The Twentieth-Century Plague
by Christopher J. Rutty
CHILDREN ARE ATTACKED BY STRANGE EPIDEMIC.

Twenty Cases of Fever and Infantile Paralysis — Once Swept Over the States.

Hamilton, Ont., Aug. 17. — An epidemic of poliomyelitis, or infantile paralysis, a comparatively new disease, which is attracting much interest among medical men the world over, has broken out here. — Toronto Star, August 17, 1910

Almost a century after this news item appeared, very similar newspaper headlines heralded the arrival in Canada of SARS, or Severe Acute Respiratory Syndrome. The sudden emergence early in 2003 in China and swift global spread of this new and perplexing infectious disease had a dramatic impact on the countries and cities it hit, particularly Toronto, not to mention the people affected. The SARS crisis of 2003 focused sharp attention on Canada’s public health infrastructure. In a desperate search for useful lessons, it also prompted many to wonder how epidemic diseases, particularly “new” diseases, were experienced and managed in the past.

Canadians last faced a major public health crisis during the summer of 1953 when most of the country suffered the worst epidemic of paralytic poliomyelitis in its history—a national emergency that followed over forty years of worsening epidemics. While Canadians have faced other infectious disease threats since 1953, none have been as publicly and politically prominent or emotionally challenging as polio. Nor have they been as dramatically brought under control: the development and supply of polio vaccines was very much a Canadian success story.

While epidemic polio was frustrating and frightening for physicians and parents, its escalating public health and financial threat, particularly to middle-class families, catalyzed and galvanized a broad range of creative Canadian responses towards understanding this disease, treating its paralytic effects, controlling epidemics, managing aftercare, and ultimately preventing and eradicating it. Yet for more than forty years, it took its toll.

The first North American outbreaks of paralytic polio were reported in the 1890s, but by 1910, polio incidence levels reached a new threshold, striking mainly parts of Canada and the United States. The first polio cases in Canada that year appeared in Hamilton, Ontario, where a little girl, thought to be suffering from hydrophobia, was taken to Young polio patients (above, left) convalescing at Project Elizabeth Hospital in Winona in the early 1950s. Note the bag brats on some of the children. Spreading algae (near left) in Calgary in 1954, in the late 1940s and early 1950s, before the discovery of the bacillus, BTV was used to control the housefly population, which was thought to be a carrier of the disease. Most uses of the pesticide were banned in Canada in 1974.

hospital, where she died. The Toronto Star reported that she was a victim of “infantile paralysis.” Canadian medical authorities of the day recognized that infantile paralysis was not a new disease. Medical journals often quoted descriptions of cases from ancient Egyptian tablets and eighteenth- and nineteenth-century doctors. But what could not be denied was that polio was now a new epidemic disease.

The 1910 Ontario poliomyelitis outbreak continued through the late summer and fall of 1910, with cases soon appearing in Toronto, Windsor, and Niagara Falls. One of the more disturbing elements was the number of adults struck by the disease who died due to chest muscle or throat paralysis. (I am not sure if this information was available at the time of this crisis.)

The financial impact of poliomyelitis was soon apparent to officials of the Hamilton Board of Health. While they had quickly posted placards on affected homes warning of the presence of the disease, the members went further to garner the effects of paralytic polio than they had done with any other infectious disease; it was felt that city council should provide a special fund ‘in case for the massaging of polio victims who couldn’t afford to pay for it themselves. It was primarily intended for middle-class families too rich for charity, but not rich enough to pay for private nursing and otherwise vulnerable to financial hardship and sudden poverty, particularly if the family breadwinner fell victim. Though it’s unclear whether the City of Hamilton implemented the plan, provincial health departments across the country took up the idea to varying degrees as the epidemics went on, and the federal government required that “children under sixteen years produce a medical certificate dated within twenty-four days of the

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The federal government did not establish a formal department of health until 1919, after the great influenza pandemic of 1918-1919.
What is polio?

Poliomyelitis is a highly infectious disease caused by three distinct types of polioviruses, of which humans are the only natural host. Almost all poliovirus infections are mild, invisible, and immuno-suppressed, confined to the gastro-intestinal tract and spread primarily via fecal-oral contact. But if the poliovirus invades the nervous system and damages the motor neurons of the spinal cord, weakness or paralysis can result, usually affecting voluntary muscles. Five to ten percent of cases die because of paralysis of breathing and/or swallowing muscles.

After centuries as an invisible, harmless, and endemic virus, with only rare, isolated cases of "infantile paralysis" reported, outbreaks of paralytic polio rose as sanitation and public health standards improved. Ironically, as parents tried to keep their infants and toddlers clean and isolated from the "dirt" and other young children, paralytic polio became more of a threat. Inseminated exposure to germs meant immune systems that couldn't fight the virus. This led growing numbers of children (and their older siblings and parents) susceptible to nervous system infection when they were inevitably exposed to the poliovirus at a later age — particularly when they first entered school — when their immune systems were less able to respond as effectively. Rapidly growing in numbers and increasingly obsessed with personal hygiene, middle-class families in northern Europe, Australia, and particularly in the new suburban areas of North America, thus became most vulnerable to paralytic polio, especially during the post-World War II baby boom.

In 1927, when polio once again took on epidemic form in Canada, it was British Columbia and Alberta that were hit first. The disease then seemed to march eastward each year, striking Manitoba in 1928, Ontario in 1928 and 1930, and Quebec in 1931 and 1932. In these years, management of the disease was conducted with an immune serum, known as "convalescent serum," which was prepared from the blood of recovered cases. While people were comforted with articles in popular publications like Canadian Magazine that declared convalescent serum a "safe, sure, and widespread means" to combat poliomyelitis, doctors and public health authorities were less assured. Although many prominent doctors and period fought polio with the serum, providing it free of charge, the value of the serum remained unclear. There was no properly controlled evaluation of its effectiveness because no doctor was willing to withhold it from a child and face the wrath of parents.

The second worst polio year in Canadian history was 1937. Almost four thousand cases were reported across the country, with Ontario officially reporting 2,546 cases and 119 dead — the most seriously hit. The site, severity, and dramatic intensity of the epidemic came as a major shock to the province. News reports and human-interest stories filled the province's newspapers, especially in Toronto, detailing school closings, convalescent serum, and other dramatic public health measures imposed by the local and provincial health departments. The press coverage also underscored the debates that persisted among doctors, public health authorities, and politicians over the effectiveness of strict quarantines, school closings, and other measures such as keeping children from such public places as pools, movie theaters, and the Canadian National Exhibition.

With polio preventing uncertain and no vaccine foreseen, pressure grew on provincial governments to take a leading role in responding to the disease. Following the 1937 epidemic, the Alberta government built a fully equipped sixty-bed hospital to provide adequate "after-treatment" for polio victims. In Ontario, faced with an unprecedented
number of disabled children in the wake of the 1937 epi-
demic, the provincial government established a program of
free standardized treatment and hospitalization for all para-
lytic cases for a three-week period. Because strict immobi-

cization was thought to prevent "unnecessary deformities,"
the province freely supplied standardized splints, braces,
and Bradford frames, which ensured the complete immobi-
lization of patients for long periods so motor neurons dam-
aged by the poliovirus could recover. At the end of the period
of free hospitalization, parents were instructed on caring for
their polio children at home. Other provinces responded
similarly when polio incidences became acute.

Meanwhile, the search for a cure continued. The Ontario
government sponsored in experiment on five thousand chil-
dren of a nasal spray thought to block the poliovirus from
entering the nervous system. It not only failed to prevent the
disease, in some cases it caused children to temporarily lose
their sense of smell, while others lost it permanently.

Treatment, too, advanced. The 1937 epidemic brought
alarming numbers of paralytic polio cases in which breathing
was impaired, requiring the use of an iron lung. As the epi-
demic began, only one iron lung existed in Canada, located
in the Hospital for Sick Children in Toronto, and it was in use.
When a boy was admitted with trouble breathing, the doc-
tors and engineers at the hospital sprang into action and
built a wooden lung out of plywood and an experimental
respirator for premature infants. While this homemade lung
saved the boy's life, it provided no solution to the growing
demand. Commercial iron lungs were available, but they
couldn't be delivered in time. Instead, over six weeks, the
hospital assembled in its basements twenty-seven iron lungs,
paid for by the Ontario government, and rushed shipped to
wherever they were needed.

The strict-immobilization approach to polio treatment

Some of the twenty-seven iron lungs (top) manufactured in the basement of
the Hospital for Sick Children in Toronto during the 1937 polio epidemic.

Elizabeth Kenny demonstrating her revolutionary polio treatment methods
in Montreal in 1949. Ryes in Australia in 1888, Sister Kenny, as she was
known, ("sister" being the British designation for "nurse") developed the
theory of muscle reeducation — retaining of muscles so they could function
again. This was contrary to the conventions of the day, which promoted the
immobilization of affected muscles with splints.

4 Type of polio that affects nerve centres in the brain seen the control swallow-
ing and talking.
was also changed in these later years. Under the leadership of Australian nurse Sister Elizabeth Kenny, heat to relieve pain and passive movement to reeducate the affected limbs became the preferred therapy. In doing so, she revolutionized polio treatment, in part because she and other nurses took much of the pressure and frustrations of therapy away from the medical profession.

Polio incidences fell during World War II, but between 1946 and 1953 they struck again, more severely, and in more parts of the world than ever before, including, during the winter of 1948–1949, the Canadian Arctic. Improved hygienic standards, more rapid international travel, a sharply higher birth rate—especially in North America—led to the sharply rising incidence, which reached a crescendo from the summer of 1953 into early 1954. Most disturbing were the high numbers of bulbar cases among young adults. Many hospitals filled rooms with iron lungs. In October, at the King George Hospital in Winnipeg, ninety-two people were dependent on the machines. The Royal Canadian Air Force was dispatched to Boston to pick up respirators. When a thundershower knocked out power at Edmonton's Royal Alexandra Hospital, nurses were forced to manually pump each iron lung until power was restored.

SYNYTHETIC POLIO VACCINE PREDICTED BY RESEARCHER

Within a few years it is likely an anti-polio vaccine may be produced synthetically, said Dr A.J. Rhodes, of Toronto, addressing doctors from Western Ontario yesterday.

—London Free Press, October 2, 1947

Andrew J. Rhodes's prediction was made shortly after he was appointed to the University of Toronto's Connaught Medical Research Laboratories to lead an expanded polio research program. Rhodes, a leading virologist from England, arrived in Toronto at a time when there was a substantial postwar renewal of scientific energies towards solving the enigma of polio. However, progress remained stymied until 1949, when a way was finally found to grow the poliovirus in a test tube, instead of having to rely on mon-
From the Montreal Daily Star, August 12, 1946.

In 1946 - Martin maintained his confidence. The Canadian immunization campaign continued with no problems. - Canadian trials to the vaccine blistered Jonas Salk’s bruised resolve and attracted considerable American press and political attention, sharply highlighting, among other things, the differing approaches to public health in the two countries.

The Salk vaccine struck a cripping blow to paralytic polio, but it was not the final answer to bringing the disease under control. Once the great publicity over the vaccine eased, ensuring high immunization rates among schoolchildren became more challenging. An unexpected post-vaccine wave of epidemics hit several provinces between 1968 and 1969, prompting renewed vaccination campaigns, especially among aboriginals, who remained vulnerable to polio during this period. This induced Connaught to develop, mass produce, and test the live Sabin polio vaccine, which, given on a spoon of a sugar cube, was cheaper and easier to administer. (The Sabin vaccine was licensed in Canada in 1962.)

Meanwhile, the Salk vaccine became an important international prestige item for Connaught, which soon exported it to countries that would otherwise be without any protection against polio’s growing worldwide threat. In Canada, the success of Salk galvanized a broad range of creative initiatives from governments, both provincially and federally, to control and ultimately prevent the disease and provide a variety of free health care services to those stricken by it, regardless of income. As such, it was an important milestone in the evolution of Canada’s universal health care system.

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