vestment in public health measures for both individual people and society overall. Simultaneously, community leaders, religious leaders, and even politicians will need to work together toward renewal of the social contract ensuring that health benefits are disseminated to everyone.

In the near term, everyone involved in public health can act to make a difference. On a daily basis, we need to redouble our efforts to convey complex concepts clearly and accompany our explanations with concise descriptions of the relevant uncertainty. We also must take the time to have extended dialogues with people who have questions about public health topics and to work through their preconceived notions and concerns. Even if such exchanges don't change minds, patient and respectful dialogue can help restore trust among people along the entire socioeconomic spectrum. In addition, if this effort is to succeed in today's environment, everyone involved in public health and particularly public health leaders will need to recognize the importance of the powerful and prolific communication of accurate information through multiple widely accessible platforms.

Finally, every single person involved, from frontline workers to national public health leaders, will need to commit wholeheartedly to the truthfulness, shared exchange, and mutual respect that are essential to advancing public health. The current situation, in which public health has been woefully undermined, must change; that will happen only if we all individually do something about it. As former U.S. Surgeon General C. Everett Koop noted, "Health care is vital to all of us some of the time, but public health is vital to all of us all of the time."[5] Because public health is critical for sustaining human well-being, all of us must have the courage to take on its current challenges.

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Venture Capital Investments by U.S. Academic Medical Centers

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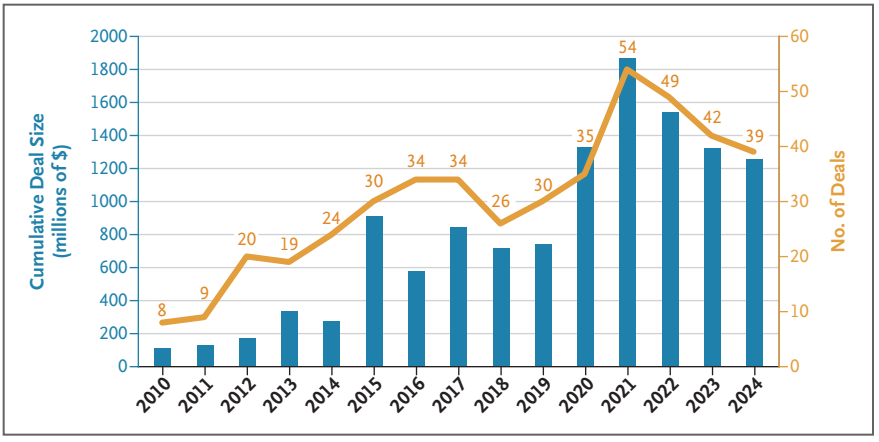
In this new era of uncertainty about traditional sources of revenue — particularly federal research funding and public insurance programs — U.S. academic medical centers (AMCs) may become increasingly reliant on alternative revenue sources. One emerging source, as demonstrated by financial data on leading AMCs, may be returns from venture capital investments.

In recent years, AMCs have increasingly developed their own venture capital divisions. Venture capital funds invest in startup companies, with targets including basic-science discoveries that may lead to new therapeutics, digital technologies for managing chronic diseases, and other emerging technologies for diagnosing illness or delivering care. AMCs use venture capital to generate revenue both by commercializing their own discoveries and by investing in other promising areas.

Venture capital differs from private equity, another form of investment. Whereas private equity firms typically acquire majority or full ownership stakes in established businesses, venture capitalists buy small, minority shares of new companies, often without ownership control, enabling the entrepreneur to continue leading. And whereas private equity firms typically sell investments several years after acquisition, with fairly assured returns on investment, venture capitalists often hold investments for longer periods, looking for more pronounced, though less certain, returns.

Over the past 15 years, venture capital investment by hospitals or health systems affiliated with a university or medical school has grown rapidly. Since 2010, the venture capital funds affiliated with 10 leading U.S. AMCs collectively participated in at least 453 investment deals, with a cumulative deal size of approximately $12.1 billion and an average deal size of $26.8 million (see graph).



Venture Capital Investment Deals Involving 10 Selected Academic Medical Centers, 2010–2024.

Venture capital funds included are Mayo Clinic Ventures, Cleveland Clinic Ventures, Mass General Brigham Ventures,NewYork–Presbyterian Ventures, Cedars–Sinai Health Ventures, UPMC Enterprises, Mount Sinai Ventures, Orlando Health Ventures, Northwell Holdings, and University Hospital Ventures. Limited partners and parent companies include Astellas Pharma Pension Fund, ShangPharma Innovation, Simcere Pharmaceutical Group, Brigham and Women's Hospital, Chipstone Foundation, Dunn Family Charitable Foundation, Edgerley Family Foundation, Eli Lilly and Company, Massachusetts General Hospital, NewYork–Presbyterian Hospital, Cleveland Clinic, Cedars–Sinai, University Hospitals (Cleveland), University of Pittsburgh Medical Center, Mount Sinai Health System, Orlando Health, Northwell Health, and Mayo Clinic. Funds do not include university-wide venture capital funds. Included are only funds making venture capital investments (exchanging money for equity in companies). The cumulative deal size represents the total size of all investment deals in which academic medical center venture capital funds participated, not only investments from those particular funds. Data are from PitchBook.

The initial capital used to establish a venture capital fund typically comes from external investors or "limited partners." In the case of AMCs, however, venture capital funds may be structured within the parent organization, often using in-house resources to finance some investments. In other instances, external institutions provide startup capital for such funds. Limited partners for AMC venture capital funds have included pension funds, charitable foundations, and pharmaceutical companies.

The 10 AMC funds whose venture capital activity is shown in the graph made a combined 8 such investments in 2010, which increased to a peak of 54 investments in 2021. The most popular health care industries for these investments, based on cumulative deal size in the period 2010–2024, were drug discovery ($4.2 billion), biotechnology ($1.5 billion), health care technology systems ($1.1 billion), enterprise systems ($807 million), clinics and outpatient services ($668 million), laboratory services ($533 million), and therapeutic devices ($531 million).

Venture capital investments may have important implications for AMC finances. For years, industry reports suggested that AMCs that cared for a disproportionate number of patients covered by Medicare and Medicaid were more financially distressed than health care entities that predominantly cared for people with commercial insurance, with the costs of training medical students, residents, and fellows exacerbating financial pressures.[1] One indicator of a health system's financial status is operating margin (the difference between revenues and costs associated with delivering patient care, divided by total revenue from patient-care services). AMC operating margins have reportedly decreased in recent years, with a median operating margin in 2022 of 1.5%, as expenses have grown faster than revenues, driven in part by high nursing costs during the Covid-19 pandemic.[1] In surveys, AMC leaders have reported that their primary strategies for responding to financial pressures include reducing lengths of stay, increasing physician productivity, and enhancing revenue-cycle management (e.g., billing and coding) and payer contracting (e.g., negotiating for higher prices).[1] These approaches resemble traditional hospital financing strategies dating back to the 1980s.

More recently, however, the financial performance of AMCs has increasingly been affected by financial markets. Despite stable patient-care revenue as a share of total revenue, many large nonprofit hospital systems reported substantial financial losses between 2021 and 2022. Losses associated with stock market investments accounted for about 85% of financial losses during this period (such losses materialize if these investment assets are sold when prices decrease, but the losses could dissipate if investment assets are not sold and prices eventually recover).[2] Large hospitals continue to face rising expenses, including increasing labor costs, which they manage in part with proceeds from investment divisions (which could include venture capital funds). The performance of these divisions — along with hospital bond ratings — is a key measure of hospital financial per-

formance and a driver of attractiveness to outside lenders and investors.

Venture capital activity is part of an evolution of AMCs toward developing new revenue streams that supplement traditional sources of income, such as patient care, research, education, and philanthropy. This shift may introduce tension between long-standing efforts to advance the AMC mission and new demands to become savvy investors in emerging, sometimes risky, areas of the financial marketplace. Some AMC venture capital funds have started raising capital in ways that resemble strategies used by traditional venture capital funds, such as receiving infusions from external, for-profit sources.

Venture capital investing by AMCs is probably underreported. The 10 example AMC venture capital funds represent a subset of total investments. In addition, certain deals may not be reported, or full transaction details may not be released. In public reports of deal sizes, the amount invested by each entity (e.g., an AMC venture capital fund) is not consistently disclosed.

As AMCs increasingly engage in venture capital investing, several potential implications warrant consideration. First, policy scrutiny of such investments by hospitals and health systems may differ from the scrutiny of private equity investments in these entities. Private equity firms have frequently sold or cut the assets of health care facilities they own, for instance by selling hospital real estate or reducing nursing home staffing, to generate predictable returns. Such business decisions carry potential risks for resources that clinicians need to deliver care and for the quality of care that patients receive, which has worried policymakers.

An audio interview with Nishant Uppal is available at NEJM.org

In contrast, venture capital funds, which typically don't sell the assets of startup businesses, generally aim for outsized returns from a few investments to offset inevitable losses from others. Venture capital investing is therefore often financially riskier than private equity investing, since most new ideas or startups don't end up as successful businesses. It is probably less likely, however, to lead AMCs to cut costs or liquidate their assets — moves that might directly harm patients and clinicians. In turn, policymakers may be less concerned about AMCs acting as venture capitalists than they have been about private equity ownership of health care entities.

Second, with federal funding streams becoming less certain, AMCs may see the pursuit of venture capital investments as increasingly necessary. Beyond changes in the federal funding landscape, continued increases in staffing and administrative costs; low Medicare and Medicaid fees, as compared with commercial prices; competition with peer institutions; and other fiscal challenges may further motivate health systems to move in this direction. Moreover, using venture capital investments to build financial reserves may be a strategy for improving hospital credit ratings, which could allow more hospitals to gain access to municipal bond markets.[3]

On the other hand, venture capital investments by AMCs could strengthen the perception that such systems are operating as nonprofits in name only.[4] Nonprofit status facilitates large tax savings for AMCs, yet for-profit venture capital funds can be housed within these nonprofit entities. Such arrangements are possible in part because of relaxed federal criteria for tax-exempt status. In the 1950s, the Internal Revenue Service (IRS) began requiring nonprofit hospitals to provide charity care to qualify for tax-exempt status. This policy evolved to require only the delivery of services defined as community benefits and, subsequently, the performance of a Community Health Needs Assessment.[5] More recently, the IRS has, on a case-by-case basis, allowed many nonprofit hospitals to own for-profit subsidiaries without losing their tax-exempt status. What venture capital profits mean for tax exposure may be an emerging policy question.

The contrast between mission and necessity, particularly in the current funding environment, could present an uncomfortable tension for clinicians, trainees, and policymakers. AMCs have increasingly become diversified corporate entities, with venture capital investing representing one type of corporate activity. Yet these entities remain the central place for medical education, research, and charity care, which could be supported by venture capital returns. How self-governance and policy will adjudicate this tension remains to be seen.

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A Wrinkled White Coat

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It was still early. Early enough in the morning that the smells of midnight coffee still hung in the halls of the intensive care unit (ICU). And early enough in intern year that the windows still fogged against the 100-degree heat of Phoenix at 4 a.m.

I had learned the routine by now, even though it was only late July. Round on patients as efficiently as possible, stopping in before families could muster from the pull-out couches, and make sure that no patient's neurologic exam findings had worsened. Send the patients who'd undergone spine surgery to the floor, keep those with subarachnoid hemorrhages in the ICU until post-bleed day 14, and make sure the pressures from any external ventricular drains didn't exceed 20 mm of water.

If anything deviated from the established plan, it was still the fact that it deviated, and not the actual situation, that caused panic. It was still early enough in my career that it surprised me, even shocked me somewhat, when things went wrong, when patients did poorly. When wrinkles appeared in the plans that I thought I was merely safeguarding, merely overseeing, not actively managing.

The patient with some shortness of breath a few days out from anterior cervical spine surgery simply couldn't have a developing neck hematoma. It was impossible that the patient with back pain a few years after undergoing a thoracolumbar fusion in the emergency department had fractured hardware. Just before the fatalism and everything-is-a-hematoma catastrophizing of later residency comes this equally reductionist and naive way of thinking that is driven by inexperience, innocence, and hopefulness. Cynicism and hopelessness arise from its eventual loss, which came for me on that early morning.

It was still early when the nurse called me back to the bedside of a patient with a ruptured cerebral arteriovenous malformation. Early enough that I hadn't yet gotten to the end of the hall, hadn't yet finished rounding, and early enough that it was still dark outside. Too early for disaster, for death.

It was still early enough in intern year that I didn't quite understand what it meant when the nurse told me that the patient had put out a copious volume of clear urine just then, or that the intracranial pressure was now remaining above 50 mm of water. This patient was supposed to be cooling down, stabilizing, kept minimally stimulated. The fact that his brain was now, as the nurse kindly helped me to see, herniating and causing an infarct in his pituitary gland was a wrinkle that I was neither expecting nor prepared to handle.

A nearby senior resident helped to stabilize the patient, but it soon became clear that no amount of heroics would save his life. His exam, which at presentation had already revealed only cough and gag reflexes, was now consistent with brain death.

The weight of the morning shifted. Our attention moved to orchestrating an apnea test — involving respiratory therapists and nurses, optimized ventilator settings and labs — so that we could meticulously and seriously prove and document what had shattered this patient's life and my own medical innocence. And then we'd have to do what for me was still unthinkable: tell a family their loved one was officially, certifiably dead.

It was still early in the afternoon when the brain death exam was complete. Early enough that the resident workroom was empty again after the morning rush. It was a Sunday, the hospital reduced to a bare-bones staff. The blinding midday light filtered in, though inside it was cold, and I rummaged around for my white coat, which sat still folded and tagged at the bottom of a cabinet.