

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 analyses 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 gauge 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.

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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.

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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

program and foster scientific productivity. We test the impact of creating a new collaboration in a research community, which decreases the average network distance and accelerates the diffusion of information and expertise among the community's investigators. **METHODS/STUDY POPULATION:** We mapped the whole network of co-authorship on publications and co-participation on extramurally awarded grants at the University of Florida (UF) between 2013 and 2015. We used network science methods to identify research communities of investigators who have consistently worked together and/or have other collaborators in common with at least one researcher based in the UF Health Science Center. We selected pairs of communities with (i) similar productivity levels, research interests, and network structures and (ii) no research projects in common. Communities in each pair were randomly assigned to a treatment or control group. In each treatment community, we selected 1 pair of investigators who had not collaborated in the past 3 years and whose connection would maximally reduce average network distance in the community. The pair was provided with an economic incentive to collaborate for the submission of a CTSA pilot proposal. **RESULTS/ANTICIPATED RESULTS:** We successfully identified 15 pairs of treatment/control communities. In each of 8 treatment communities, a pair of potential collaborators agreed to participate in the intervention. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Network-informed Clinical Translational Science Awards (CTSA) pilot programs can identify research communities and create innovative collaborations. Statistical experiments can establish the programs' causal effects on scientific productivity.

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Emotional dysfunction and stigma: Its effects on HIV-associated neurocognitive disorders (HAND)

Mitchell R. Aponte, Maribella González-Viruet and Valerie Wojna
University of Puerto Rico-Medical Sciences Campus, San Juan,
Puerto Rico

OBJECTIVES/SPECIFIC AIMS: HIV is a chronic disease that affects the immune system. HIV+ people live more thanks to effective antiretroviral treatments. The scientific data demonstrate that HIV+ is associated to the cognitive impairment presented in the 50% of the patient. The objective of this study is to determine the correlation between emotional dysfunction and perceived stigma in HIV+ women and its effects HIV-associated neurocognitive disorders (HAND). **METHODS/STUDY POPULATION:** HIV+ women will be recruited from the Hispanic Longitudinal Cohort and evaluated questionnaires for emotional dysfunction and stigma, neuropsychological tests, and MRI. **RESULTS/ANTICIPATED RESULTS:** We anticipated that women with HIV+ will experience higher levels of emotional dysfunction (ie, fear) and perceived stigma when compared with the control group. Women with HIV infection will present an association between emotional dysfunction most like fear and perceived stigma when compared with the control group. This correlation will be associated with HAND. The women with HIV infection will present circuit integrity dysfunction associated with emotional dysfunction and perceived stigma as determined by DTI and connectivity (MRI). **DISCUSSION/SIGNIFICANCE OF IMPACT:** HIV stigma and emotional dysfunction have a negative impact in quality of life (QOL). This effect can be improved with several treatment interventions with eventual improvement in adherence, emotional control, and QOL.

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An exploratory study of how physicians' identities inform clinical practice

Candace Chow, Carrie L. Byington, Lenora M. Olson, Karl Ramirez, Shiya Zeng and Ana Maria Lopez

OBJECTIVES/SPECIFIC AIMS: Knowing how to deliver culturally responsive care is of increasing importance as the nation's patient population diversifies. However, unless cultural competence is taught with an emphasis on self-awareness (Wear, 2007) and critical consciousness (Kumagai and Lyson, 2009) learners find this education ineffective (Beagan, 2003). This study examines how physicians perceive their own social identities (eg, race, socio-economic status, gender, sexual orientation, religion, years of experience) and how these self-perceptions influence physician's understandings of how to practice culturally responsive care. **METHODS/STUDY POPULATION:** This exploratory study took place at a university in the Intermountain West. We employed a qualitative case study method to investigate how academic physicians think about their identities and approaches to clinical care and research through interviews and observations. In total, 25 participants were enrolled in our study, with efforts to

recruit a diverse sample with respect to gender and race as well as years of experience and specialty. Transcriptions of interviews and observations were coded using grounded theory. One major code that emerged was defining experiences: instances where physicians reflected on both personal and professional life encounters that have influenced how they think about themselves, how they understand an aspect of their identity, or why this identity matters. **RESULTS/ANTICIPATED RESULTS:** Two main themes emerged from an analysis of the codes that show how physicians think about their identities and their approaches to practice. (1) Physicians with nondominant identities (women, non-White) could more easily explain what these identities mean to them than those with dominant identities (men, White). For example, women in medicine had much to say about being a woman in medicine, but men had barely anything to say about being a man in medicine. (2) There was a positive trend between the number of defining experiences a physician encountered in life and the number of connections they made between their identities and the manner in which they practiced, both clinically and academically. It appeared that physicians who have few defining experiences made few connections between identity and practice, those with a moderate number of experiences made a moderate number of connections, and those with many experiences made many connections. Physicians who mentioned having many defining experiences were more likely to be able to articulate how those experiences were incorporated into their approaches to patient care. **DISCUSSION/SIGNIFICANCE OF IMPACT:** (1) According to literature in multicultural education, those with dominant identities do not think about their identities because they do not have to (Johnson, 2001). One privilege of being part of the majority is not having to think about life from a minority perspective. This helps to explain why women and non-White physicians in this study had more anecdotes to share about these identities—because they have had defining experiences that prompt reflection on these identities. (2) We propose that struggles and conflict are what compel physicians to reflect on their practice (Eva *et al.*, 2012). Our findings suggest that physicians are more prepared to apply what they have learned from their own identity struggles in delivering culturally responsive care when they have had more opportunities to reflect on these identities and situations. Findings from this study have implications for transforming approaches to medical education. We suggest that medical education should provide learners with the opportunity to reflect on their life experience, and that providers may need explicit instruction on how to make connections between their experiences and their practice.

2200

Best practices for social and behavioral research: A new course to address good clinical practice and preliminary course evaluation

Susan Lynn Murphy, Christy Byks-Jazayeri, Brenda Eakin, Jordan Hahn, Brandon Lynn, Elias M. Samuels, Fanny Ennever, Sarah Peyre, Margarita L. Dubocovich and Wajeeh Bajwa
University of Michigan School of Medicine, Ann Arbor, MI, USA

OBJECTIVES/SPECIFIC AIMS: To conduct a preliminary evaluation of the Social and Behavioral Research Best Practices Course. **METHODS/STUDY POPULATION:** Learners are sampled from 5 institutions: University of Michigan, University of Rochester, University of Florida, Boston University, and University of Buffalo. Learners who take the course and consent to be in the study receive a web link to a survey immediately after course completion and at 2–3 months follow up. In addition to demographic information, learners will report their perceptions of usefulness and relevance of the course to their job, their satisfaction with the course and associated job aids, and at follow-up, if and how the course impacted their work. Additional information will be collected from the learning management systems which host the course at each institution. The data collected will include the number of participants who take the course, the number who complete, how many times the course was attempted, and pass rates. **RESULTS/ANTICIPATED RESULTS:** We anticipate that several hundred learners will take the course by the end of our project. Of learners who agree to participate in the survey, we anticipate that they will find the course useful and relevant to social and behavioral clinical trials and will be satisfied with the course. Information including suggestions about missing content, items or content that were not extremely clear, or any other comments will be collected to iterate and expand the course. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This course was developed to fill a gap in training in good clinical practice for social and behavioral research. An evaluation of how the training provided in the course impacts the jobs of learners is needed both to ensure that the most relevant information is included in the course as well as to identify ways that the training may contribute to the quality and safety of social and behavioral clinical trials.