Spirometers have a built-in 'correction' for race

June 3 2013

Not all spirometers have accessible controls for race correction. But can it be turned off?

Lundy Braun studies racial health disparities and their history as a professor of both pathology and laboratory medicine and Africana

studies and a member of the Science and Technology Studies Program.

In the June 1 edition of the *European Respiratory Journal*, Braun and her co-authors present a systematic review of 226 papers forming the historical evidence base for the automatic "correction" for racial differences in instruments called spirometers, which pulmonologists use to measure lung performance. In the analysis, she and her colleagues found that fewer than one in five studies defined race, even though they used it as a primary variable. Even fewer studies considered socioeconomic data.

When the paper first appeared online last summer it called for a conference at which physicians and racial scholars could examine this literature and determine the course of future research. Now in a new commentary accompanying the paper's print version, Dr. Philip Quanjer backs the idea for that workshop, calling it "a timely initiative."

Braun, meanwhile, will publish a book titled *Breathing Race into the Machine: The Surprising Career of the Spirometer From Plantation to Genomics* (University of Minnesota Press, January 2014) in which she examines the history of race correction in spirometers more deeply. She spoke with David Orenstein about the subject.

How did this study come about, and what did it show?

I happened to learn about the application of "race correction" when reading about a large asbestos lawsuit in Baltimore. The attorneys for the asbestos maker had requested that race correction be applied before workers could be moved from the inactive docket to the active docket, in other words for them to become eligible for compensation.

So I decided to look into the literature and soon realized that a more systematic approach would be beneficial. I asked a former colleague Kay

Dickersin, an epidemiologist at Johns Hopkins Bloomberg School of Public Health, who is an expert systematic reviewer to come on board. Also working with an undergraduate Melanie Wolfgang, we began systematically looking at the literature asking two simple questions: Did researchers define race? And how did they explain the differences they observed?

There were 94 groups defined as racial or ethnic that came up in our systematic review, whose lung function was compared to whites. (Researchers used a variety of terms such as Western or Caucasian to define whites.) The vast majority of studies found that every group in the world, with few exceptions, has lower lung capacity than whites. That in itself raises certain interesting questions. Of those that did find lower lung capacity, a majority of papers explained difference as either innate or due to anthropometric factors with about 23 percent citing environmental factors.

So despite the fact that this central variable isn't defined, a significant number of researchers explained difference as fixed and then on this basis corrected for race.

Only 6 percent of the papers looked at socioeconomic factors. We were surprised by the degree to which socioeconomic status and race were disconnected.

What is the consequence of race correction?

It is very consequential in compensation cases for occupational diseaase. It can mean people are compensated or not. For blacks the normal [spirometer reading] is reduced by about 13 percent. So if blacks are subject to a different normal they could actually have to demonstrate more lung damage before being eligible for compensation.

This is an issue in a major asbestos case in South Africa. But interestingly enough in South Africa physicians have grappled with the problem and thought it through very carefully. So some physicians in South Africa actually disable the race correction feature in the spirometer.

One of the major problems with race correction is applying population standards to individuals. Moreover, race correction is based on an understanding of groups [such as whites or Africans and African-Americans] as genetically homogeneous, when in fact they are highly heterogeneous.

The other dimension of the problem, which I address in the book, is that manufacturers program race into the machines so operators do not necessarily know that lung function is automatically adjusted. Sometime U.S. standards are used elsewhere in the world. In South Africa, for example, some spirometers have historically used American standards.

Where race correction is less consequential—and I've found this in my interviews with physicians—is in the clinical setting. In the clinic most physicians have told me that they reach a diagnosis primarily on the basis of a clinical exam and a patient history. The spirometer, even though it is race correcting, is only a part of that diagnosis. They use it in a much more complex way than happens in the legal setting.

On the other hand, doctors are taught in medical school that races differ innately in the capacity and function of their lungs. It's in all the textbooks. I've tracked textbooks to see how this belief entered medicine and then how it was perpetuated.

Is this somehow a peculiarity of pulmonology or is this more broadly an issue across medicine?

As far as I am aware, what is unique about spirometry is that race is actually embedded in the software and hardware of the machine.

Increasingly there is a turn to what is termed race-based medicine. We see race-based medicine in many contexts, including understandings of disparities in blood pressure and heart disease. Glomerular filtration rates are reported according to race. There have also been debates around growth curves.

There was a major controversy widely reported in the press in the 2000s around a drug called BiDil developed to treat congestive heart failure. BiDil comprises two widely available generic drugs. After the researchers failed to get patent approval they turned to race, making poorly supported arguments to the FDA for its unique benefits in African Americans.

How do physicians define race if they are going to be applying differential standards? Rather than looking at social factors, some physicians explain that higher rates of disease are due to genetics. One example is what's referred to as the salt-slavery hypothesis—it's a hypothesis about the cause of high blood pressure in African Americans that has been completely debunked but maintains credibility in the clinic.

How would a conference address this problem? Who should be there?

There is currently a disconnect between the research on race taking place in humanities and social sciences and in biomedicine. While biomedicine continues to invoke genetic explanations for racial disparities in health, there are really thoughtful, careful critiques coming out of other fields. We called for a workshop to stimulate truly

interdisciplinary dialogue on respiratory disease. If you are going to have a practice based on race, it makes sense to include people who have actually studied how the idea of race changes over time and place.

You'll publish a book in January with the University of Minnesota press. What else will this tell us?

The book is a historical examination of the roots of the practice [of race correction] and how it gained authority and credibility.

The book starts with the asbestos lawsuit in Baltimore and explores the history of the underlying assumptions about race that have informed lung capacity measurements historically.

I originally approached the spirometer as strictly a biomedical instrument but quickly realized that it was also used in physical education programs beginning in the early 1860s at Amherst College. It then spread through public and private colleges and universities. It was also used in life insurance assessments. Then in the early 20th century spirometry moved back into medicine and became deeply entrenched as a tool in cardiology and pulmonology.

What I find interesting about this project is that it demonstrates how history is embedded in science in ways that we don't even know or can't even see. I was inspired by anthropologist and historian Michel-Rolph Trouillot who illuminates the "layers of silences" that shape our understanding of the past and the present. And so I frame the book in that way: What past lives in the present practice of race correction?

Provided by Brown University