The legacy of bias: Building the foundation for sex and gender-based medicine

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Alyson J. McGregor, Associate Dean at the University of South Carolina School of Medicine, highlights the historical bias present in medical research; the exclusion of which has created a significant knowledge gap that impacts the diagnosis and treatment of various health conditions

The hidden architecture of medical bias

Modern medicine is built on the promise of objectivity – a discipline grounded in evidence, reproducibility, and the pursuit of universal truth. Yet the history of that evidence reveals a fundamental flaw: for much of the 20th century, the 'universal' patient in research was male.

Women were routinely excluded from basic science and clinical trials, deemed too hormonally complex or too vulnerable to study. Their exclusion was rationalized as a means of scientific control, but in practice, it erased the biological diversity of half the population from the data that shaped diagnostics, drug development, and clinical standards.

This omission created a silent architecture of bias. Every reference range, dosing guideline, and disease model reflected a male baseline, producing a knowledge gap that distorted care for everyone who did not fit that template. The consequences are visible across specialties: women's heart attacks are misdiagnosed, medications cause more adverse effects, and countless conditions manifest differently across sexes, yet are still treated as the same.

Building the field of sex and gender in emergency medicine

My own research career began in this gap – the space where women's health was rendered invisible by the assumptions of neutrality. During my tenure at Brown University's Department of Emergency Medicine, I founded the Division of Sex and Gender in Emergency Medicine (SGEM), the first of its kind in the nation. The division became an academic hub for studying how biological sex and sociocultural gender influence the presentation, diagnosis, and treatment of acute illness.

Recognizing the need to connect this work across institutions, I helped launch the Society for Academic Emergency Medicine (SAEM) Interest Group on Sex and Gender in Emergency Care, creating a professional network to promote scholarship and education. This work then expanded nationally with the co-founding of the Sex and Gender Health Collaborative (SGHC) – a multispecialty organization that remains active today. The SGHC unites researchers, educators, and clinicians to standardize how sex and gender are integrated into medical training and practice.

These collective efforts helped define the emerging discipline of sex- and gender-based medicine, transforming it from a niche concern into a recognized scientific and educational priority. Our research demonstrated that sex differences affect disease prevalence, symptom patterns, pharmacokinetics, and outcomes across nearly every system of the body – findings that are now being incorporated into clinical guidelines and medical curricula worldwide.

Translating science for the public

While academic progress was essential, it became clear that the problem was also cultural: the public deserved to know that the medicine they trusted was not designed with women equally in mind. To bridge that gap, I authored Sex Matters: How Male-Centric Medicine Endangers Women's Health and What We Can Do About It (Hachette, 2020) and delivered a widely viewed TED Talk that distilled decades of research into an accessible narrative.

These efforts translated the science of sex and gender differences into public awareness – illustrating, through patient stories and data, how historical bias continues to shape everyday care. The goal was not to assign blame but to spark reform: to remind clinicians, policymakers, and patients alike that inclusion is not a political gesture but a scientific necessity.

Rebuilding at the University of South Carolina School of Medicine Greenville

Today, as Associate Dean at the University of South Carolina School of Medicine Greenville (USC SOMG), I have the privilege of extending that mission into a new institutional context. Here, the goal is not only to study inequities but to train future physicians to prevent them.

Through an NIH-funded R25 faculty development grant, USC SOMG is leading a national initiative to integrate sex and gender-based medicine into academic medicine. The program equips faculty across disciplines with the knowledge and tools to incorporate these principles into their teaching and research, ensuring that the next generation of physicians understands how biological and sociocultural factors influence health.

At the student level, our Sex and Gender Differences in Medicine Elective offers an immersive introduction to the science and ethics of individualized care. Our Emergency Medicine Fellowship provides advanced clinical and research training, focusing on these mechanisms in acute disease. Together, these programs form a pipeline – cultivating a new generation of clinician-scientists who will carry this work forward.

The convergence of sex, gender, and lifestyle medicine

USC SOMG's national leadership in Lifestyle Medicine provides a vital complement to sex and gender research. Lifestyle factors – diet, sleep, exercise, stress, and social connection – intersect profoundly with both biology and gendered experience. Women, for instance, metabolize nutrients differently and face distinct social determinants of health, while men may experience under-recognized barriers to mental health care due to gender norms.

By integrating Lifestyle Medicine into medical education through a sex and gender lens, we teach that prevention must be tailored to the individual. Cardiovascular risk reduction strategies that are effective for men may not achieve the same outcomes for women if hormonal cycles, stress patterns, or caregiving roles are ignored. Health equity depends on understanding these interactions at the cellular, clinical, and societal levels.

Research that reflects reality

Precision medicine cannot exist without inclusion. When studies exclude or under analyze sex differences, their conclusions are neither precise nor universally applicable. Recent NIH policies requiring the inclusion of sex as a biological variable (SABV) mark a crucial step forward, but inclusion must extend beyond enrollment. Data must be analyzed, reported, and interpreted through the lens of sex and gender, or the bias shifts downstream.

At USC SOMG, our faculty are pursuing research that embodies this principle – from cardiovascular physiology and pharmacology to emergency care and health education. The integration of basic science, clinical practice, and pedagogy creates a living laboratory for rebuilding medicine's evidence base, one that reflects the diversity of human biology and experience.

A scientific and moral imperative

Changing the foundation of medicine requires persistence and collective will. It demands that we question long-held assumptions, diversify leadership, and reform the way we train, research, and communicate. However, the rewards are immense: when medicine sees everyone, it serves everyone better.

The legacy of male-centric research has cost lives, but it has also revealed the path forward. True precision medicine begins with recognition – that every person's biology and lived experience shape their health in unique and meaningful ways.

At the University of South Carolina School of Medicine Greenville, our mission is to build what was missing for so long: a medical education and research ecosystem grounded in sex and gender equity. By uniting rigorous science with compassionate practice, we can finally achieve what medicine has always promised – care that not only saves lives but truly understands them.

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