

The Saskatchewan Response to Poliomyelitis

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Abstract

Saskatchewan's poliomyelitis experience occurred within a context of national and international epidemics. Canada's response to polio, characterized by government-led intervention to promote the development of scientific solutions and increasing free access for victims and their families to new health services, was entirely different from that of the United States. Canadian contributions to the long international fight against polio, although not well publicised, were critical to the eventual elimination of the disease in North America and beyond.

Saskatchewan benefited directly from and participated in these developments. The province provided **early free health service and therapies** to polio victims and their families, and was proactive in setting up **polio hospitals** and clinics. Saskatchewan was a leader in **tracking polio victims**, in **reviewing its service** to victims, and in **investing in patient rehabilitation**.

The Prince Albert field test of 1961, carried out by the Saskatchewan Provincial Laboratories and Toronto's Connaught Medical Research Laboratories, was the **first urban community field test** of the trivalent Sabin vaccine in the world.

Saskatchewan's province-wide vaccination program of 1962-63 was **unique in Canada** for its comprehensive coverage, including adults, and represented a massive logistical undertaking.

The Saskatchewan Response to Poliomyelitis

1. Introduction

Poliomyelitis is an ancient, mostly harmless infection of the intestinal tract which causes flu-like symptoms. The first known case was illustrated in an Egyptian carving of about 1200 BC. The World Health Organization hopes to eradicate it by 2005. Formerly known as “infantile paralysis”, polio has until relatively recently been an isolated childhood ailment world wide.

In Canada, evolving public health traditions, on both the national and provincial scenes, favoured free access to health care and government supported non-profit medical and scientific research. The scientific contributions Canada made to the larger polio vaccine story sprang from this tradition. Polio has had an important effect on Canada, while Canada had a major impact on the international history of polio. This complementary situation is rare in Canadian medical history. (Rutty 1996b; Bliss 1982)

During the 1950s Saskatchewan experienced the fear and devastation of a major “Summer Plague”, and rose to the challenge. The Emerson iron lung in the WDM collection will be featured in the polio section of the Health Story module in the 2005 exhibits at Moose Jaw branch. Dramatic lighting and a mannequin are envisaged to increase the impact of this artifact. Audio clips, telling of life in an iron lung and polio treatment in Saskatchewan, and leg braces, crutches and boots will contribute a personal, human dimension to what might otherwise be just a machine sitting in a gallery.

2. What is Polio?

Before modern sanitation, the polio virus occurred commonly in many populations. While most people had been exposed to it, few were affected because of the antibodies they carried. Babies were protected by antibodies passed on to them in the womb and in breast milk and then by repeated exposure in childhood from open sewers, contaminated food and water, and playing in the dirt. There had been small outbreaks here and there around the world, but they were isolated and widely spread in time.

It took a very long time to understand this apparently mysterious disease. From its medical description in 1789, through the discovery of the virus which caused it in 1908, to a better understanding of the damage it does to the body in the late 1940s, it was not until the early 1950s that a vaccine was developed and tested. A second vaccine became available in the 1960s. Post-polio syndrome now threatens many former victims of the epidemics. (Paul 1971; Gould 1995; Halstead and Grimby (eds.)1995; Rutty 1997b; Smith 1990)

In its natural or wild form, the virus which causes polio thrives only in humans. The tiny ribonucleic acid (RNA) virus is spread by invisible carriers, through faecal-oral contamination, and exists in three related strains. After entering the body through the mouth, it travels to the spinal cord and the motor neurons which control voluntary movement of the body. Infection is most easily fought off early in life before it causes lasting damage. In the past, we developed antibodies to the polio virus naturally as we were exposed to it in our normal everyday activities. Then, threatened by recurring serious polio epidemics, we created antibody protection by vaccinating ourselves. Now that polio has become rare in our part of the world, vaccination is done less and less, to prevent accidental infection by the very vaccines that we developed to

prevent polio.

At first, infection by the polio virus damages the motor neurons of the spinal cord. Symptoms include headache and fever. Those victims with no natural antibodies, or who have not been vaccinated, will be hit with further and more damaging infection of the entire spinal cord and brain stem. About two weeks later, the onset of paralytic polio begins. The acute phase of the illness is characterized by high fever, vomiting, muscle stiffness, and intense headache and muscle pain, followed by varying amounts of weakness or paralysis, often permanent, in one or more parts of body. Often the arms, legs, feet, hands, and back are affected. Children ages four to fourteen are most vulnerable. The sensory neurons are not affected: paralysed muscles are often wracked by pain. “Bulbar” polio strikes nerves in the upper spinal cord and brain and causes deadly paralysis of the throat and chest, and sometimes even the heart.

2.1 How Did the Epidemics Happen?

The fearful rash of epidemics in North America and Europe of the 1940s and 1950s were, ironically, closely related to improvement in living standards: modern sanitation, better hygiene and food handling, and improved water quality, especially in towns and cities. As conditions improved and fewer people were exposed to the polio virus, sectors of the population gained no natural antibody protection against the disease. With postwar changes in the status of women and rise in disposable incomes came a de-emphasis on breast feeding and new babies’ feeding formulas began to be marketed as being better than mothers’ milk. This resulted in fewer antibodies being passed on and a new generation of unprotected children, an ironic result of twentieth century public health progress, and one felt most strongly among those most confident in their modern sanitized environment. Demobilized Second World War soldiers returning from eastern Europe, Asia and Africa were a major factor in bringing the polio virus home. (Rutty 1995:385; Koop 1998) When polio struck, the effects were devastating. The crisis was exacerbated by the poor understanding of how polio spreads and by the lack of any means to combat it by the scientific and medical communities at the time.

3. An Overview of Polio in Canada

Polio was a minor player in the game of devastation by infectious disease in Canada. There were a total of 50,000 cases and 4,240 deaths from infectious diseases and chronic killers such as chickenpox, diphtheria, measles, mumps, whooping cough, polio, scarlet fever, tuberculosis and typhoid fever in Canada between 1927 and 1962. However, the panic and fear that polio epidemics created made it one of the most dramatic infectious diseases of the 20th century. A magazine article described the threat of polio in the 1930s as a “...ragged grey ogre [stealing] across the country pointing here and there to its victims with fiendish impartiality.” (Davies 1934:34-35)

Polio has been known to exist in Canada since about 1910. In epidemics which started in 1927, 1936, 1941 and 1952 there was a general trend of infection arising in the west and travelling province by province eastward. Most victims until the late 1940s were not hospitalized: they were treated at home, usually by their mothers, with absolute bed rest, immobilization of affected limbs, fresh air, a good diet and, sometimes, massage and heat.

3.1 Early Treatment for Polio

The 1920s tradition, especially in the west, of provinces providing free injections and setting up tuberculosis and venereal disease clinics was a valuable stepping stone to progressive and generous polio policies and programs to help individuals, families and physicians survive the long term financial and psychological threat of polio. During the 1930s, **prophylactic convalescent immune serum**, derived from the blood of polio victims, was given free to victims. Although it was eventually discovered to have little effect on polio, its use continued in Canada into the 1940s, since there was no other effective therapy for the growing number of cases.

The 1937 epidemic was infamous for its unprecedented numbers of **bulbar cases** of respiratory and/or throat paralysis. It was at this time that the “**iron lung**” became an icon of polio. As Rutty says, “The iron lung symbolized the disease and its worst possible effects while at the same time it provided the medical community with a specific and hopeful technological tool against them.” (Rutty 1995:116-117) Other equipment used included the Bradford frame and splints.

3.2 Canadian Public Health Traditions

As poliomyelitis epidemics worsened, from 609 cases and 193 deaths in 1927 to the peak of 8,878 cases and 494 deaths in 1953 (see Table 1), the response from Canadian governments escalated. New precedents were established in the **free and unconditional provision of public health care** services. No other single infectious disease prompted such a broad public response in Canada. The press participated by publishing emotional stories and photographs of victims.

Although health care was traditionally a provincial responsibility, the frightening escalation in polio cases after the Second World War galvanized the federal government into intervening in the control and evaluation of emerging medical solutions to the plague. Supported by contributions from the federal government and the provinces, research into polio and the development of vaccines was carried out over many years at the Connaught Medical Research Laboratories in Toronto in association with University of Toronto’s School of Hygiene. (Rutty 1995:46) These institutions, and the leadership of Dr Robert Defries, were vital to the evolution of public health in Canada. It was through Defries’ direct leadership that Connaught developed the post-war methods and capacity that proved so important for the large scale production of the Salk inactivated polio vaccine. (Rutty 1996a; Defries 1968)

The advances made there were accessed directly by the provinces through their representation on the Dominion Council of Health. **Solutions provided to the provinces** included convalescent serum, nasal sprays, the gamma globulin program and both Salk and Sabin polio vaccines.

3.3 The Kenny Revolution

Sister Elizabeth Kenny, a former Australian Army nurse who had developed a method of massage and hot packs to treat muscles and limbs damaged by polio, was a burr under the saddle of the international medical establishment. Condemned by an Australian Royal Commission for methods they called “dangerous, damaging, costly and cruel” (Cann 2000), this “volatile,

imperious, outspoken woman” (Swanson 1999) had a huge impact internationally on the treatment of polio cases.

The Kenny method, as it came to be known, consisted of the application of hot packs and the massage and manipulation of affected limbs. Abhorring such treatments as immobilization and splints, she developed a **hospital-based treatment program**, which de-emphasised home treatment, physicians and parents, and relied heavily on nurses and physiotherapists. Her therapy was quite successful at relieving patients of pain caused by spasming muscles. Eventually, in part because of the need of governments and physicians to be seen to be doing something about polio in the absence of effective medical solutions, she gained acceptance. She became a fixture in Minneapolis at the University of Minnesota Hospital, and many physicians and nurses came to train under her, including many from Canada. Her influence was pervasive, and has been credited with the beginnings of rehabilitation therapy in Saskatchewan. (Smithwick interview 2001)

3.4 National Foundation for Infantile Paralysis and the Salk trials

After 1938, the National Foundation for Infantile Paralysis (NFIP) in the United States and its annual March of Dimes campaigns had a tremendous continental influence. Established by polio victim and U.S. president Franklin D. Roosevelt, the NFIP had unprecedented fundraising success and sophisticated voluntary, patient care and polio scientific research programs. It was the NFIP who funded Dr Jonas Salk and, later, Dr Albert Sabin, in their development of vaccines.

3.4.1 NFIP Funding of Poliovirus Production at Connaught Laboratories

Because of federal support and its not-for-profit nature, the Connaught Laboratories was the only facility in North America able to produce huge quantities of poliovirus. The NFIP came to Canada and established a strong relationship with Connaught to supply all the poliovirus necessary for its massive Salk vaccine field trials of 1954. At the same time, **Connaught began to produce and double-test Salk vaccine for Canadian use**. The work done by Connaught was not publicised, by mutual agreement. The NFIP did not want the U.S. public to know that its dimes marched up to Canada, and Connaught and the federal government were unwilling to let the Canadian public know that large amounts of poliovirus produced in Canada were going south for use in United States field tests, when we had a need for it here.

3.4.2 The Salk Vaccine in the United States

The field trials in the U.S. showed the Salk vaccine to be safe in 1955, and commercial pharmaceutical companies rushed into production. However, disaster soon struck. Shocked by the paralysis and deaths which resulted from contaminated commercially-produced Salk vaccine in the U.S., the U.S. Surgeon General shut down the entire polio vaccine program there. In Canada, Connaught-produced vaccines had a perfect record, due to **better testing procedures and more controlled, non-commercial production** facilities. Many comparisons between the Canadian and U.S. programs were made in the press and medical journals. Production in Canada went ahead, and the provinces received scheduled allotments of Salk vaccine, without incident.

3.5 Sabin Trivalent Vaccine Production at Connaught Laboratories

It became apparent that the Salk vaccine had its limitations when cases of infection arose among people who had received the full three dose course. The timing of these outbreaks with the

testing of attenuated or weakened live vaccine being done by Albert Sabin at this time influenced developments in Canada. It was decided to develop, test and mass produce Sabin's attenuated vaccine at Connaught Laboratories, starting in July of 1959. While other manufacturers made separate monovalent vaccines, each of which immunized against a single strain, **Connaught prepared a "trivalent-oral" vaccine**, made up of different strengths of the three types of virus. (Rutty 1997a) By 1961, Connaught was the leading supplier of the Sabin vaccine, after the USSR whose vaccine was of questionable quality. With the "double whammy" of Salk and Sabin, polio was brought under control in Canada and other industrialized countries after the early 1960s.

3.6 Communities Mobilized in Support of Victims and Their Families

Polio epidemics demanded the mobilization of community level resources such as voluntary associations, municipal governments and medical services, to support health professionals, hospitals, victims and families in their struggle to provide treatment and equipment to deal with the disease. The path to recovery from polio was seldom easy or, as we realize forty years later, complete. The lives of survivors and their families were changed radically. Those in iron lungs were often hospitalized for months, even years, at a time. The care and treatment of infants and children required patience, dedication and energy. Many were returned to their homes after hospital treatment, where they required aftercare. **Physiotherapy was an essential component** of this. Where aftercare was not possible, some children were institutionalized or put into foster homes. The weeks spent in hospital or rehabilitation centre isolation deeply affected many victims. Children returned home to find that their peers had moved on or that they did not recognize or remember their parents or siblings. Adult victims sometimes lost their careers, even their spouses and children. Most had to adapt to working with braces, crutches and from wheelchairs. If a former occupation did not allow this, they had to find new jobs where they could adapt.

4. Polio in Saskatchewan

Events in Saskatchewan resulted from and mirrored events and developments which took place both internationally and nationally. The effects of these major events were felt by each and every patient in the crowded polio wards and clinics around the province, as the Saskatchewan government and local physicians did everything they could to bring break-through treatments and therapies to the people who needed them.

4.1 Background- Early Polio in the Province

The earliest cases of polio in Saskatchewan happened in obscurity, since national polio figures did not become available until 1924. It is known, however, that polio existed in the province in 1910 and, in 1916, 80 cases were reported, with 15 deaths. (Robertson and Riddell 1986:92; see Table 1) In these early years, and even into the 1940s, polio could not be diagnosed until paralysis had set in, and there was little that could be done for victims, beyond quarantining them at home. Most polio cases were never admitted to hospital.

4.2 Saskatchewan Provincial Laboratories' Convalescent Serum Program

The first wave of epidemics hit Canada between 1927 and 1932. At this time the medical

community in Saskatchewan, as elsewhere, depended on convalescent immune serum prepared from the blood of recovering polio victims, to minimize paralysis and prevent the spread of the disease. The **Saskatchewan government prepared and supplied it free of charge** to all diagnosed cases beginning in 1929. Dr Frances McGill, director of the Saskatchewan Provincial Laboratories, developed a convalescent serum program for the entire province. Blood was bought from polio victims at 10 cents per ml., and the serum separated out. It was then injected into acutely ill patients. (Robertson and Riddell 1986:93) Unfortunately, despite its widespread use, by 1932 it was plain that the serum was not so effective as had once been thought and its therapeutic use dwindled.

After the fortunate years of 1931 and 1932, when there were only 11 cases of polio reported in Saskatchewan, numbers peaked in 1937 at 519 cases, and 22 deaths. (Saskatchewan. Department of Public Health 1938:14; see Table 1) The Depression and the profound difficulties faced by Saskatchewan at that time focussed attention on what were often viewed as non-producing drains on the provincial and municipal systems. The responsibility for the treatment of polio was, of necessity, passed on to local doctors, hospitals and public health services. In effect, victims were treated as well as possible at local hospitals, and then were sent home for the standard treatment of **quarantine, absolute bed rest and immobilization** by splinting.

Convalescent serum was still the only therapy available. In 1937, the worst year of the wave, 114 crippled blood donors provided blood for 1,000 doses of serum which were injected into acutely ill patients by Dr McGill. (Robertson and Riddell 1986:93) Demand for the serum ended by 1940, however, once it was decided that it was almost certainly ineffective.

4.3 Saskatchewan's Aggressive Response to the Epidemic of the Late 1930s

Saskatchewan was among those provinces that experienced the worst epidemics and who thus developed the most sophisticated and generous polio policies between 1928 and 1940. With no effective treatments for polio available after the promise of convalescent serum was lost, provincial governments devised measures during the late 1930s to relieve some of the extraordinary pressures felt by private physicians fighting polio. (Rutty 1996a:7) A Manitoba medical journal summed up the distress caused by polio: "There is no disease over which the public is more apprehensive and in which both the laity and the medical profession feel so helpless than Epidemic Poliomyelitis."¹

In 1937, a 25 bed **Poliomyelitis Orthopaedic Hospital** was set up at Regina's Grey Nuns Hospital, where splints and other equipment were provided free by the Saskatchewan Department of Public Health to all paralytic cases. Over half the cases of this outbreak were paralysed, prompting the province to pay for three weeks of hospitalization and treatment in each case, and for the transport of a guardian to Regina at the end of the three weeks to receive training in "the necessary care, massage and the use of splints, in order that the treatment given in hospital might be given in the home." (Saskatchewan. Department of Public Health 1938:14, 19-20)

¹C.R. Donovan, "News Items: Epidemic Poliomyelitis," *Manitoba Medical Association Review*, 16 Sept. 1936, p. 187, quoted in Rutty 1995:9

A serious feature of the 1937 epidemics everywhere in Canada was the large number of bulbar cases of **respiratory and/or throat paralysis**, which affected breathing and swallowing and which often caused death. Iron lungs became a visible symbol of the fight against polio at this time. The feverish pace of basement production of “homemade” iron lungs at the Hospital for Sick Children in Toronto benefited Saskatchewan, as at least one of these lungs came to Regina from Sick Kids. (Rutty 1996a; Braithwaite 1974:94-103)

4.4 The Saskatchewan Polio Epidemic of the Early 1940s

The epidemic of the early 1940s coincided with the radical shift in polio therapy across Canada which has been called the “Kenny revolution”. It also coincided with the important confirmation in the United States that the poliovirus did indeed exist beyond the neural tissues of the body. The discovery of poliovirus in excretions from the gastrointestinal tract of people who did not have any apparent signs of polio or in those who had natural immunity began a revolution of its own in polio research. As well, it cast serious doubt on current public health strategies such as quarantining of victims.

Saskatchewan hospitals were very much influenced by Sister Kenny’s well publicised visit to the Children’s Hospital of Winnipeg in 1941. (Saskatoon StarPhoenix 7 March 1944) This new hands-on method of therapy gave the government something specific to offer families and hospitals in the face of medical confusion over treatment.

4.4.1 St Paul’s Hospital Polio Clinic

In 1941 Saskatchewan, with the other western provinces, again had many polio cases. During the mid-1940s, with convalescent serum and nasal sprays out of favour and polio vaccine research not yet under way, the Saskatchewan government focussed on the after-care of victims, by financing treatment and hospitalization programs. (Saskatchewan. Department of Public Health 1944:20) A small wooden isolation annex was converted into a polio ward. Medical director Dr Howard D. Hart was assisted by Dr J.C. Dundee and Saskatoon paediatrician Dr Alvin Buckwold. Mrs Olive Cowell, RN, a clinical assistant at St Paul’s and Sr A. Bonin, supervisor of the Second Floor, were released from their duties to help in the new clinic. Mr Jerry Smithwick, who operated a private physiotherapy service, was called upon to help patients and train nurses. (Clubb 1982:28-29; St Paul’s Hospital 1997:126; Smithwick interview 2001)

The Department of Public Health **covered all hospitalization charges** for patients, assisted with the necessary equipment, and the Grey Nuns set about providing the required furnishings and other supplies, as well as hiring extra nursing staff. The first patient, a young man from a Dundurn farm whose lower limbs were paralysed, arrived on 19 Aug 1943 and was immediately treated with the Kenny method. (St Paul’s Hospital 1957:16,26)

4.4.2 The Kenny Method at St Paul’s

Patients arrived rapidly by ambulance from various Saskatchewan districts to the free clinic. (Saskatoon StarPhoenix June 1944) As the number of polio cases grew, it was realized that more information on the treatment of polio was necessary. Dr Hart travelled to Minneapolis to study under Kenny herself at the Kenny Institute. The Public Health Department also sent northern nurses Pierce and Hopkins to study Kenny’s methods. They were then transferred to St Paul’s to

instruct student nurses in the care of victims. (Rutty 1995:156; St Paul's Hospital 1997:126; Smithwick interview 2001) The Medical Officer of Health, Dr Arthur Wilson, reported to the Health Board that experienced nurses were giving the Kenny method, "which usually has favorable results." (Saskatoon StarPhoenix April 1944)

Dr Hart emphasized that the treatment did not cure polio but "did prevent disabling deformities, and returned patients to active life without the assistance of mechanical apparatus". (Saskatoon StarPhoenix March 1944) Jerry Smithwick remembers how the Sister Superior wrung her hands, questioning out loud where the money was going to come from to pay for all the woollen blankets that he cut up to soak for the Kenny hot packs. (Smithwick interview 2001) Mrs Cowell performed Kenny massage and stretches in a special room that the patients called "the torture chamber". (Martyniuk 1997)

We were all "packed" as they called the treatments round the clock for a month. Hot flannel cloths were steamed, wrung out on an old wringer washer (hot as you could take them) put on your parts of body between the joints then an oil cloth and finally flannel cloths. There were left on for one hour. Your muscles would expand and contract till cloths were cold. Remove all these packs after an hour and lay there for one hour, then start the whole process again. I can remember the first time the nurses sat me up on the edge of the bed for the first time they sat me in a wheelchair... (Martyniuk 1997)

At first, St Paul's borrowed an iron lung from the Saskatoon Sanatorium, but the province and private sources soon supplied more up-to-date and essential equipment. Iron lungs and rocking beds were among the necessary equipment provided for the 26 patients in the clinic. (Clubb 1982:28-29; Rutty 1995:117, *fn* 113; see Appendix I: The Iron Lung)

An important aspect of the life of young polio patients at St Paul's was school work. During 1944, Mrs Edward Feehan taught the children a correspondence course similar to one given at the provincial sanatoria. She would accept no fee for this service. (Saskatoon StarPhoenix June 1944; Saskatoon StarPhoenix 2 Nov 1944)

4.5 Saskatchewan's 1947 Epidemic Increased the Pressure on Services

Saskatchewan's 1947 epidemic was very serious: 277 cases were reported, with 12 deaths. (See Table 1) Such numbers put considerable pressure on the Polio Clinic in Saskatoon and two new clinics were added in **Regina and Moose Jaw**. (Saskatchewan. Department of Public Health 1948:22; Hopkins 1948:633-635) Financed by the province under the 1947 Hospital Insurance Plan, these Polio Clinics offered **unlimited free hospital, nursing and medical services**. Most of the work was performed by public health nurses. As the epidemic grew, an acute shortage of Kenny-trained nurses and staff soon developed and all Regional Medical Officers of Health were asked to reduce the number of cases referred to the clinics. They were to keep suspected polio cases at home under the care of their physicians until definite paralytic signs appeared. (Rosenfeld 1947) However, the prospect of free comprehensive polio care was too attractive to the public and the clinics remained overcrowded.

At St Paul's polio clinic, patients trickled in at first from Wakaw, Prince Albert and Rosetown at

first. Then, suddenly, the number of cases ballooned and St Paul's was not ready for "these people coming out of the woodwork. No facilities were ready. No one at the hospital had any experience with it, so patients were sent home". (Smithwick interview 2001)

In 1949, the Saskatchewan Council for Crippled Children (SCCCA) was formed and became very involved in ameliorating the effects of polio. (Saskatchewan Abilities Council 2001) Federal Crippled Children's grants were also important to Saskatchewan children's polio programs. The basic grant was \$4,000 per province plus a further amount given on a *per capita* basis. They were matched by provincial funds, and supported personnel training, specialized equipment, and outfitting of hospitals. (Rutty 1995:222) The SCCC was responsible for the referral of an English physiotherapist to St Paul's who served in the polio clinic. (St Paul's Hospital 1997:78)

Saskatchewan was **a leader in the process of reviewing its already extensive polio treatment policy** and wrote to the other provinces in early 1950 to find out how they dealt with polio. (Best 1949; Bentley 1950) The Saskatchewan Chapter of the March of Dimes (CFP) provided the facilities and the wherewithal to re-examine every patient who had contracted polio since 1937. A travelling clinic was sent to rural areas and permanent post-polio clinics were set up in Regina and Saskatoon to provide rehabilitation services to cases of long standing. An SCCC children's rehabilitation clinic was set up in Saskatoon as well as mobile consultation units and auxiliary services such as the provision of braces and orthopaedic shoes. (Rutty 1995:205-206; Saskatoon StarPhoenix February 1952)

4.6 The 1952 Epidemic

Saskatchewan was the epicentre of the 1952 Canadian polio epidemic, which began in an isolated Mennonite community north of Saskatoon. A group from this community had visited Texas, where there was a terrible outbreak, and had brought it home with them.² (Barsky 1954:517; Saskatchewan. Department of Public Health 1953:39) Saskatchewan's 1,205 reported cases included 90 deaths, by far the greatest number among Canadian provinces for that year. (see Chart 1) This was a case notification rate of 142.9 per 100,000 population, the highest provincial rate yet seen in Canada. (Rutty 1995:230) The entire life of the province was altered.

During the 1952 epidemic, **St Paul's Hospital was again the main centre** in northern Saskatchewan for the treatment and care of polio victims, most of whom were children. Housed in the crowded annex, the clinic was overcrowded by the beginning of September. It became necessary to move convalescents to the second floor of the main hospital. The annex continued to be used for infectious patients. (St Paul's Hospital 1997:126) The St Paul's clinic handled up to **49 polio patients at a time**. (Smithwick interview 2001; Regina Leader-Post 12 August 1952)

The epidemic spread slowly at first, allowing the province time to mobilize physicians and nurses, prepare hospitals, check respirators and place the government's new air ambulance service on alert. (Saskatchewan. Department of Public Health 1953:32-33) Soon, however, the

²Texas was suffering its worst outbreak, along with much of the U.S. Almost 58,000 cases were reported nationally, a case rate of 36.2 per 100,000 population. Canadian case rates in 1937 (35.4) and 1953 (32.9) were similar, but during the 1953 epidemic, Canada's national case rate was nearly 60. (Rutty 1995:230, *fn* 82)

provincial polio clinics were overloaded, forcing other hospitals to accept acute cases. (Smithwick interview 2001; Rutty 1995:230)

June 26, 1952. The cases of polio are multiplying. The epidemic is taking alarming proportions in the province. Sister Superior Bézaire and Dr H.D. Hart find it impossible to supply all the demands for treatment.³

Saskatchewan's **Air Ambulance Service**, the first such service in North America, played an important role in getting polio victims to hospital, particularly in rural areas. Nine cases in the Waldheim-Hepburn-Hague area were flown to Regina in June of 1952. (Saskatoon StarPhoenix 20 June 1952) Other victims did not survive the flight.

Often, **orthopaedic surgery** was performed to straighten deformed limbs and correct musculature. It was frequently unsuccessful. "There was the shortening, the lengthening, the snipping and tucking. There were muscle transplants, bone surgeries and a knee manufacture. A child should not have to endure such things." (Dale 1997)

The **potential cost of the Saskatchewan epidemic** was a real worry to the government because of an extremely generous policy that covered all costs for cases admitted to the polio clinics "established or which may be established..." (Saskatoon StarPhoenix 21 November 1952) There was also a public and medical expectation that all individual physician's fees would be paid for the many cases treated at home or at other hospitals because of clinic bed shortages. (Rutty 1995:230-232, 231 *fn* 91) As happened in 1947, the province instructed local doctors to keep their patients at home whenever possible if there were only mild symptoms. In the news media, this was justified by stressing the "excessive publicity" about the outbreaks and the "undue alarm" it was causing. (Saskatoon StarPhoenix 15 August 1952) The guidelines for physicians were narrowed, stating that care for mild cases, and for the first 21 days of severe cases, were the patient's responsibility. Only when the patient was financially unable to carry on would the government cover the costs. Polio cost Saskatchewan \$250,000 in 1952. (Rutty 1995:232, 335)

The emphasis on local care had some serious implications for polio patients, their family physicians and local hospital, who were often unfamiliar with and unprepared for handling acute cases.

4.6.1 Iron Lungs

One of the great expenses of this epidemic was the **acquisition of iron lungs**. Because of the high percentage of bulbar polio cases, respiratory failure was a frequent crisis, especially during 1952-53. Iron lungs were transported all over the country. Two Emerson iron lungs, each worth \$1350, were given to St Paul's Hospital, one by the Department of Public Health and the other by the SCCC. Two rocking beds were donated by the DPH in the fall of 1953.

September 9, 1952. The cases of polio continue to multiply. The Department of Public Health is sending us six nurses to assist the already overworked nurses in our clinic. Nine iron lungs are functioning without stop. Eight of these are borrowed from smaller

³Annals of St Pauls Hospital 1952. Quoted in Clubb 1982:35-6

hospitals in the province.⁴

Four more lungs were operating at City Hospital, for a Saskatoon total of 13 at this time. A Central Registry of respirator equipment, established in 1954, enumerated seventy-two lungs in late August in all of Saskatchewan. (Rutty 1995:256, *fn* 215) Caring for patients in iron lungs was an exhausting job, requiring round the clock care to ensure that the current to the machine was not decreased or interrupted. (Clubb 1982:29) Nursing and medical staff at the hospital became infected with polio while caring for patients at St Paul's. (St Paul's Hospital 1997:126; Rutty 1995:244)

The Emerson iron lung in Western Development Museum collection is from the polio clinic at St Paul's Hospital, Saskatoon, and was donated to WDM in 1972.

Many residents of Saskatoon and surrounding area received vital assistance from this machine including four Saskatoon doctors. One of these Physicians [, Dr Dick, became] Head of Surgery at City Hospital Saskatoon, another ...[, Dr Peter Cameron,] Professor of Rehabilitation Medicine in [London,] Ontario. One doctor unfortunately succumbed. (Western Development Museum 1972)

Iron lungs were not appropriate for every bulbar case. A patient died at St Paul's because they could not put him into a lung. He was an acute respiratory case, and they had to hold back from putting him into the iron lung, because he had spinal spasms, which would have conflicted with the mechanical breathing action of the lung. Unfortunately, before he could be put into the respirator, he succumbed. (Smithwick interview 2001) Nurses sometimes became despondent when several patients died in a single day. (St Paul's Hospital 1997:127)

Have you ever been fed while lying flat on your back [in an iron lung]? Well it's quite the experience, let me tell you. Although the nurses tried very hard to hit my mouth, there was an occasional spill of soup or juice down the side of my face. While I was in the iron lung the nurses enjoyed reading me Tommy's love letters and writing my responses to him for me.

Finally the day came when they began to wean me off of the iron lung, one minute at a time. It was pretty scary at first. One time, when I was able to stay out of the lung for about two hours, the power went off. The nurses scrambled to foot pump the iron lungs to keep them going. I was fine since I could breath some on my own by this time, but it still was a relief when the power came back on. (Mary 1997)

Gamma globulin therapy⁵ was practised in Saskatchewan throughout this epidemic, as it was generally in Canada. GG was produced by Connaught Laboratories. Saskatchewan asked for only 200 vials of gamma globulin immune serum held by the federal government for distribution to the most needy provinces in 1953, compared to 11,000 for Alberta, 1,260 for BC, and 11,000 for badly hit Manitoba.⁶

⁴Annals of St Paul's Hospital 1952. Quoted in Clubb 1982:36

⁵GG therapy consisted of injection with the antibody-rich protein fraction of human blood. At this time, mass GG field trials were taking place in the United States, but supplies were extremely limited in Canada.

⁶GG was reserved for distribution only to "household contacts" of paralytic polio cases between six months and 11 years of age, to be allotted through provincial health departments, by a public health team. Under strict federal rules of distribution, GG could not be made available to nurses. (Rutty 1995:238, 242-243, 244-245)

A controversy arose after the epidemic: should Saskatchewan be responsible for the full costs of polio care for residents who found treatment outside the province? **Saskatchewan was providing polio services at local hospitals and centres on an out-patient basis.** Some victims wanted in-hospital care and found it next door in Manitoba or Alberta. Because Saskatchewan had universal public hospitalization insurance, the government discouraged what it saw as unnecessary and expensive polio admissions. To back this up, it did not allow out-of-province benefits. Polio cost Saskatchewan \$250,000 in 1953. (Rutty 1995:, 253, 335; Saskatoon Star-Phoenix 7 November 1953)

5. Saskatchewan looks to the future

The Saskatchewan government and the medical community were very conscious of the need for long-term investment in solving the polio crisis.

5.1 Government Investment in Rehabilitation

During the 1952 epidemic, physiotherapist Jerry Smithwick had trained several of the nursing staff at St Paul's but they were unable to keep up, and patients could not afford to pay for treatment at private practices. "The physiotherapy carried out at the polio clinic was the **beginning of rehabilitation practice** in Saskatchewan." (Smithwick interview 2001) Following the epidemic, provincial rehabilitation facilities were expanded at government expense, despite the "very significant increase in expenditures" this required. A new Division of Physical Restoration was created in 1953, consolidating and improving rehabilitation services to polio and cerebral palsy patients. During 1953-54, 965 polio and 217 cerebral palsy cases were cared for at the Saskatoon and Regina polio clinics. (Saskatchewan. Department of Public Health 1954:98)

By about March many of us began attending the Physical Restoration Centre (the PRC) or "Rehab". We traveled by "Bunny Bus" - term used in those days because the vehicles were funded by Easter Seals, and since the majority of the passengers were children, the name was appropriate. (Betty 1997)

5.2 Saskatchewan Contributes to the Vaccine Production Program

In June 1954, the province of Saskatchewan signed on to the Dominion Council of Health's decision to proceed with Dr Defries' plan to **produce and test the Canadian Salk vaccine** at Connaught while awaiting the results of the U.S. field trials. The vaccine would be paid for jointly by the provincial and federal governments and would be made available to the provinces at the much lower Canadian price. (Rutty 1995:334-5; Regina Leader-Post 7 November 1953) The official announcement in Ann Arbor, Michigan, of the success of the U.S. Salk trials was not held until 12 April 1955.

"It was a coincidence that at the height of the 1952 polio outbreak, Dr H. Robertson, Director of the Provincial Laboratories, left Regina to accept a post at the University of Minnesota Medical School as Assistant Professor and Fellow of the National Foundation for Infantile Paralysis. There, while associated with leaders in the efforts to develop a safe, effective vaccine, he was able to learn the techniques and skills of the new art of cell culture. The knowledge and skills acquired proved to be a real benefit to Saskatchewan when he returned in late 1954 to set up a viral diagnostic laboratory and **enable provincial participation in early vaccine trials.**" (Robertson and Riddell 1986:94)

6. The Era of Polio Vaccines

As the horrible polio epidemics of 1952-53 tailed off, Saskatchewan cases fell from over 1,200 in each of those years to 197 and only seven deaths in 1954. (see Table 1) The province was still in shock. Physicians, physiotherapist, nurses, public health units were all kept busy dealing with the devastation caused by the previous two years.

6.1 Saskatchewan's Salk vaccination program

Saskatchewan people were well aware of the controversy swirling around the mass field trials of the Salk vaccine in the United States. However, reassurances from Health Minister Paul Martin ensured that the program went ahead in the province. (Regina Leader-Post 7 May 1955, 19 May 1955, 11 June 1955, 20 June 1955)

When, in May of 1955, a limited production of Connaught Salk vaccine was made available for distribution to the provinces, Saskatchewan's share was only 29,000 doses. (Regina Leader-Post 13 April 1955) With this disappointingly small supply in hand, it was decided to immunize the most susceptible members of the population: children born in 1949 or in 1950. (Robertson and Riddell 1986:94; Regina Leader-Post 12 April 1955) Also, prompted by several tragic cases of infection among St Paul's staff during the 1952-53 epidemic, the first of many groups of student nurses received injections of the newly developed vaccine. (Clubb 1982:36)

From 1956 to 1960, all preschool children were vaccinated, then all school children, and finally all adults under the age of 40 years. At the end of 1960, about **99% of all children up to 16 years of age and 55% of adults** from 17 to 40 years had been given three or more doses of the Salk vaccine. (Regina Leader-Post 18 April 1956; Robertson and Riddell 1986:94)

The result of this aggressive program was a drop in paralytic polio to one case and no deaths in 1958. (see Table 1) Cases climbed again in 1959 and 1960, mostly among unvaccinated people. Some adults refused to be vaccinated, while others did not complete the three dose course. Although Saskatchewan had vaccinated 65% of people 20 to 40 years of age in public health clinics, as the number of cases dropped, public interest in immunization waned, even though the vaccinations were free. Manitoba charged adults a fee for the shots, which was then passed onto physicians. In many other provinces, adult vaccination programs were minimal. (see Table 1; Ruddy 1995:365)

At St Paul's Hospital and the other polio clinics in the province, the work of rehabilitation went on. Physiotherapy was of particular importance. During the mid-1950s, the blind physiotherapist, Frank Connolly, worked on polio patients at St Paul's clinic. (St Paul's Hospital 1997:78) The clinic boasted equipment such as specially-designed respirators and rocking beds; there were amenities such as a TV set, a radio, and other contributions from various local clubs and societies. Personnel comprised one registered nurse supervisor, six student nurses and six ward aids, and there was accommodation for 26 patients with rocking beds and iron lungs. (St Paul's Hospital 1957: 16; St Paul's Hospital 1997:128; Clubb 1982:34)

St Paul's polio clinic closed in 1960. Saskatchewan's last known adult paralytic polio case in Saskatoon, Mrs Anna Daughn Falkingham, was admitted to St Paul's Hospital in the summer of

1960. She spent three months there in an iron lung. (Grosse 1998)

6.2 Sabin Trivalent Oral Vaccine

Dr Albert Sabin's weakened live vaccine had been undergoing testing since 1958-59. In 1959, Connaught Laboratories began the development and production of a trivalent Sabin vaccine. (Rutty 1995:370-371) New hope was placed in this product, which required only one oral dose to immunize against all three strains of the poliovirus, and which, as a live but weakened virus, was able to spread naturally among individuals in a community without producing paralysis.

One of the last steps in Connaught's evaluation of its Sabin vaccine consisted of field trials in Canadian communities. There were specific requirements for these trials, to do with tracking the effects of the vaccine as it spread through a controlled community.

6.2.1 The Prince Albert Field Trial

"Public health history is being made in Prince Albert this week with the first administration in Canada of the Sabin oral polio vaccine on community scale, " Dr E. W. R. Best, chief of the epidemiology division in the federal health and welfare department in Ottawa said on Monday 27 Feb 1961.

"I have sensed, since my arrival here Sunday, the wonderful way in which everyone is getting behind the medical health officer to end the threat of paralytic polio her once and for all.... There is every indication that the citizens of Prince Albert will make history this week. It must be a pleasure to be a physician or public health worker in this city." (Regina Leader Post 28 Feb 1961)

Prince Albert was selected as the site of a unique community wide field trial for the Sabin vaccine. The trial was a major organizational public education challenge, carried out by the Saskatchewan Provincial Laboratories and Connaught Laboratories. Local doctors, schools and community organizations participated in the co-ordinated event from January to March of 1961.

Absolutely essential was the primary phase of ensuring that the test community was relatively free from wild polio viruses or other viruses of the gastrointestinal system which might have caused illness and resulted in undeserved blame on the vaccine. (Robertson and Riddell 1986:96) The primary phase began two to six weeks ahead of the vaccinations and consisted of a search made for these viruses in the stools of 200 pre-school children, 200 children six to eight years of age, and 200 adults. The samples were examined by the Provincial Laboratories and very few viruses found. This allowed the testing to proceed.

Beginning 27 February 1961, each person previously tested contributed a second stool at the time he was vaccinated. This was to provide a specimen that could be tested later on if it appeared that any stray viruses had entered the community between the first stool testing and the actual vaccination. (Robertson and Riddell 1986:96; Robertson et al. 1962; Smith 1961, 1962:2-3) A few drops of the vaccine were administered orally in a single dose, in sugar syrup. The vaccination component was completed by 7 March 1961. Prince Albert area doctors worked closely with the Provincial Laboratories, submitting for immediate testing and reporting stool and

blood samples from all patients in the area who had contracted an illness even remotely resembling a gastrointestinal fever. (Robertson and Riddell 1986:96; Robertson et al. 1962; Smith 1961, 1962:2-3)

In further tests, run by Connaught Laboratories concurrently with the Provincial Laboratories testing, microsamples of blood were collected for antibody measurement at the time of vaccination and again seven weeks later. (Robertson and Riddell 1986:96) Including the pre-immunization phase and the post-immunization blood sample testing, the trial took approximately four months to complete.

The **Prince Albert field trial was very successful.** (Regina Leader-Post 19 October 1961) A total of **23,711 individuals representing about 95% of the population** took the vaccine in the eight day feeding period, with absolutely **no negative side effects**. The post-vaccination blood tests indicated that by far the majority of people developed antibodies that they lacked before the vaccination. (Regina Leader-Post 19 October 1961; Robertson et al. 1962; Smith 1961, 1962:2-3, Ruttly 1995:375) The trial 'clearly demonstrated the convenience and practicability of administering an oral vaccine to a large population in a short period of time.' (Robertson et al. 1962:191)

7. Saskatchewan's Unique Immunization Program

After the successful Prince Albert trial⁷, Connaught produced enough vaccine for the Canadian immunization initiative. **Saskatchewan's program was the most notable of all the provinces.** During its **unprecedented province-wide administration of trivalent Sabin vaccine of 1962-63**, some 735,786 doses of vaccine were given, immunizing 82% of the population. Even people who had been infected with polio received the vaccine. (Dobrowolsky interview 2002) The administration of this mammoth program was a **major public health achievement** that involved intensive publicity, necessitated by Saskatchewan's largely rural population. (Ruttly 1995:377-378; Skoll and Kotyk 1963)

Not a single case of polio was reported in 1964 and the few recorded between 1965 and 1975 all occurred in unvaccinated people. After 1975, there were no cases at all and, in 1986, the province cautiously declared polio to be contained, if not eradicated.

It would be most unwise to presume that poliomyelitis has been eliminated from Saskatchewan. Certainly it has been contained. Experience from world-wide application of oral vaccines has shown that there is a very small risk - about one chance in 4 million - that a susceptible individual given the live vaccine will develop a paralytic illness due to the vaccine. At present in Canada, the risk from the live vaccine exceeds the risk from natural infection, so oral poliovirus is no longer offered to Saskatchewan adults... (Robertson and Riddell 1986:97)

⁷About 50 people in Regina also took part in the Canadian tests and similar tests were carried out in controlled communities in Quebec. In Regina, some government employees, such as those working for the Department of Public Health, were given either the Sabin syrup or a placebo. (Johnson interview 2002)

8. The Polio Story in Saskatchewan Belongs Not Just to the Past: It is Also a Story of the Future

In 1988, the Saskatchewan Abilities Council sponsored two provincial representatives to attend a National Post-Polio Syndrome Conference held in Toronto. Shortly after returning to Saskatoon, the Saskatchewan Awareness of Post Polio (SAPP) association was established and branches set up in the province. Today, membership has surpassed the 200 mark, with branches in Saskatoon, Prince Albert, Nipawin and North Battleford. The aim of the association is to increase awareness of post-polio syndrome and share information around the province with polio survivors and medical professionals. (Saskatchewan Awareness of Post Polio 1996)

Problems for Saskatchewan's former polio victims continue. Young physicians with no experience of the disease often believe that the constellation of symptoms which comprise post-polio syndrome are the result of other causes, such as multiple sclerosis. Support funding can be difficult to access, because of the competition they face with paraplegics. Because the sensory nerves were not damaged by the poliovirus, PPS sufferers can feel their limbs and can sometimes move about more easily than other impaired people. (Dobrowolsky interview 2002)

The World Health Organization estimates that there may be as many as 50,000 post-polio syndrome sufferers in Canada. The number is undoubtedly larger than that. After 1957, the Department of Health collected statistics only of those paralysed by polio. It is now becoming clear that many people who were infected by the poliovirus, but did not suffer paralysis, are becoming affected by PPS. **The Western Development Museum polio exhibits of 2005 will be very timely**, as a new public awareness of polio and the devastation of its long-lasting effects grows.

Bibliography

Banister, Betty

1975 Trapped: A Polio Victim's Fight for Life. Western Producer Books, Saskatoon.

Barsky, P.

1954 "The Management of Poliomyelitis." Canadian Medical Association Journal May 1954:517-520.

Bentley, T.J.

1950 Letter, T.J. Bentley, Saskatchewan Minister of Public Health, to all Provincial Ministers of Health, 22 April 1950. Saskatchewan Archives Board, R11, file 14-87. Regina.

Best, S.C.

1949 Memo, S.C. Best, Director, Division of Communicable Diseases, Saskatchewan Department of Public Health, to T. J. Bentley, Minister of Public Health, 19 December, 1949. Saskatchewan Archives Board, R11, file 14-3.

Betty

1997 "Betty's Story." Saskatchewan Awareness of Post Polio Society Inc. website. [http](http://www.saskpostpolio.ca/betty.html)

Bliss, Michael

1982 The Discover of Insulin. McClelland & Stewart, Toronto.

Braithwaite, Max

1974 Sick Kids: The Story of the Hospital for Sick Children in Toronto. McClelland & Stewart, Toronto.

Cann, Alan J.

2000 "Sister Kenny." Siptah's Revenge website, University of Leicester.
<http://www-micro.msb.le.ac.uk/Tutorials/polio/polio9.html>

Clubb, Sally Potter

1982 Our Story: Seventy-Five Years of Caring. St Paul's Hospital, Grey Nuns' of Saskatoon. Modern Press, Saskatoon.

Collins, Huntly

1999 "Decades later, a trauma revived." Polio: Death of a Disease website.
<http://www.philly.com/packages/polio/text/poli24.asp>

Dale

1997 "Dale's Story." Saskatchewan Awareness of Post Polio Society Inc. website.
<http://www.geocities.com/sapponline/poliodal.html>

Davies, B.

1934 "Death Walks in Summer." Canadian Magazine 82 (July 1934):7, 34-35.

Defries, Robert D.

1968 The First Forty Years, 1914-1955: Connaught Medical Research Laboratories, University of Toronto. University of Toronto Press.

Gould, Tony

1995 A Summer Plague: Polio and Its Survivors. Yale University Press, London.

Grosse, Noelle

1998 "Iron lung reminder of polio's terror." The Saskatoon Sun, 13 December, p. B15.

Halstead, Lauro S. and Gunnar Grimby (eds.)

1995 Post-Polio Syndrome. Halney & Belfus Inc., Philadelphia.

Hopkins, D.M.

1948 "Poliomyelitis Clinics in Saskatchewan." Canadian Nurse 44(August 1948):633-635.

Koop, Everett C.

1998 "Hepatitis C." Epidemic website, Dartmouth College.
www.epidemic.org/.../viruses/theConsequencesOfViruses.html

Martyniuk, Olga

1997 "Olga's Story." Saskatchewan Awareness of Post Polio Society Inc. website.
<http://www.geocities.com/sapponline/polioolg.html>

Mary

1997 "Mary's Story." Saskatchewan Awareness of Post Polio Society Inc. website.
<http://www.geocities.com/sapponline/poliomst.html>

Paul, John R.

1971 A History of Poliomyelitis. Yale University Press, New Haven and London.

Regina Leader-Post

1952 "Saskatchewan Leads West in Reported Polio Cases." 12 August 1952, p. 8.

1953 "Meeting Endorses Polio Bid." 7 November 1953, p. 8.

1955 "Vaccine for 29,000 Saskatchewan children. 1,000,000 may be immunized." 12 April 1955, p. 1.

"Regina, Saskatoon regions start May 2. Polio vaccination program announced - enough Salk for two groups." 13 April 1955, p. 1.

"U.S. urges polio vaccine suspension for check - Martin says vaccine safe." 7 May 1955, p. 1.

"Deputy health minister reports on Salk anti-polio vaccine." 19 May 1955, p. 32.

"U.S. Salk policy rapped." 11 June 1955, p.8.

"Lesson from Canada." 20 June 1955, p. 23.

1956 "Saskatchewan Salk plans will be delayed." 18 April 1956, p.3.

1961 "Public Health history made in P.A. says Best." 28 February 1961, pp. 1,5.

"Oral Polio vaccine trial successful, doctor states." 19 October 1961, p. 27.

Robertson, Hugh E. and William A. Riddell

1986 Saskatchewan Rprovincial Laboratories, Eighty Years of Service. Appendix VI. Poliomyelitis in Saskatchewan. Ms. Saskatchewan Health Library, Regina.

Robertson, Hugh E., M.S. Hacker, H.O. Dillenberg, R. Woodrow, R.J. Wilson, W.K. Ing and D.R.E. MacLeod

1962 "Community-Wide Use of a 'Balanced' Trivalent Oral Poliovirus Vaccine (Sabin)." Canadian Journal of Public Health (May 1962):179-191.

Rosenfeld, L.S.

1947 Memo, L.S. Rosenfeld, Director, Division of Regional Health Services, Saskatchewan Department of Public Health, to All Regional MOHs, 28 July 1947. Saskatchewan Archives Board, r194, file 31p.

Rutty, Christopher J.

1995 "Do Something!... Do Anything!" Poliomyelitis in Canada 1927 - 1962. PhD Thesis, Department of History, University of Toronto.

1996a " 'Herculean Efforts': Connaught and the Canadian Polio Vaccine Story." CONTACT 9(3); also published on the Internet in 2000.

<http://www.healthheritageresearch.com/Polio-Contact9606.html>

1996b "The Middle-Class Plague: Epidemic Polio and the Canadian State, 1936-1937." Canadian Bulletin of Medical History 13:277-314.

1997a "Dr. Robert Davies Defries (1889-1975): Canada's 'Mr. Public Health.'" In Lois N. Magner (ed.), Doctors, Nurses and Practitioners, pp. 62-69. Greenwood Press, Westport, Conn.

1997b "Tell Me More About Polio." Arctica website.
<http://www.accessexcellence.org/arc/polio.html>

St Paul's Hospital

1957 St Paul's Hospital 1907 - 1957. 50th Anniversary publication.

1997 A Tradition of Caring: A Future of Hope. 90th Anniversary 1907 - 1997. St Paul's Hospital, Saskatoon.

Saskatchewan. Department of Public Health

1938 Annual Report, 1937. Regina.

1944 Annual Report, 1943. Regina.

1948 Annual Report, 1947. Regina.

1953 Annual Report, 1952. Regina.

1954 Annual Report, 1953-54. Regina.

Saskatchewan Abilities Council

2001 Website. <http://www.abilitiescouncil.sk.ca/>

Saskatchewan Awareness of Post Polio

1996 Website. <http://www.geocities.com/sapponline/sappdesc.html>

Saskatoon StarPhoenix

1944 "Kenny Treatment a Success." 7 March 1944.

"Only One Death from Paralysis." April 1944.

"St. Paul's Hospital Ladies Auxiliary Sponsors Courses in 'Kenny Clinic.'" June 1944.

- “St. Paul’s Hospital Auxiliary Reviews Activities of the Year.” 2 Nov 1944.
- 1952 “To Re-Examine Polio Cases Travelling Clinics Planned.” Feb 1952
“Nine Polio Cases in North Area.” 20 June 1952.
“Polio Deaths Ten in Sask.” 15 August 1952.
“Care of Polio Cases Problem for Council.” 21 November 1952, p. 6.
- 1953 “Aid Asked for Polio Victims Treated Outside of Province.” 7 November 1953, p.6
- Skoll, S.L. and P.L. Kotyk
- 1963 “The Acceptance of Sabin Polio Vaccine : Motivation at the Regional and Local Levels of a Primarily Rural Population.” Canadian Journal of Public Health (May 1963):213-230.
- Smith, C.
- 1961 “The Role of Health Education in the Prince Albert Oral Live Polio Vaccine Demonstration, 1961.” Report, 10 March 1961. Saskatchewan Archives Board, 88-327, file 1.5.24b. Regina.
- 1962 “Oral Vaccine: A Successful Community Experiment:, in Canada’s Health and Welfare, May 1962:2-3. Department of National Health and Welfare, Ottawa.
- Smith, Jane S.
- 1990 Patenting the Sun: Polio and the Salk Vaccine. William Morrow and Co., New York City.
- Swanson, William
- 1999 “Sister Act. (Elizabeth Kenny’s revolutionary techniques in medicine).” MPLSs-St Paul Magazine, October 1999, 27(1):226.
- Western Development Museum
- 1972 Artifact File, WDM-73-S-3018, Emerson iron lung Exhibit History. WDM, Saskatoon.

Interviews

Dobrowolsky, Donna

4 February 2002. Donna Dobrowolsky is a teacher and former polio victim of the 1952-53 epidemic. She now suffers from post-polio syndrome.

Johnson, Ronald

4 February 2002. Ron Johnson is a retired provincial employee and a former polio victim of the early 1930s outbreak. He now suffers from post-polio syndrome.

Smithwick, Jerry

11 December 2001. Jerry Smithwick was a physiotherapist at St Paul’s Hospital Polio Clinic in Saskatoon during the late 1940s and 1950s. He implemented the Kenny method.