issue directly, the Third Circuit Court of Appeals held that, although prisons could consider expense when devising treatment plans, cost considerations could not trump medical judgment.

Several states are pursuing innovative strategies for increasing DAA access at reasonable cost. Louisiana and Washington State, for example, have negotiated agreements with manufacturers allowing them to pay a fixed price for unlimited access to a particular DAA for their Medicaid and correctional populations.[5] The scalability and long-term cost-effectiveness of this so-called Netflix model are unclear.[5] But any substantial improvement in DAA affordability will probably strengthen Eighth Amendment claims for access.

Prisons are propitious places to intervene to stem the HCV epidemic; they present a captive population with a common disease for which a cost-effective treatment exists. Treating HCV in prisons may also reduce transmission in the general population, especially if treatment programs are linked to efforts to prevent reinfection and ensure post-release care. Courts could force the government's hand if many decide to recognize a broad constitutional right for incarcerated people to receive DAAs. Alternatively, if *Dawson* and *Roy* foreshadow the direction of litigation, this right will be narrowly construed and, for most incarcerated people, virtually any care for HCV will be considered adequate for Eighth Amendment purposes. We believe setting the bar that low is a problematic way to evaluate adequacy of treatment when highly efficacious therapy is available. Analysis should instead focus on the size of the gap between the treatment (if any) available to incarcerated people and the standard of care in the general community as well as the health effects of this disparity. By this metric, the constitutional case for wider access to DAAs in prisons is compelling.

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

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HISTORY OF MEDICINE

A National Medical Response to Crisis — The Legacy of World War II

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This August marks the 75th anniversary of the conclusion of World War II. In history's largest, most destructive war, an estimated 80 million people, or roughly 3% of the world population, died. Nearly 420,000 Americans were killed, and 670,000 were wounded. These grim numbers were mitigated, however, by an incalculable number of lives saved as a result of medical care. Many of the advances that were made would persist long after the war concluded — a silver lining that we hope will have parallels in our current struggle with Covid-19.

A reductive argument that "war is good for medicine" would minimize the horrific human cost of combat. Yet multiple scholars have highlighted how the urgency, aura of crisis, national attention, and material resources inherent in organized armed conflict have catalyzed developments in medicine and surgery.

George Washington successfully inoculated his army against smallpox, demonstrating the value and efficacy of that public health intervention. Walter Reed helped elucidate the epidemiology of typhoid and yellow fevers during the Spanish–American War and its

immediate aftermath, which led to effective control methods. Efforts to care for wounded veterans after World War I contributed to the rise and professionalization of physical and occupational therapy.

But the unprecedented scale and intensity of the Second World War created a particularly fertile environment for U.S. medical and surgical innovation. Moreover, whereas government involvement had generally dissipated after previous wars, World War II marked the commencement of a long-term, deeply integrated relationship between government and medicine that continues to shape the U.S. research agenda.

The story of penicillin, one of the war's most successful and best-known medical developments, highlights the involvement of the federal government in translational research.[1] In 1928, British physician Alexander Fleming had noted by chance that the mold penicillium appeared to kill bacteria — a discovery that was publicized around the world but then lingered untapped for a decade. In 1941, the U.S. government, contacted by Oxford researchers Howard Florey and Norman Heatley and recognizing this drug's potential, sponsored a national effort to discover and implement a more efficient production system, an undertaking on the scale of the Manhattan Project. By D-Day in 1944, there was abundant penicillin for wounded soldiers, and by 1945, both service members overseas and civilians at home had ready access to the drug. The requisite scientists, laboratories, and production facilities would never have joined together in peacetime or through private industry alone. Other therapies, such as chloroquine and radioisotopes, have similar histories.

In addition to providing massive resources to stimulate innovation, the government leveraged its hierarchical chain of command to deliver and use new technologies at unprecedented scales, as exemplified by the proliferation of blood transfusions.[2] The devastation of World War I had led to active investigation of shock, and research elucidated the crucial role of whole blood. Yet daunted by the logistics of supplying fresh blood to forces fighting across the Atlantic and Pacific Oceans, the U.S. military in World War II initially relied on substitutes such as albumin. Publicly declaring the situation unacceptable in a widely read 1943 *New York Times* article, Edward Churchill, the chief surgical consultant for the Mediterranean theater of operations, helped transition the military to blood-based resuscitation. This switch required a herculean logistical effort in the United States to collect, type, and transfer blood to far-flung military hospitals. By war's end, fresh whole blood was widely available to U.S. casualties.

The ability to alter practice by fiat and the organization required for implementing such developments globally and rapidly similarly advanced the surgical management of colon injuries and psychiatric care for battle fatigue, among other examples. And such changes endured long after the war. Before the war, for instance, blood banks were uncommon and chiefly local affairs, serving the needs of individual institutions. The processes institutionalized in World War II, with the American Red Cross assuming a leadership role, ultimately led to a network of blood banks in a decentralized yet national system that effectively supplied communities throughout the country with needed blood.

World War II also fundamentally transformed health care provision nationwide. By rewarding physicians' board certification with rank and pay, the military catalyzed medical specialization in post-war America. Equally important, it remade the Veterans Administration (VA; now Veterans Affairs) hospital system.[3] Whereas the VA had previously focused on patients with tuberculosis and mental illness, after the war, it came to manage a range of acute and chronic conditions. Increasingly affiliated with academic medical centers in the 1950s, VA hospitals proliferated and broadened their capabilities to create a functionally parallel, government-run health care system that now treats approximately 10 million veterans per year.

The war similarly stimulated the expansion of private health insurance. During a 4-year wage freeze, U.S. companies began attracting employees by offering health insurance — a previously rare benefit that brought coverage to millions of workers and their dependents and fundamentally reshaped the delivery of health care in this country.

The government's involvement in medical research outlasted the war. Before the 1940s, the federal government had had little interest in or influence on medicine during peacetime; what minimal research funding existed came from private sources. Today, the National Institutes of Health alone provides about $41.7 billion in annual research support. In recent years, the U.S. military has

separately spent about $50 billion per year on health care, including $2 billion on research — accounting for a sizable percentage of the national research budget.[4] Although much of this attention is focused on military concerns such as trauma, in other arenas, such as antimalarial drugs and cold injury, the military has led investigative efforts decades after civilian attention has faded. Just as a military–industrial complex arose in the 1950s, a parallel military–medical complex emerged that leveraged the Cold War's quasi-wartime footing to marshal significant resources and shape the evolution of U.S. medicine.

For the past few months, the world has been dealing with another global crisis, the Covid-19 pandemic. Politicians, clinicians, and the public have been quick to draw analogies with war, describing a "battle" against an "unseen enemy," led by a "wartime president." War and pandemics clearly differ. Attention during a pandemic focuses on a single disease rather than on the myriad medical problems created by warfare. Commercial interests and personal freedoms vie with public health considerations, without regard for the imperative of military victory. An unruly, disorganized, international mass of civilians account for the bulk of patients, and they are treated in independent health systems that don't coordinate with one another and thus lack the benefits that a martial command structure provides. Moreover, such comparisons can have unfortunate, unintended social consequences, such as alienation of people seen as "others" and compromise of safety standards for the sake of efficiency.[5]

Yet Covid-19 has also prompted a governmental response similar to that seen during wartime, characterized by a large influx of resources and attention. Legislatures have allocated trillions of dollars to fund direct and indirect means of stemming the spread of disease. Clinical trials are being expedited, and therapies are being adopted much more readily than under normal conditions — with less reliable data to validate them. The Defense Production Act, intended for times of armed conflict, is being used to mandate repurposing of industrial facilities for ventilator production.

In 75 years, it will be intriguing to reflect on the lingering effects of Covid-19 and our response to it. Certainly, it seems already to have normalized telehealth in previously unimaginable ways. We hope that it will also lead to the development of a more equitable infrastructure for health care delivery. History has proven that as the threat of a war or pandemic fades, interest and resource investment also decline. Yet for all their common horror, these events also have analogous potential to catalyze and reconfigure development in medicine and public health. Such moments of shared crisis merit reflection as we consider our collective medical and social priorities and interventions moving forward.

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