and other types of evidence syntheses are best when collaborative teams with expertise in multiple disciplines participate, including content experts, librarians and information specialists, systematic review methodologists, and statisticians. The Center for Clinical & Translational Science (CCTS), due to its interdisciplinary nature, connectivity to clinical experts, and existing Cores of methodologists, presented an opportune location for a Systematic Review Core. We designed the Systematic Review Core to focus on 2 primary aspects of evidence synthesis support: overall systematic review methodology guidance and in-depth information retrieval planning and execution. After establishing a conceptual partnership, a new position, Evidence Retrieval and Synthesis Librarian, was created to build capacity within the Core. RESULTS/ANTICIPATED RESULTS: Close connections with the CCTS's Population Health Research Foundation have led to better interdisciplinary coverage of systematic reviews and other evidence syntheses produced by the University of Utah. We are able to partner with statisticians and clinical experts from formulating the question to completing the final manuscript. Hourly rates charged through a cost recovery model have enabled us to grow our staff able to work on the Core, as well as offset costs for major databases and resources these bibliographic data-heavy research methods require. After 1 year of existence, the Core is already at maximum capacity, with no sign of slowing. Projects have ranged from brief consultations to highly intense interactions for the duration of the research spectrum. We have also been added as key personnel to grants with systematic review components. DISCUSSION/SIGNIFICANCE OF IMPACT: Systematic reviews and other evidence syntheses are a labor-intense, interdisciplinary team effort that fit well within the scope of CTSA's. They are a key component of the translation of science to practice, and can be used at all stages of the translational science spectrum. Quality of systematic reviews remains poor, particularly surrounding protocol development, sensitive search strategy design and reporting, and overall reporting. Librarians and information specialist involvement has been shown to positively correlate to the search strategy design and reporting aspects of systematic reviews, and librarians and information specialists increasingly act as systematic review methodologists. By including librarians and information specialists as part of the CTSA's official Core structure, these systematic review methodologists are able to connect with statisticians, other methodologists, and clinical experts in a nexus of interdisciplinarity. At the University of Utah, the visibility and structure provided by the CCTS helps the Systematic Review Core with promotion, creating connections and opportunities for collaboration across the campus. This partnership has already led to increased uptake in services, and over time, we believe it will increase the quality of the science produced. CTSA's have a natural partner with their health science library colleagues in translational science, as shown by this model.

2053

Evaluating impact of CTSA usage on research productivity outcomes

Yue Zang, Tom Greene, Trent Matheson and Erin Rothwell

OBJECTIVES/SPECIFIC AIMS: In this study, we propose to investigate effectiveness of 2 core services provided by the Center for Clinical and Translational Science (CCTS), home for CTSA program in the School of Medicine at the University of Utah. METHODS/STUDY POPULATION: We will apply a longitudinal database of research and tenure track faculty ($n > 600$) in the School of Medicine at the University of Utah from 2006 to 2016 to estimate the effect of initial usage of the biostatistics and clinical services cores of the University of Utah CCTS on the probability of (a) ≥ 1 peer reviewed publication, (b) external grant funding, and (c) academic promotion within 1, 2, and 3 years after the initial contact. We will apply a "new users" design (Hernan *et al.*, *Epidemiology*, 2008; 19: 766–779) to compare the outcomes of faculty initiating use of the 2 CCTS cores Versus faculty without prior use of these cores in a series of cohorts defined by the calendar year of initial contract with the
2 cores, with covariate adjustment performed within each cohort to account for measured confounders. Separate outcome models will be specified for each cohort, but the statistical models will be fit to stacked augmented data sets which include the data from each cohort. Using the stacked data set, results will be pooled across each of the cohorts to increase statistical power. Robust sandwich estimates of standard errors will be used to account for the inclusion of multiple assessments for each faculty member. RESULTS/ANTICIPATED RESULTS: Estimates of the effect of initiation of new CTSA usage on academic productivity outcomes will be obtained, and provided in conjunction with sensitivity analyses to address the potential impact of uncontrolled confounding. DISCUSSION/SIGNIFICANCE OF IMPACT: The proposed evaluation strategy should overcome some of the biases inherent in typical metrics for effectiveness of CTSA programs, and will be applied to evaluate success of future initiatives.

2068

Expanding capacity for Clinical and Translational Science by investing in research staff through the strategic teamwork for effective practice-mentor development program (STEP-MDP)

Christine Marie Denicola, Lisa Altshuler and Sondra Zabar
General Clinical Research Center, New York University, New York, NY, USA

OBJECTIVES/SPECIFIC AIMS: Skillful research staff members are critical to productive translational research teams and yet their ongoing professional development is rarely formally addressed. Through the Strategic Teamwork for Effective Practice-Mentor Development Program (STEP-MDP), we aimed to both create a community of practice (COP) for research staff and build the skills needed to enhance research team performance. METHODS/STUDY POPULATION: We selected 16 participants of 32 staff-level applicants from among the NYU Schools of Medicine, Social Work and Nursing for the first STEP-MDP cohort. Participants included research assistants, coordinators, managers, and directors. We delivered 3, two-hour workshops, scheduled 3 weeks apart, focused on team communication, identifying team areas for improvement, and mentorship/coaching skills. Peer-Coaching Teams (PCTs) were created by pairing participants at the same position level, and PCTs worked together at each session to explore and practice learned skills. Sessions featured brief didactics, group-based learning and exercises based on participants' real issues. A variety of active learning techniques such as brainstorming, role-playing, problem solving, and peer coaching were used. Practical core readings, worksheets, and summary cards were provided. PCTs met between sessions to practice coaching skills, and troubleshoot problems. RESULTS/ANTICIPATED RESULTS: Participants ($n = 16$) completed a 37-item retrospective pre/post self-assessment of team behaviors and skills, and a STEP-MDP evaluation survey at the end. We saw pre-post improvements in each of 5 self-assessment domains: Communication (4 items, pre-mean 2.66, post mean 3.36, $p \leq 0.001$), Leadership (8 items, pre-mean 2.76, post mean 3.55, $p \leq 0.001$), Empowerment and Motivation (12 items, pre-mean 2.86, post mean 3.51, $p \leq 0.001$), Coaching (6 items, pre-mean 2.40, post mean 3.58, $p \leq 0.001$), and Community (3 items, pre-mean 2.33, post mean 3.76, $p \leq 0.001$). On average, PCTs met twice (range 2–4 times) between workshop sessions. Learners valued the PCTs, and 1 commented on the value of working with peers in PCTs, having no one in a similar position within his immediate work environment. Participants' written comments strongly endorsed the value of the workshops for their work, with the coaching skills session seen as the most valuable. Some participants worry that skills will decrease over time without continued reinforcement. All but 1 participant reported that they planned to continue with the PCT. DISCUSSION/SIGNIFICANCE OF IMPACT: The number of applicants to our program suggests a need and motivation for staff to participate in the STEP-MDP. Participants' reported improved skills and sense of community. To maintain the COP and address worry about degradation of skills we are planning to remind PCTs to meet once a month and will follow-up with them 3 and 6 months post intervention to evaluate their continued development. This spring a second cohort will receive the training. We believe developing these core teamwork skills will lead to more collaborative, efficient, and innovative research. We have implemented a successful program targeting critical members of research teams with potential to facilitate expansion of institutional capacity for translational research. It will be important to understand the long-term impact of the program on individuals, on team science, on research, and ultimately on the health of the public.

2069

Competency indices for clinical research professionals

Carlton Hornung, Carolyn Thomas Jones, Terri Hinkley, Vicki Ellingrod and Nancy Calvin-Naylor

OBJECTIVES/SPECIFIC AIMS: Clinical research in the 21st century will require a well-trained workforce to insure that research protocols yield valid and reliable results. Several organizations have developed lists of core competencies for clinical trial coordinators, administrators, monitors, data management/informaticians, regulatory affairs personnel, and others. While the Clinical Research Appraisal Inventory assesses the self-confidence of physician scientists to be clinical investigators, no such index exists to assess the competence of clinical research professionals who coordinate, monitor, and administer clinical trials. We developed the Competency Index for Clinical Research Professionals (CICRP) as a general index of competency (ie, GCPs) as well as sub-scales to assess competency in the specific domains of Medicines Development; Ethics and Participant Safety; Data Management; and Research Methods. METHODS/STUDY POPULATION: We analyzed data collected by the Joint Task Force on

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the Harmonization of Core Competencies from a survey of research professionals working in the United States and Canada. Respondents reported how competent they believed themselves to be on 51 clinical research core competencies. Factor analyzes identified 20 core competencies that defined a Competency Index for Clinical Research Professionals—General (CICRP-General, ie, GCPs) and 4 subindices that define specialized research functions: Medicines Development; Ethics and Participant Safety; Data Management; and Research Concepts. RESULTS/ANTICIPATED RESULTS: Factor analysis identified 20 core competencies that defined a Competency Index for Clinical Research Professionals—General (CICRP-General, ie, GCPs) and 4 subindices that define specialized research functions: Medicines Development; Ethics and Participant Safety; Data Management; and Research Concepts. DISCUSSION/SIGNIFICANCE OF IMPACT: These indices can be used to gage an individual's readiness to perform general as well as more advanced research functions; to assess the education and training needs of research workers; and to evaluate the impact of education and training programs on the competency of research coordinators, monitors, and other clinical research team members.

2124

Three stages of cultural change in translational science

Joseph A. Kotarba

OBJECTIVES/SPECIFIC AIMS: This report describes the evolution of scientific culture since the NIH/translational science (TS) mandate. The transition of the conduct of science to an increasingly translational model involves 2 dimensions of change. The first dimension consists of change in the structure and process of scientific work, in terms of factors such as funding, administration, application of new knowledge, and so forth. The second dimension consists of change in culture of scientific work. The culture of science is the set of values, assumptions, meanings, and traditions that inform the conduct of science. As part of the comprehensive evaluation of TS at the University of Texas Medical Branch-Galveston, we have monitored the status of the culture of science there through a sociological framework. We focused on the ways the changing culture of science facilitates and/or inhibits creative and effective medical research. We argue that the long-term success of TS is dependent upon the evolution of assumptions, everyday practices, and taken-for-granted ways of conducting research. Culture also provides meanings for who its people are and helps us define who we are to ourselves (ie, self-concept). In terms of the scientific enterprise, self-identity provides the motivation to participate in group activities or to be content with being a "lone ranger" researcher; the orientation to be either a leader or a follower; the security to take creative chances with one's work or to simply conduct "normal science"; and the sense of esteem for being the best or simply doing one's job. TS requires a constant "reengineering" of its total enterprise. Consequently, we raised the following research questions: (1) What is the traditional culture of science at UTMB? (2) How has the culture of science at UTMB changed since the introduction of the Clinical and Translational Science Award project? (3) What has been the relationship between the culture of science and the conduct of science at UTMB since CTSA? (4) How have cultural influences on self-concept changed? METHODS/STUDY POPULATION: Data have been collected by means of ongoing 1-on-1 interviews with CTSA participants at all levels; observations of lab and classroom interaction; participation in organizational and planning committees; and other everyday organizational activities. RESULTS/ANTICIPATED RESULTS: Following the grounded theory method of qualitative analysis and discovery, we found 3 stages of cultural change. Stage 1 is Cultural Invasion of the existing culture at UTMB by the implementation of the CTSA project. Stage 2 is Cultural Accommodation by which internal responses to change follow the normal scientific paradigm. Stage 3 is Cultural Expansion by which the organizational and cultural platform for conducting science has expanded regionally, nationally and cross-disciplinarily. DISCUSSION/SIGNIFICANCE OF IMPACT: Whether a distinct fourth stage emerges depends on such factors as funding and programmatic directives from NIH; the tension between research and clinical demands for resources; and the emergence of junior investigators schooled on the principles of TS.

2134

Integrating Epidemiology and Biostatistics teaching using the case method

Jessica K. Paulus, Angie Rodday and Farzad Noubary

OBJECTIVES/SPECIFIC AIMS: Biostatistics and Epidemiology courses within clinical research or public health training programs are typically developed and taught separately. As a result, students may have trouble in their research outside the classroom, where biostatistical and epidemiological concepts must be well integrated. Case method teaching is a participant- and discussion-centered pedagogical approach that has been used in business and law schools for more than 50 years to improve student learning, yet has taken longer to be adopted in health professional schools. The case method is distinguished by presenting learners with a real-world problem without a single unique solution. Designed to mimic the constraints and incomplete information found in real life, it is an ideal approach for integrating multiple related disciplines. A team of Clinical and Translational Science (CTS) faculty from the Tufts CTSI collaborated to develop a new course that integrates epidemiology and biostatistics disciplines using the case method. METHODS/STUDY POPULATION: We developed an intermediate-level, case-based course integrating epidemiology and biostatistics topics using modern, real-world clinical examples. Recognizing the importance of technical skill building, this intermediate-level Tufts CTS course adopted a hybrid approach, incorporating lecture and in-class laboratory exercises, alongside cases. We surveyed CTS faculty to identify a set of core methodological competencies. These included randomized trials, case-control and cohort studies, confounding, effect modification, propensity scores, linear and logistic regression, and survival analysis. Faculty provided us with clinical questions and deidentified data sets corresponding to these competencies; we also reviewed publicly available data sets. RESULTS/ANTICIPATED RESULTS: CTS faculty collaborated to develop 10 cases (with accompanying data sets) from modern clinical research examples that illustrate the connections between epidemiology and biostatistical concepts. Each case contains a background section, a statement of the core problem, a data set with data dictionary, articles from the primary literature (often the publication of the data set) with discussion questions and in-class lab exercises (R programming). One case presents students with the challenge of whether acupuncture may be an effective therapy for pain associated with chronic headache. Through case activities, students gain experience weighing observational Versus experimental evidence, apply directed acyclic graph theory, and analyze clinical trial data. Qualitative evaluations in 2015 (pilot year) and 2016 indicate students preferred the integrated approach to separate courses, and found the integration facilitated application of methods to their independent research projects. Significant rewards for faculty include cross-disciplinary collaboration, sharpened teaching skills, and engaging with learners in a dynamic classroom environment. DISCUSSION/SIGNIFICANCE OF IMPACT: Despite administrative and pedagogical challenges, a case-based, integrated curriculum offers rewards for faculty and students. The case method may be a useful pedagogical strategy to integrate other closely related topics or courses in translational science to better prepare scholars for the challenges of independent research.

2142

A competency-based approach to redefining clinical research workforce quality and development

Rebecca Namenek Brouwer and Denise Snyder

OBJECTIVES/SPECIFIC AIMS: Describe the process used to develop job descriptions and how this translates into consistent hiring practices. Describe how competencies are used to provide transparency into professional development opportunities. Discuss planned incorporation of competencies into efforts to train the clinical research workforce. METHODS/STUDY POPULATION: These processes were developed at Duke, an academic medical center with over 2000 active clinical research protocols and 300 new clinical trials per year. Over 1000 employees were evaluated for mapping into clinical research positions, with 685 mapping into new research positions (makeup of workforce to be depicted). RESULTS/ANTICIPATED RESULTS: Prior to this initiative, the clinical research workforce was not well-defined. Through the mapping process, employees were mapped from over 80 different positions into 10 (figure), resulting in a workforce that allows for visible career ladders and greater opportunity for development. As the initiative evolves and grows to include competency-driven performance evaluations, training modules, and assessments, we anticipate the ability to see the relationship between the competencies and high-quality clinical research support. DISCUSSION/SIGNIFICANCE OF IMPACT: The use of competencies in the context of workforce development is not new, yet in clinical research, they provide a much-needed framework for an ever-evolving profession. This comprehensive use of competencies throughout a workforce development initiative is key to ensuring strong support of high-quality clinical research.

2151

Using social network analysis to design and evaluate CTSA pilot programs

Therese Kennelly Okraku, Valerio Leone Sciabolazza, Raffaele Vacca and Christopher McCarty

OBJECTIVES/SPECIFIC AIMS: We aim to leverage our analysis of the scientific collaboration network at a research university to design an innovative pilot

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