lematic. Balancing these considerations against the real potential benefits — the removal of an inherited genetic disorder from the family lineage — is difficult.

The potential adverse effects of gene editing, in which even small numbers of off-target edits can have disastrous effects, are extreme, and safety in clinical application is rightly a top concern of researchers. But a satisfactory risk–benefit profile is not a sufficient condition for an ethical trial. A strategy for intergenerational monitoring and the other unique ethical concerns attending germline gene editing is essential for future safe and ethical clinical use.

These concerns are not necessarily insurmountable, but they are real challenges, and responsible human subjects research in the future will require their satisfactory resolution. There is no doubt about the great therapeutic potential of this technology, and everyone who studies medicine from any angle cannot help but stand in awe of the transformative potential of germline gene editing for families dealing with inherited genetic disorders. But protection of the dignity, welfare, and privacy of research participants is of the utmost importance, and no amount of therapeutic potential can justify proceeding with human experiments until that protection is secured.

Disclosure forms provided by the author are available at NEJM.org.

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DACA and the Dream of Becoming a Physician

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Teaching institutions and graduate medical education (GME) program directors must do some soul searching this recruitment season. Discontinuation of the Deferred Action for Childhood Arrivals (DACA) program — announced in September and due to take effect next March — threatens the ability of medical school graduates in this program to begin residency and the ability of those already in GME programs to continue. It remains unclear whether Congress will act in time for these physicians to complete their training. While we wait, hoping for that outcome, GME programs and potential applicants have tough decisions to make.

The DACA program, initiated by President Barack Obama in June 2012, provided a path for some undocumented children and young adults to move through our educational system and into the workforce. DACA has applied to people under 31 years of age who were brought here as children (by age 16) and have resided in the United States since 2007. Participants can avoid deportation and obtain renewable work authorization for a 2-year period.

Over the next 2 years, nearly 800,000 "Dreamers," as these young people are called, will lose these benefits as their DACA certificates expire. Among them are individuals who aspired to become physicians or other health professionals and were finally given a viable chance of achieving their goals. Some are now medical students, and a smaller number are in GME programs.

Without work authorizations, these newly minted physicians cannot be employed by teaching institutions in the United States and therefore will not have access to GME or medical licensure. These students enrich our medical and health professions schools by strengthening diversity. Medical students have reported that contact with a diverse peer group has enhanced their educational experience, and students who attended a racially diverse medical school felt better prepared to care for a diverse patient population.[1,2]

DACA students face a dilemma. Current fourth-year medical students are applying now for positions in residency programs that

begin next July, and it's likely that many have had to accrue considerable educational debt in order to reach this point. A medical school graduation survey conducted by the Association of American Medical Colleges indicates that 75% of responding 2017 graduates have educational debt: the mean level of debt is $195,000, and 11% report owing at least $300,000.[3] Residency applications involve an additional financial burden in the form of application fees and the costs of travel for interviews, averaging $2,000 to $7,000, depending on the specialty.[4]

Students must decide whether to undertake the effort and expense of applying for residency positions in light of two major risks. First, a student might apply and be accepted into a GME position but then be unable to matriculate without a work authorization if Congress has not acted to provide protected status to the Dreamers. Second, even if Congress does pass protective legislation, teaching hospitals may avoid selecting undocumented applicants because of the uncertainty about whether they will be able to matriculate.

Merit-based selection has been an important tenet of U.S. GME; upholding this commitment requires that DACA candidates be evaluated — like everyone else — on the basis of academic and other accomplishments, potential future contributions, and personal characteristics. So GME programs face a difficult choice: either screen out DACA candidates or risk having precious training positions left vacant. An empty slot in a GME program not only means a lost opportunity for another deserving candidate, but could result in additional burden on other residents, extra cost for alternative patient coverage, and potentially inadequate clinical staffing. Similar considerations arose last year with respect to applicants from countries subject to a travel ban, and uncertainty in this realm continues: A presidential proclamation issued in September sought to suspend or limit "entry for nationals of countries of identified concern" and was subsequently blocked by the courts.[5]

Residency programs are currently evaluating applications for trainees who would start in July 2018. Multipronged efforts are needed, beginning with advocacy for congressional action. Although eliminating DACA is first and foremost a social justice issue, we should ensure that our legislators also understand its impact on the health care workforce. In addition to stunting the physician pipeline, undocumented clinicians across the health professions will be forced out of health care, along with others serving in vital nonclinical roles.

Medical schools can help vulnerable DACA students target residency programs that have committed to ignoring DACA status. In addition, we recommend that schools develop backup plans with DACA students who opt out of applying for residency this year and with those who don't match successfully amid these extraordinarily difficult circumstances. Backup plans would ideally provide an opportunity to maintain clinical skills and strengthen academic credentials. Such plans might include pursuing research training or an additional degree. Assistance in identifying funding sources, such as institutional financial aid or charitable foundations, will also be important. In addition, schools may be able to facilitate student access to attorneys as they seek pathways to remain and work in the United States.

GME programs need to consider carefully how they might care for patients without a full complement of residents; many have experienced that scenario because of a resident's illness or career change and have been able to sustain staffing, care, and training with a smaller cohort.

Institutions sponsoring GME can take action by endorsing and publicly declaring a DACA-blind approach to trainee selection. Filtering out the relevant fields from electronic residency applications might be helpful in operationalizing this approach. Pledging institutional support for programs that recruit a Dreamer who cannot matriculate could be particularly important — for instance, an institution could allow its GME program to apply the unused salary line to support other caregivers, moonlighting coverage, or both. Regional cooperation might even be envisioned: residents in the same specialty could rotate from other institutions to spend elective time helping to fill a "DACA-friendly" institution's empty slot.

Finally, we propose consideration of a joint medical school and teaching hospital solution. A would-be intern who cannot obtain work authorization might continue as a fifth-year medical student, tuition-free, doing rotations in his or her chosen specialty. Such an option could be structured as a yearlong "subinternship," in which the student gets needed training and the teaching institution gets the clin-

ical care that it was counting on. Conceivably, these fifth-year students could remain on the roster of their "home" medical school while on "away rotations" in the GME program with which they have matched. Once the DACA protections are restored through another mechanism, certification and licensing organizations could be petitioned to count the additional time in medical school toward fulfillment of residency and specialty-board requirements.

As physicians and as educators, we believe we must stand behind undocumented students and trainees. These individuals have chosen a path of service, and undoubtedly many have sacrificed to pursue those dreams. Our country needs caregivers — and needs greater diversity among our physicians. We urge Congress to enact protections that will help these Dreamers while supporting the health care workforce overall. In the meantime, schools and teaching hospitals will have to find creative — though we hope short-term — solutions.

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The Code, the Cloud, and the Doppler

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Janna insisted that the oscillator made the perfect white noise machine. It was almost loud enough to drown out the heart-rate monitor. Even so, when Kynslee's heart rate, blood pressure, or oxygen saturation went out of range, a louder alarm would blare and flashing red lights would bring the nurse in. Turn up the oxygen. Turn up the pressors. When medication infusions were completed, another pump would beep, and Janna would jump up. "It's not her vitals. It's just the antibiotic finishing," I reassured her.

On the sixth evening, I finally convinced Janna to go home and sleep. "I've got this, honey," I said. Before leaving, she took another look at our daughter's 2-year-old frame, which shook slightly with the oscillator's rhythm.

Eight hours later, I was standing outside Kynslee's room with the ICU fellow. The respiratory therapist brought us the newest blood gas results. "That has to be wrong," the fellow said — P_{CO_2}, 150. A repeat test showed the same result. "Something is wrong with the circuit," he said.

The respiratory therapist disconnected Kynslee's breathing tube from the oscillator circuit and attached a bag valve mask. "I'm getting a lot of resistance," she said. "No air is going in." Still standing at the door, I watched as my daughter's oxygen saturation dropped to the 50s.

The flashing red lights came on. Residents, nurses, and the attending physician flooded into a room that was too small to hold them all. Kynslee's heart rate dropped from 120 beats per minute to below 60. Bradycardia.

"Start chest compressions!" the attending yelled. "We need to exchange the ET tube!"

Time and space broke.

I was a younger man, a paramedic again. I tried to save people. But none of the patients I performed CPR on in the field had survived. This was pediatric CPR in the hospital, though. Survival rates are better. If bradycardia is the initiating rhythm, 22 to 40% survive.

Suddenly, I was an elderly man, my legs too weak to hold me up. I sat down and watched from the window. I glanced at the clock at the bottom right corner of the nurse's computer. A prolonged