, and an e-Learning Faculty Development Guide on