Breath by Breath

Michigan's role in treating polio helped build today's intensive care units.

BY JAMES TOBIN

MEDICINE NOW SEEMS unimaginable without the intensive care unit. Yet the ICU is a comparatively new approach, with roots in the treatment of polio at Michigan only 50 years ago.

Starting with a terrible outbreak in 1916, poliomyelitis devastated thousands of American families — and frightened millions more — for decades. The poliovirus struck mostly children and young adults. In a deep irony, most of its victims had grown up with clean water and good hygiene, so they never developed natural immunities.

The infinitesimal virus passes through most people unnoticed. In the unlucky, it destroys cells of the nervous system. Some infections are so mild they cause only a passing weakness. Others cause permanent paralysis. Sometimes stricken muscles recover after the early, acute phase, sometimes not. In the worst instances the virus shuts down the nerves that regulate the lungs. Most of these patients — a small but tragic minority of all polio cases — die.

Physicians grew desperate for any means to help children threatened by the respiratory form. In the 1930s, James L. Wilson, M.D., soon to play a key role in polio treatment at Michigan, described the ordeal: "Of all the experiences the physician must undergo, none can be more distressing than to watch respiratory paralysis in a child with poliomyelitis."

At Children's Hospital in Boston, Wilson and other doctors enlisted the help of a Harvard engineer to improve on designs that replicated the work of the lungs and supplied electrical power. His respirator was an airtight tank encasing the body up to the neck. Inside, a vacuum was created and released in the rhythmic pattern of breathing. The varying pressure would draw air in and out of the lungs.

Wilson and his colleagues debated whether to try it on humans. The question, he recalled, was "whether respiratory muscles could spontaneously recover or whether, once we saved a polio life with the machine, the patient would have to live in it for the rest of his life. There was no experience to guide us, but there was a feeling that since some muscle power did come back in the arms and legs [of other polio patients], it might come back in the respiratory muscles and therefore the attempt was justified."

It was cumbersome, but it worked. For many children, it became a life-saving vessel that carried them through the acute phase. Many, not all, could be weaned off it after a few weeks, then recover on their own, partially or fully. As Howard Markel (M.D. 1986), Ph.D., the George E. Wantz, M.D., Distinguished Professor of the History of Medicine and director of the Center for the History of Medicine, has noted, "the artificial respirator was one of the earliest successful attempts at employing man-made devices for the treatment of human disease." (Its nickname became famous. "I don't know the origin of the horrible name 'iron lung,'" Wilson said later. "I think some reporter first used it.")

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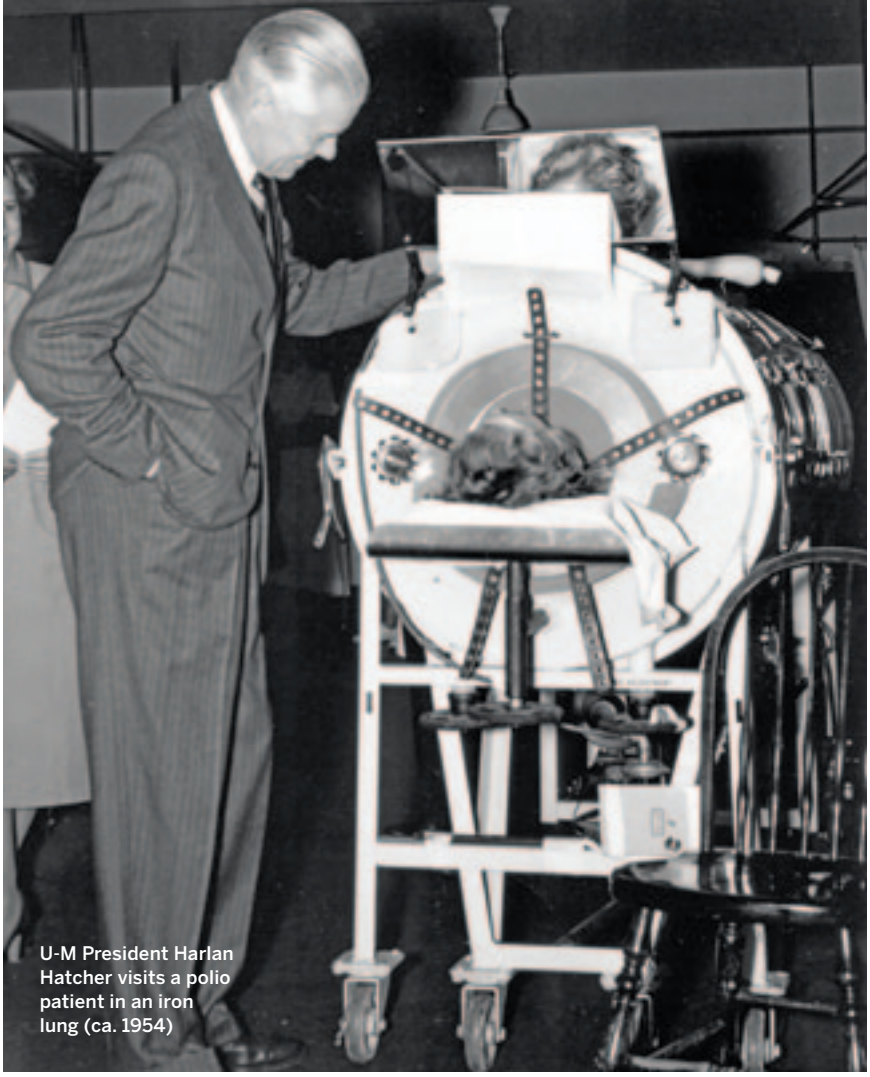

U-M President Harlan Hatcher visits a polio patient in an iron lung (ca. 1954)

James Wilson

David Dickinson

But in wide service iron lungs proved vexing. They took a lot of skill. Yet patients needing long-term care in the respirators were relatively few and widely scattered, so many doctors didn't acquire sufficient expertise. Some used the respirators only as a last resort, too late to save lives, and iron lungs became associated in many minds with death, not life. A growing number of patients, as the doctors had feared, couldn't be weaned from the machines; they faced a grim imprisonment. As polio grew to a terrifying crescendo at mid-century, someone had to figure out how to make better use of the iron lungs.

This urgent need was tackled by the powerful National Foundation for Infantile Paralysis, better known as the March of Dimes. In the late 1930s, the foundation asked Wilson to study the problem.

"This is when I developed the concept of a respirator center ...," he recalled later, "so that patients could be brought to the center rather than bringing machines to the patients, since I thought experience was worth a great deal in their care."

With the collaboration of Wilson, March of Dimes medical director Kenneth Landauer, M.D., and others, the idea took shape. Iron lungs would be concentrated in major medical centers, where specialists trained in respiratory physiology and the equipment would maximize the machines' effectiveness and help wean patients off them.

Ultimately, the March of Dimes funded 13 new centers at academic medical centers across the country. Wilson, who became chair of pediatrics at Michigan in 1944, was the key organizer of the center at Michigan, the third in the nation.

Its first director was David G. Dickinson (M.D. 1945, Residency 1950), who showed deep compassion for the patients who struggled to emerge healthy from the iron lungs. He insisted that "meticulous attention must be given" not just to the patient's medical care but to "practical, personal and emotional problems." Dickinson later became chief of clinical affairs at C.S. Mott Children's Hospital and director and CEO of University Hospital.

Polio vaccines and positive-pressure ventilators soon made iron lungs obsolete, yet they were crucial stepping stones. They helped many patients past life-threatening crises, and were the catalyst of respiratory centers — the forerunners, as Markel has noted, of today's intensive care. [M]

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