Bodies into Bits

by Joy Lisi Rankin

Computerized medical education was supposed to help mend our broken healthcare system. Instead, it has reinforced some of medicine's most deeply ingrained biases.

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One morning this June, I sat in my car at the drive-through of a local pharmacy, waiting for a COVID-19 test. Speaking through an intercom, a woman wearing a mask walked me through the process of administering the test on myself: where I could find the cotton swabs, how to open the vial of preserving saline, how to properly swab my nose, including the fifteen-second countdown for each nostril. She explained where there was an additional wipe for my protection when opening the biohazard bin in which I placed my sample, as well as how to wipe to protect others.

The woman administering all of this care was among the legions of specially trained frontline health workers needed to help manage the coronavirus crisis in the United States, under a dire lack of federal coordination and guidance. In the early stages of the pandemic, nurses around the country struggled to train

enough people to provide care, especially after officials closed schools and other usual educational avenues. Technology, however, seemed to provide a ready solution: the National Council of State Boards of Nursing and the American Association of Colleges of Nursing, among others, recommended using computer simulations and online learning platforms to upskill the nation's healthcare workers.

This turn to technological solutions for training caregivers in the face of an inadequate healthcare system is nothing new. At least since the early 1960s, when the country faced a shortage of trained nurses, computer-based education has been touted as an efficient and cost-effective way to patch holes in the nation's disastrous healthcare infrastructure. Then, as now, the rhetoric of urgency has been paired with the logic of cost savings to make online learning and computer simulations seem indispensable.

But computerized medical education has inevitably represented complex patients through grossly simplified models. Because you can't fit the diversity of human health experience into a software program, this education has always been oriented around notions of so-called "normal" or "typical" patients. In reality, these "typical" patients turn out to be composites of the sorts of people who hold power in society, particularly well-off white men. As a result, computerized medical education has helped to perpetuate the structural racism and sexism that has long pervaded the medical establishment, as well as our wider society.

Working under the promise that a computer could "dispense information just as effectively, sometimes moreso, than a human instructor," students in Illinois in the 1960s began the very first experiment in computerized medical education, learning nursing fundamentals on one of the world's earliest computer

networks. Looking back to those students and their computer-based courses demonstrates what is often overlooked, and even dangerous, with techno-care, and why that matters more than ever in our algorithmic age.

Crushing Substernal Pain

In the early 1960s, Maryann Bitzer was pursuing her master's degree in educational psychology at the flagship campus of the University of Illinois. The university also employed her husband, Donald, who was using his engineering doctorate to investigate whether computers could be used effectively for education. Throughout the 1960s and into the 1970s, Donald led a team of researchers, including Maryann, in developing a computer network known as PLATO, Programmed Logic for Automatic Teaching Operations. PLATO comprised individual user terminals connected to a mainframe computer and, through the mainframe, to each other. The network went through several evolutions, and by the mid-1970s it included nearly 1,000 terminals around the United States, each with a flat-panel plasma touch screen, with applications including games, instant messaging, screen sharing, and email.

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In a decision that ultimately benefited both of them, Maryann focused her master's thesis on how computer-based education

could work in nursing. She cited two motives for her study: a dearth of trained nursing instructors across the country, and the tremendous educational value for nursing students of working with "actual" patients. Using one of the early iterations of PLATO, which employed custom keysets and television-like cathode-ray tube screens, Maryann developed a course on treating heart attack patients. Then she delivered it to first-year nursing students at the university-associated Mercy Hospital. The course imaginatively integrated several components, immersing students in what sometimes seemed, behind the gloss of the new technology, like an actual experience of care.

First, the trainee nurse watched a short live-action film on the PLATO screen that depicted a doctor interacting with a patient, a middle-aged man. It was a clever way to present what Maryann described as "the patient's socio-economic background, his present family situation, and his outlook on life [and] the patient's past medical history and treatments." Then, partway through the conversation with his doctor, the man grabbed his chest and was rushed to the hospital.

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After this sudden turn, the terminal presented a series of screens that provided the trainee with fundamental information about different diagnostic tests and treatment courses. Then the nurse entered an extended simulation in which she could use the

PLATO keyboard to select from a limited menu of options to test out various interventions on the virtual patient and see the results. For example, after administering oxygen or nitroglycerin to her virtual patient, the nursing student could ask the computer to report her patient's pulse, temperature, blood pressure, electrocardiogram, or other test results. The nursing student could also consult a screen displaying clinical norms, such as the normal blood pressure range, to gauge the effects that her care was having on the patient.

It was a potentially engrossing but also highly circumscribed experience. The scenarios and results of the simulation were limited by the minimal level of complexity that could reasonably be programmed into the computer, especially given the fact that it took roughly forty hours of programming to create just twenty minutes of instruction. The film was designed so that each student could picture a particular living, breathing individual patient for whom they were caring as they worked through the simulation and its twenty-eight questions. But that single patient—a composite of several "typical" case studies—was the sole basis for how the computer was programmed to respond to the nurse's therapeutic interventions.

This focus on a so-called typical patient—a middle-aged man—both reflected and reinforced the prejudices of contemporary medical practice. A quarter century of research, beginning in the mid-1990s, has shown that heart attack symptoms manifest differently for women than men. For a long time, however, doctors and nurses and PLATO programs did not know how to recognize and diagnose heart attacks in women. For example, Maryann's course described its virtual patient as having "crushing" substernal pain. But women are much more likely to experience symptoms unrelated to chest pain. If they do experience chest pain, they more often describe it as discomfort or

pressure. (Despite our advances in knowledge, women are still 50–60 percent more likely to be misdiagnosed following a heart attack.) Maryann's course was blind to this clinical reality, and as she went on to expand her PLATO-based nurse training, she helped to inculcate this bias, and others like it, in a new generation of nurses.

Virtual Mrs. Dodd

Maryann's experiment with techno-care occurred against the background of significant national investments in nursing. In 1960, the US Public Health Service created a new Division of Nursing tasked with improving patient care, increasing the number of nurses, and ensuring better nursing education. In 1963, the Surgeon General's office published the report *Toward Quality in Nursing* which identified, among other problems, too few nursing educators, too few new nursing students, and an inadequate nursing education system. Maryann realized her experimental nursing course could be positioned as an efficient technological solution to these problems, training nurses faster and more cheaply than traditional nursing courses. In 1964, Congress enacted the far-reaching Nurse Training Act, designating the substantial sum of $283 million (approximately $2.3 billion in 2020 dollars) over five years to nursing education. The Nurse Training Act funded the expansion of Maryann's PLATO project to develop a complete course on maternity nursing and a series of lessons on pharmacology.

The reliance on a single "typical" patient continued. The maternity nursing course focused on the virtual Mrs. Dodd, a secretary. Its twenty-two lessons "emphasized the normal, and presented problems which required knowledge of the normal as a basis for recognition of and action concerning the abnormal." Students learned that "Mrs. Dodd suffers from many of the common

discomforts of pregnancy," including nausea and swollen feet. And just as it was with the "typical" heart attack patient, the way "normal" Mrs. Dodd responded to therapeutic care was contingent on how PLATO had been programmed.

That programming was based on the standard of care for pregnancy in the 1960s, which was developed for, and applied to, white women—a bias that reinforced the invisibility of Black women to the medical establishment. (At many hospitals, including Mercy, the nurses, too, were overwhelmingly white; according to an archive at the University of Illinois, among the hospital's hundreds of graduates until it closed in 1970, there were only ever six Black students.) For example, in the PLATO course, nurses monitored virtual Mrs. Dodd throughout all three trimesters of her pregnancy, as well as labor and delivery. But many Black women, then and now, lack sufficient access to and insurance coverage for complete prenatal and postnatal care; nurses exclusively trained to care for patients like Mrs. Dodd are poorly prepared to care for these women. Indeed, in the past few years, prominent Black women including writer and scholar Tressie McMillan Cottom and tennis superstar Serena Williams have called attention to how they and other Black women are dangerously mistreated during pregnancy, labor, and delivery. As Cottom recently wrote in *Time*: "In the wealthiest nation in the world, black women are dying in childbirth at rates comparable to those in poorer, colonized nations."

Though severely limited, Maryann's nursing course was nevertheless a success—in part because it reflected the limitations of the surrounding medical establishment. All of the students who completed the PLATO maternity nursing course later passed the Obstetric Nursing portion of the Illinois State Board examinations; the biases encoded in Mrs. Dodd were the same ones written into the exam. During the remainder of the 1960s,

hundreds of students at Mercy Hospital School of Nursing and nearby Parkland Community College completed PLATO nursing lessons, thus inscribing the biases into their own care.

The Other Pandemic

In 1970, to commemorate its seventieth anniversary, the *American Journal of Nursing* invited prominent researchers to reflect on "Nursing in the Decade Ahead." Under the title "Computers Have Entered Our Lives," Maryann declared, "All indications are that computers are likely to play an integral part in assisting members of the health professions to provide comprehensive health care to people." She has since been heralded as the influential figure who introduced simulations and computer-based courses to nursing education, where they are now widespread.

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But the types of sexism and racism subtly enacted on PLATO's small screens through Maryann's nursing courses also continues to pervade computerized medical education—even in the midst of a pandemic that is disproportionately killing Black people. In early April, the healthcare staffing provider IntelyCare reported that over 37,000 nursing professionals had completed its

COVID-19 online training, and another 310 healthcare facilities enrolled their staff in the course. When I took the course in early July, I discovered that every single patient and healthcare provider in it is white. Similarly, the online training assembled by the American Association of Critical-Care Nurses, which echoes Bitzer's heart attack course on many levels, has four units that each begin by immersing students in a critical healthcare situation with a "real" patient, all of whom appear to be white.

The exception that proves the rule is a webinar from the American Nurses Association titled "How *You* Can Have a Direct Impact on Reducing the Devastating Racial Disparities of COVID-19," which presents the case study of a forty-five-year-old Black man. Released in June amid protests over police brutality and the police murder of Black people, including George Floyd, it is the only online COVID-19 training I've seen that even begins to address American healthcare's deeply ingrained racism.

These virtual trainings are telling instances of the larger systems of racism and sexism that are shaping the country's response to the pandemic. Black people are dying from COVID-19 at a rate at least six times higher than white people. There is a multiplicity of overlapping and mutually amplifying reasons for this: the doubt with which many healthcare workers treat Black people when they report symptoms; the overall poor quality of care that Black people receive; the cumulative damage of environmental pollution that disproporationaly impacts Black communities; the precarious place that many Black people occupy in our racist economy, especially in the poorly paid jobs that we now deem "essential"; the daily stress of enduring racialized discrimination and violence. As a sign carried by Dr. Jasmine Johnson, who studies maternal-fetal medicine, declared at a Black Lives Matter protest in Chapel Hill, North Carolina in June, "Racism is a pandemic, too."

Computerized medical education could be used to highlight and challenge this pandemic of racism, but only if institutions and society are willing to attend more closely to the specific needs of women and Black, brown, and Indigenous people; devote the resources necessary to creating courses that reflect the diversity of human experience; and overturn the centuries of economic exploitation that leave Black people at the bottom of America's caste system.

Ultimately, though, no computer program can sufficiently capture the extraordinary range of individual human medical experience, so we also need to invest in the sorts of hands-on medical education that doesn't seem efficient or cost-effective to policymakers and hospital administrators operating under the perverse logic of austerity. And as long as the medical establishment and medical knowledge remain hostile to the experiences of women, Black people, and other members of BIPOC communities, then no form of medical education can escape these sorts of biases.

Of course, this is true beyond medical education as well. The dramatic rise of online courses—not just in healthcare but across higher education—raises questions that were as relevant in the 1960s as they are today: What are we teaching? Who are we teaching? For whose benefit? For what larger public good? 〰

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