



Commentary

Advancing Sex- and Gender-Informed Approaches to Health in an Academic Medical Center

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Social science, and basic and clinical research continue to demonstrate the powerful impact of sex and gender on health and disease across all organ systems and throughout the lifespan (Legato, Johnson, & Manson, 2016; Schiebinger & Stefanick, 2016). Gender and sex also influence responses to treatment, care provision, and use (Legato et al., 2016). Gender and sex should be central components of the growing precision medicine movement. However, gender and sex remain inadequately considered in clinical care, medical research, and medical education and training. Further, strategies to promote consideration of sex and gender in the activities of academic medical centers (AMCs) are not well-described.

Numerous AMCs have distinct women's health centers and initiatives that lead important efforts in women's health care, research, and teaching. Given the historic underrepresentation of women in basic and clinical research studies, critical clinical and public health issues specific to women, and the value of distinct approaches to women's health, we feel that there remains value

in centers for "women's health" that pursue innovative efforts specifically to care for women. However, a risk of traditional women's health centers is their potential to serve as their own silos. These centers may isolate sex and gender considerations within a discrete set of activities rather than advocating for their inclusion throughout an AMC's initiatives (Legato, 2003). We argue that, in addition to women's health initiatives, establishing fundamentally multidisciplinary programs that can guide the incorporation of gender and sex throughout AMCs' departments and activities could help to advance precision medicine and health equity.

The Mary Horrigan Connors Center for Women's Health and Gender Biology (Connors Center) at Brigham and Women's Hospital (BWH) serves as one example of a program that, in concert with BWH Department of Medicine's Division of Women's Health, has provided both women's health and the more inclusive field of sex- and gender-informed medicine with a distinct academic home but a cross-departmental presence and impact. This positioning has allowed the Connors Center to pursue a comprehensive array of activities that include developing multidisciplinary health care delivery programs, evaluating and informing health care policy, and training a workforce in sex- and gender-informed medicine.

What Is Sex- and Gender-Informed Medicine?

Sex—the distinct biological and physiological traits that characterize men and women—and gender—the roles and

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attributes a society constructs for and associates with men and women—inform disease and health outcomes independently and together. In a biological context, sex-specific refers to a process that occurs in only one sex and sex-dependent reflects a shared occurrence with divergent manifestations in each sex. We use the term sex- and gender-informed to include sex specificity and sex dependence in biology, as well as the influence of gender. Of note, a sex- and gender-informed approach must include and value the experiences of sexual and gender minorities beyond the binary (Streed & Makadon, 2017).

Academic medicine's inclusion of sex and gender as an important variable affecting research and clinical outcomes has evolved since the 1990s' federal efforts to strengthen the field of women's health. From 1996 to 2007, the Office on Women's Health of the Department of Health and Human Services designated National Centers of Excellence in Women's Health at 18 AMCs (Milliken et al., 2001; Weisman & Squires, 2000). This step signaled critical national recognition of the importance of dedicated efforts to pursue women's health care, research, and teaching within AMCs. Most Centers of Excellence host institutions retain academic and clinical structures to pursue women's health efforts (Domino, Smith, & Johnson, 2007; Miller, 2014), and the discipline has established its place within many more AMCs. Women's health training opportunities have expanded to 8 residencies and 26 fellowship programs in the United States (Directory of Residency, 2016).

Although the field of women's health has historically addressed both sex and gender in its clinical and research efforts, considering the roles of sex and gender more broadly (rather than focusing on female sex or gender alone) allows more meaningful exploration of the physiologic and behavioral mechanisms involved in sex and gender differences (Miller, 2014). By illustrating the implications of these differences for health and disease, such an approach can advance science and improve the health of all individuals (McGregor, Kleinman, & Jenkins, 2013). However, both women's health and broader sex- and gender-informed initiatives require approaches integrated sufficiently to engage with and support translation of evidence to other disciplines, yet distinct enough to allow development of deep research and clinical expertise, obtain targeted funding, and advocate for changes in policy and practice. The Connors Center and the associated Division of Women's Health have functioned together to pursue this balance.

Overview of the Connors Center

The Connors Center was established in 2002 by some of this article's co-authors to catalyze and coordinate efforts in sex- and gender-informed medicine across BWH. The associated Division of Women's Health within the Department of Medicine is the academic home for 46 faculty members across 13 specialties with a primary research or clinical interest in the impact of sex and gender on health and health care. However, through its collaborative programs, the Connors Center engages 62 other faculty across 21 specialties. This hybrid model provides associated faculty with the structure and professional opportunities associated with an academic division, and the flexibility to overcome the administrative and technical boundaries of a single department and develop relationships with colleagues across specialties.

The Connors Center and Division of Women's Health pursue the core academic clinical, research, and educational activities of

an AMC. The program's clinical hub, the Gretchen and Edward Fish Center for Women's Health (Fish Center), houses clinicians in primary care and nine specialties. Connors Center faculty pursue research in sex-dependent and sex-specific medicine across an array of fields and methodologies including basic science, clinical research, epidemiology, and community and population research. Research funding from external sources for Connors Center-supported activities increased 19% between the 2013 and 2016 fiscal years, despite today's challenging funding environment.

Translating Sex- and Gender-Informed Research to Transform Care Delivery

Beyond the Fish Center, the Connors Center funds and coordinates gender- and sex-informed care across the hospital and within multiple specialties, including Women's Lung Health, Women's Neurology, Women's Sports Medicine, Women's Orthopedic and Joint Disease, Women's Mental Health, and Cardiovascular Disease in Women. Common features of these programs include leadership by Connors Center-affiliated experts; the generation of evidence regarding sex- or gender differences in patients' clinical presentations, care, treatment responses and experience of disease; and the application of this evidence to clinical care. In the Center for Arrhythmia Prevention in Women, for example, investigators use both large-scale epidemiologic studies composed of women and clinical trials that include women and men to investigate novel methods to predict and prevent atrial fibrillation in women, who are at higher risk of stroke and other complications. These findings inform the center's care of both women and men.

Connors Center-affiliated faculty also study and implement gender-informed, patient-centered strategies addressing fragmentation of care that may particularly impact women (McCloskey, Bernstein, Winter, Iverson, & Lee-Parritz, 2014; Scholle, Chang, Harman, & McNeil, 2002). For example, Connors Center researchers are evaluating transitions of care for women after a preeclamptic pregnancy (Skurnik et al., 2016), and piloting a web-based program to engage new mothers in heart-healthy behaviors (Heart Health 4 Moms: Improving Health after Preeclampsia; available: <http://www.hh4m.org/>). In response to evidence about gender differences in lung cancer diagnosis delays (Shugarman et al., 2009), the Women's Lung Cancer program developed a multidisciplinary clinical pathway to expedite diagnostic evaluation in women and other vulnerable patients with suspected lung cancer (Figure 1). The pilot program reduced time to diagnosis and treatment for these high-risk patients, especially women, and has been incorporated into the multispecialty BWH Lung Center.

Informing Health Care Policy

In the current dynamic health policy environment, academic researchers and clinicians play an important role in informing evidence-based, sex- and gender-informed health policy. The Connors Center launched the Women's Health Policy and Advocacy Program (WHPAP) in 2003 to inform evidence-based health care legislation, resource allocation for research, and clinical guidelines. One critical aspect of the WHPAP's work has been to disseminate research findings to the public and policy-makers. For example, the WHPAP collaborated with Connors Center faculty in thoracic surgery and radiology to advocate for

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