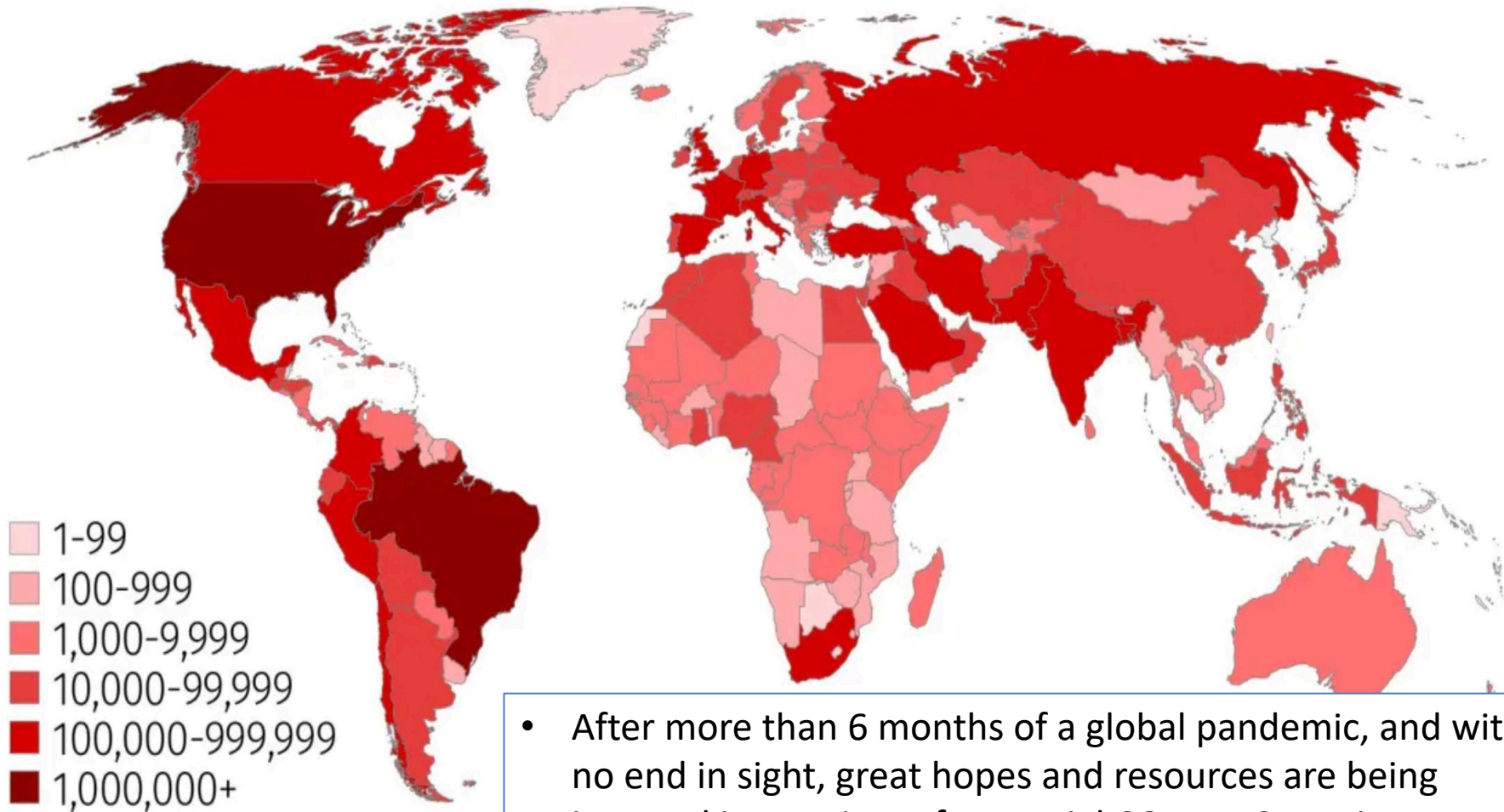


Emergency Responses: Canada's Vaccine Legacy; Influenza, Polio & COVID-19 Vaccine(s)



By Christopher J. Ruty, Ph.D., Medical/Public Health Historian; Adjunct Professor, Dalla Lana School of Public Health, University of Toronto
Canadian Society for the History of Medicine: Pandemic Histories series; "Vaccine Viewpoints: From Polio to Pandemic Influenza" July 7, 2020

COVID-19 outbreak July 4

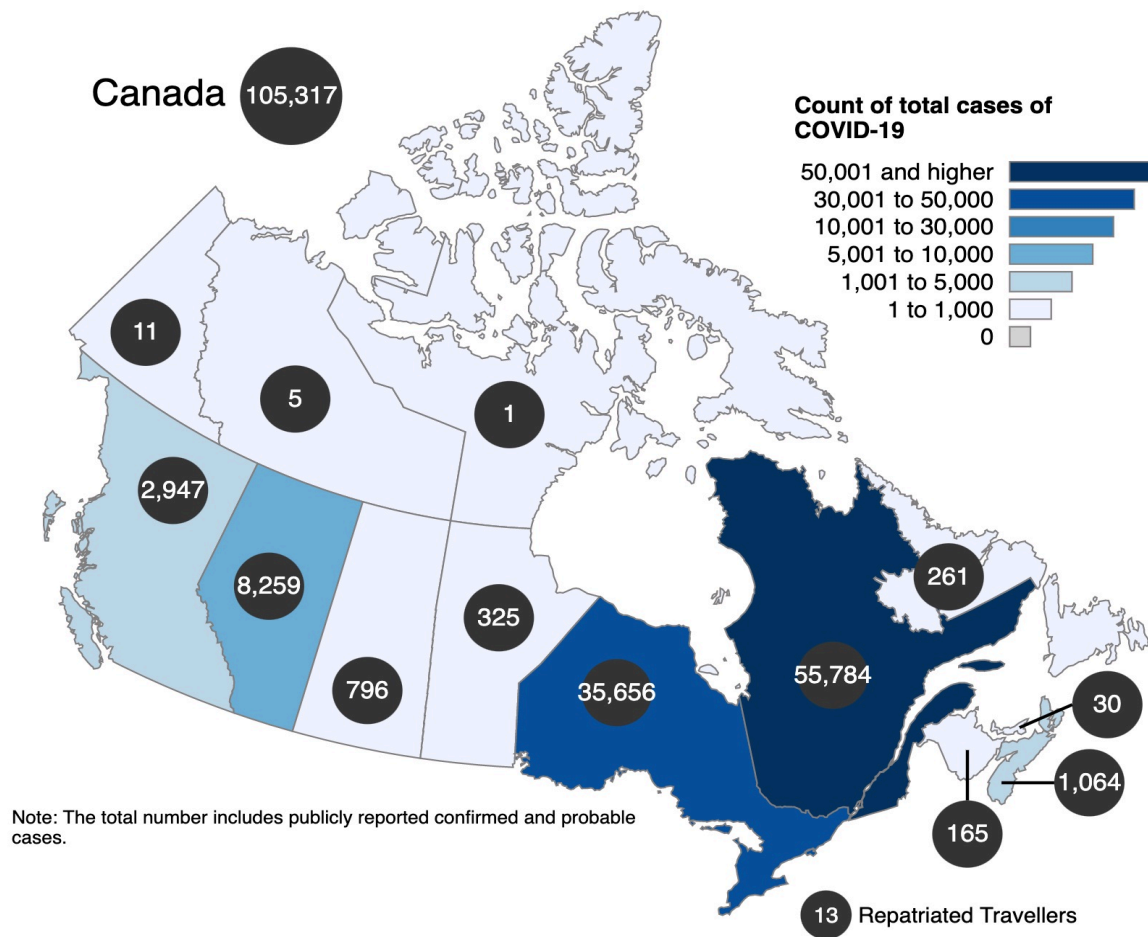


- After more than 6 months of a global pandemic, and with no end in sight, great hopes and resources are being invested in a variety of potential COVID-19 vaccine candidates

Count of total cases of COVID-19 in Canada as of July 4, 2020

Last data update 2020-07-04 19:00 EDT

📍 Hover over provinces and territories to see total cases, recovered cases, number of people tested or deaths in Canada over time. Click the play button to animate the map.



The count of total cases of COVID-19 in **Yukon** was 11 as of July 4, 2020.

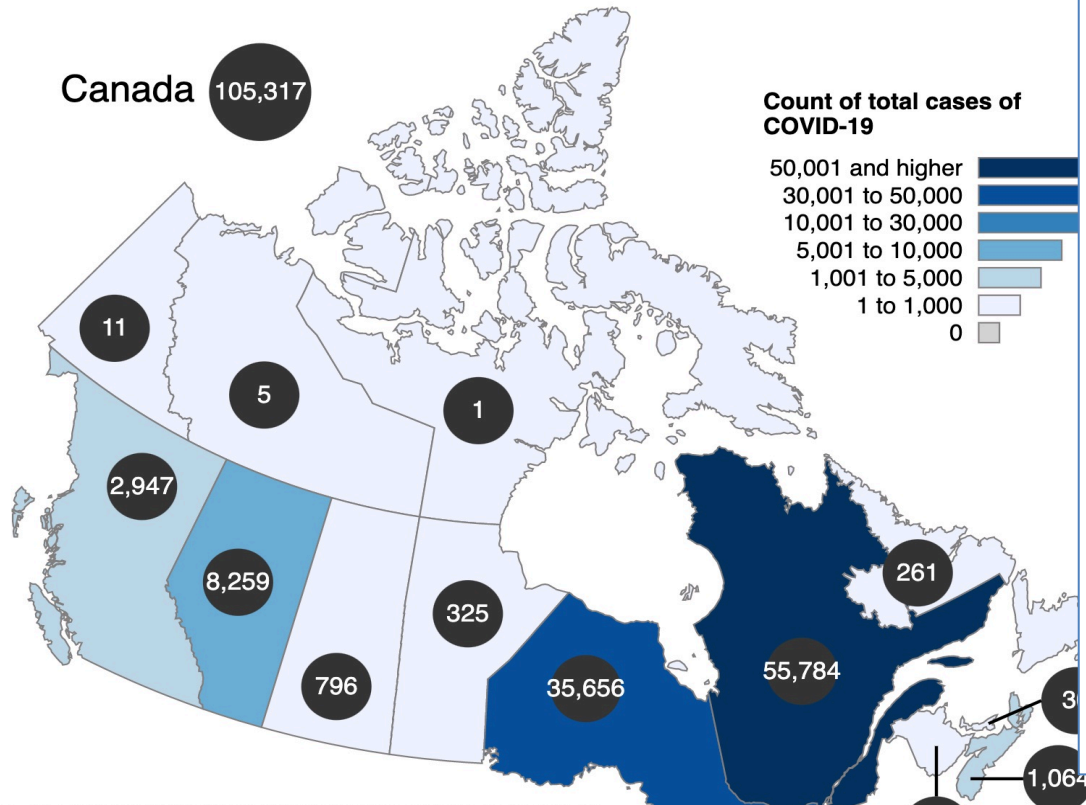
- From a Canadian historical perspective, the COVID-19 pandemic experience resonates closely with the 1918 influenza pandemic, but also with major polio epidemics of the early 1950s

Note: The total number includes publicly reported confirmed and probable cases.

Count ▾ of total cases ▾ of COVID-19 in Canada as of July 4, 2020

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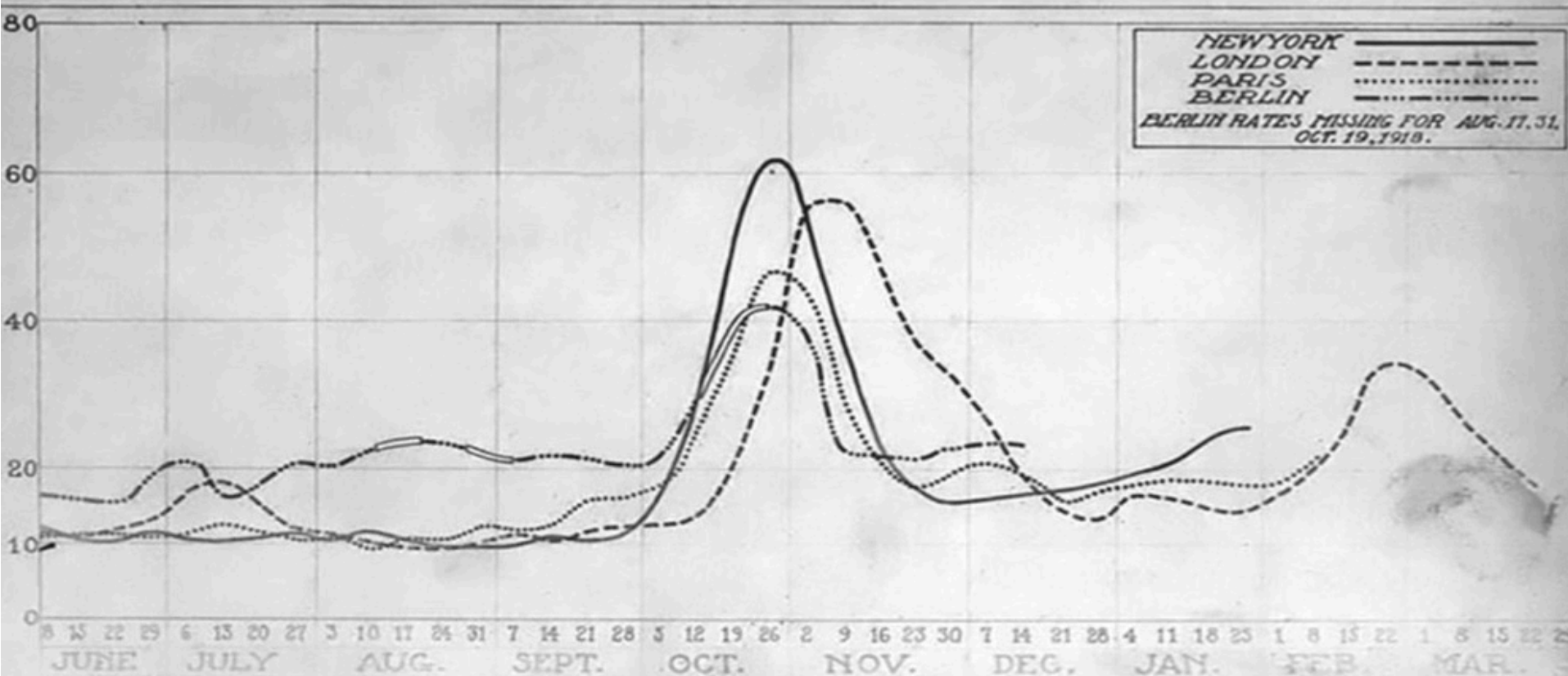
- In terms of mounting an emergency response through the development, production and distribution of vaccines, Canada has a distinctive legacy
- Most evident during influenza pandemics in 1918, 1957, 1976 (an abortive pandemic), and 2009
- And in the essential role Canada played in expediting the development, production and distribution of polio vaccines

- I would like to highlight these Canadian emergency vaccine responses and how they can relate to potential COVID-19 vaccines

INFLUENZA PANDEMIC

MORTALITY IN AMERICA AND EUROPE DURING 1918 AND 1919

DEATHS FROM ALL CAUSES EACH WEEK
EXPRESSED AS AN ANNUAL RATE PER 1000

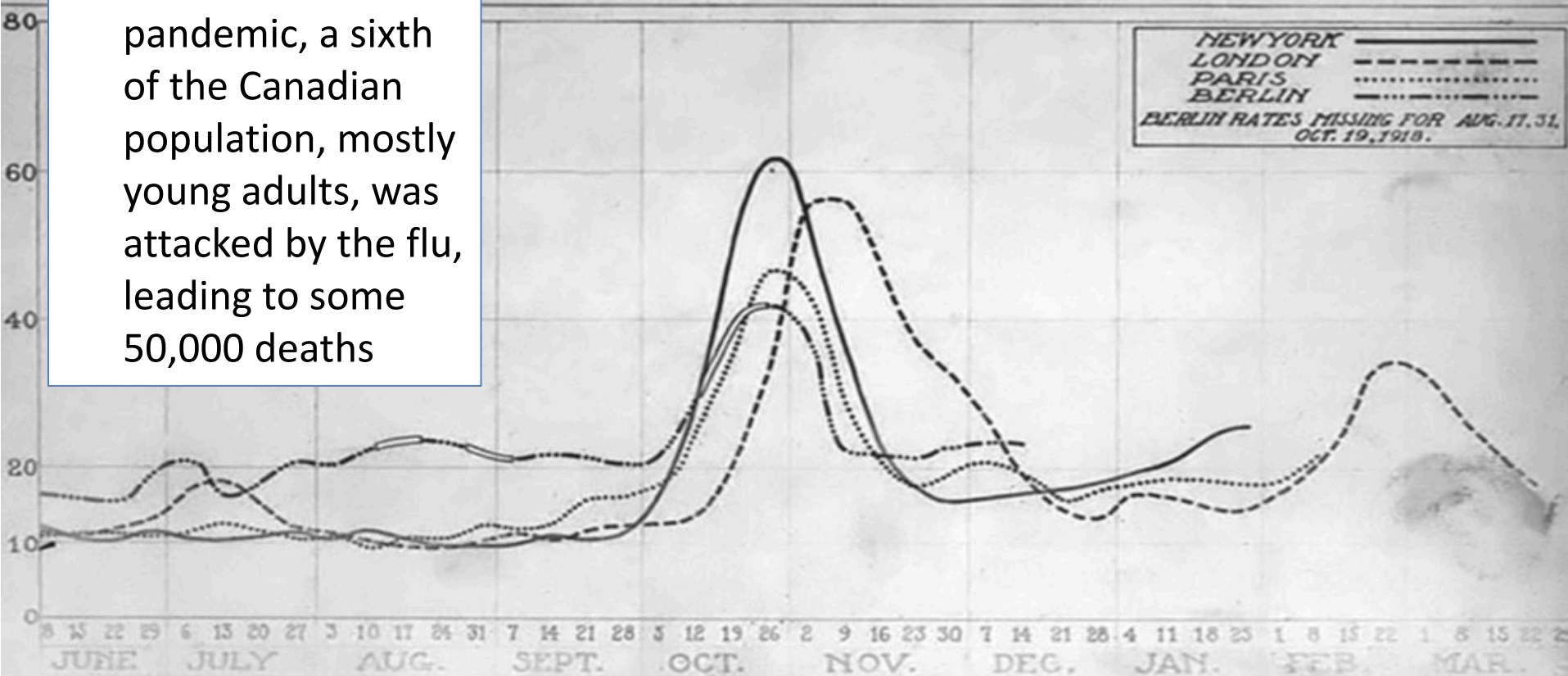


INFLUENZA PANDEMIC

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- During the 1918 “Spanish” influenza pandemic, a sixth of the Canadian population, mostly young adults, was attacked by the flu, leading to some 50,000 deaths

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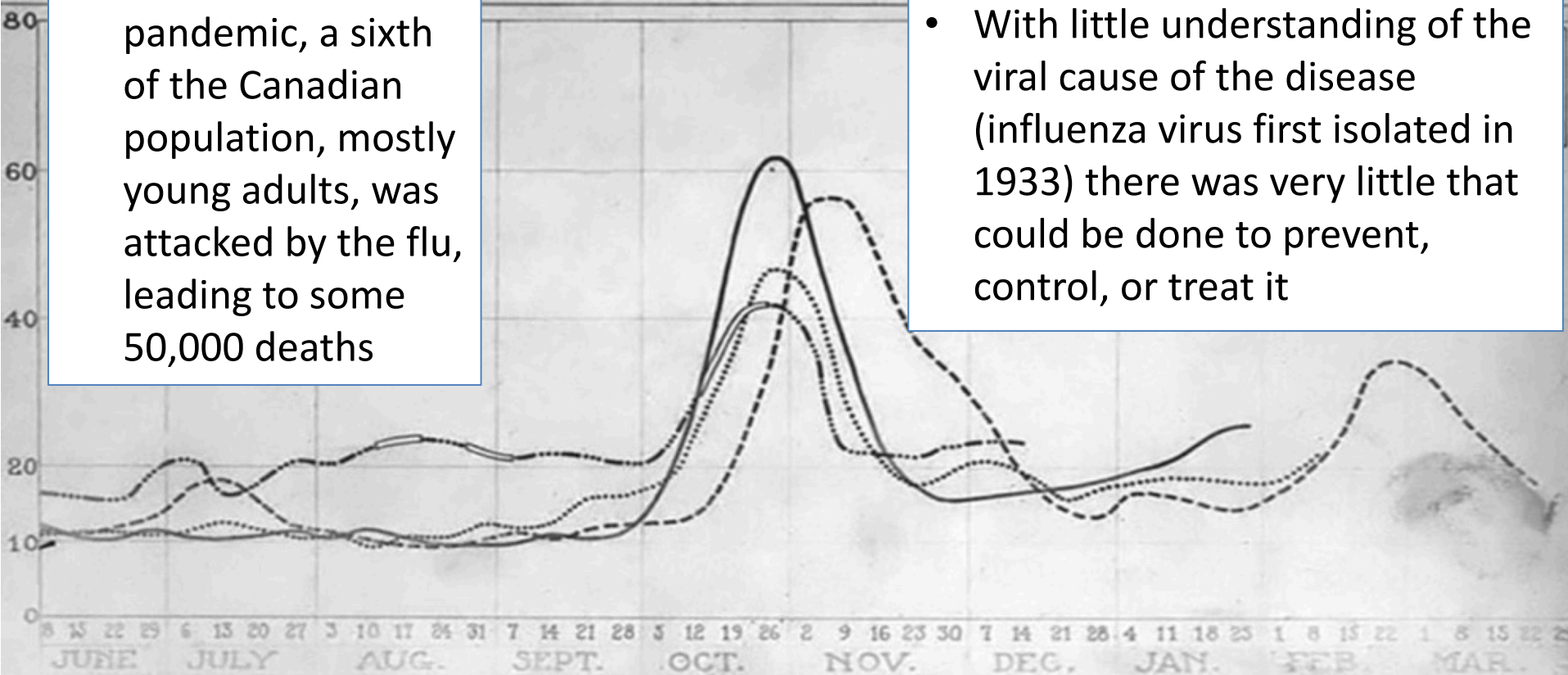
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- With little understanding of the viral cause of the disease (influenza virus first isolated in 1933) there was very little that could be done to prevent, control, or treat it





- **Oct 1918** - Nevertheless, early in the devastating 2nd wave of the pandemic, Connaught Laboratories, part of University of Toronto from 1914 to 1972 (Sanofi Pasteur Canada today), launched a heroic effort to prepare a vaccine based on the prevailing view that *Bacillus influenza* was causing the disease



On Oct. 25th, 1917 the Laboratories were formally opened by His Excellency the Duke of Devonshire

- Connaught was soon able to distribute vaccine in large quantities free of charge to provincial health departments, hospital, medical and nursing staff, the military and other public health services across Canada



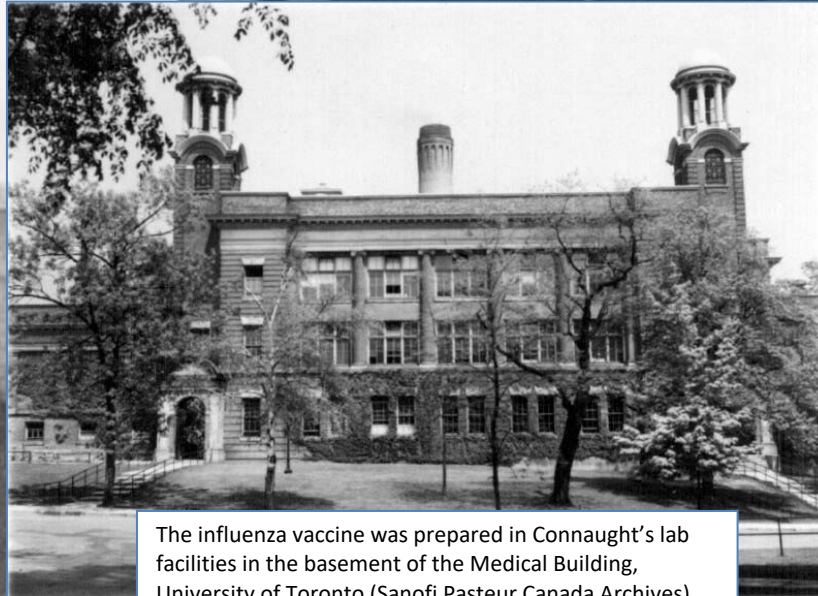
FIND VACCINE FOR EPIDEMIC

Connaught Laboratories of
University of Toronto An-
nounce Discovery

SEND IT TO HOSPITALS

Though Difficult to Prepare,
Large Supply May Soon
be Available

The Globe, Oct 21, 1918, p. 1



The influenza vaccine was prepared in Connaught's lab facilities in the basement of the Medical Building, University of Toronto (Sanofi Pasteur Canada Archives)

- Due to this unprecedented emergency, no claims for the effectiveness of the vaccine were made, but it did no apparent harm and the Lab's efforts were widely appreciated

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Ampoule of Connaught's 1918 influenza vaccine held in collection of the Canada Science & Technology Museum, Ottawa

VACCINE FOR THE PUBLIC

Provincial Board of Health Now In
Position to Supply the
Serum.

"The Provincial Board of Health is now in a position to supply prophylactic vaccine for the use of the general public as a preventative to the attacks of influenza," was the interesting statement made to The Star at noon to-day by Dr. J. W. S. McCullough, Chief Medical Health Officer of the Province.

"It is expected that in a few days the Connaught Laboratories and the Provincial Board of Health, working in co-operation, will be able to supply all those who need prophylactic vaccine," said Dr. McCullough.

"Our reports show us that there is still no diminution in the wave which is now sweeping over the Province," says the Provincial M. O. H.

Toronto Star, Oct 21, 1918, p. 2

DEPARTMENT OF



PROVINCIAL SECRETARY

ONTARIO
PROVINCIAL BOARD OF HEALTH

To The Medical Officer of Health.

This package contains PROPHYLACTIC INFLUENZA VACCINE, and you are requested to divide it fairly among the physicians practising in your municipality in order that the public may receive any benefit which may result from its use.

*JOHN W. S. McCULLOUGH,
Chief Officer.*

- Connaught's vaccine was supplemented by a supply prepared by the Ontario Provincial Board of Health Laboratories

ANTI-INFLUENZA VACCINATION FOR ALL SUGGESTED

Sufficient Supply of Virus Arrives From Mayo Brothers' Institution

Every man, woman and child in Winnipeg is asked by the health authorities to go to a physician and be vaccinated with anti-influenza virus.

The first supply of anti-influenza vaccine, sufficient to inoculate thousands of persons, has been received from Dr. E. C. Rosenow, of the Mayo Brothers Foundation, Rochester, Minn.

Additional vaccine is being prepared in local laboratories. Enough to inoculate every applicant will be provided. Although it may not make persons immune to influenza, the authorities say it prevents serious complications.

Following vaccination no ill effects are experienced. Persons can work

as usual.

The vaccine has been distributed among physicians. Citizens will be treated by their family doctors and if they have none special offices are to be provided where they can receive inoculation. The city plans to bear all expense.

Nobody will be compelled to submit to inoculation which is in the form of a hypodermic injection. If the disease continues to spread treatment may be made compulsory.

Supplies of the vaccine may be turned over to industrial plants, department stores and similar institutions which maintain private medical bureaus, enabling them properly to inoculate their employees.

A general call for volunteer nurses also is a possibility of the near future, officers connected with the departments intimate.

Confronted with actual conditions throughout the country and realizing that Winnipeg has no guarantee it will be one of the few cities of the continent to escape lightly, despite all precautions, the officials are laying their plans accordingly.



- There were also other influenza vaccine production initiatives elsewhere in Canada, most notably in Winnipeg and Kingston

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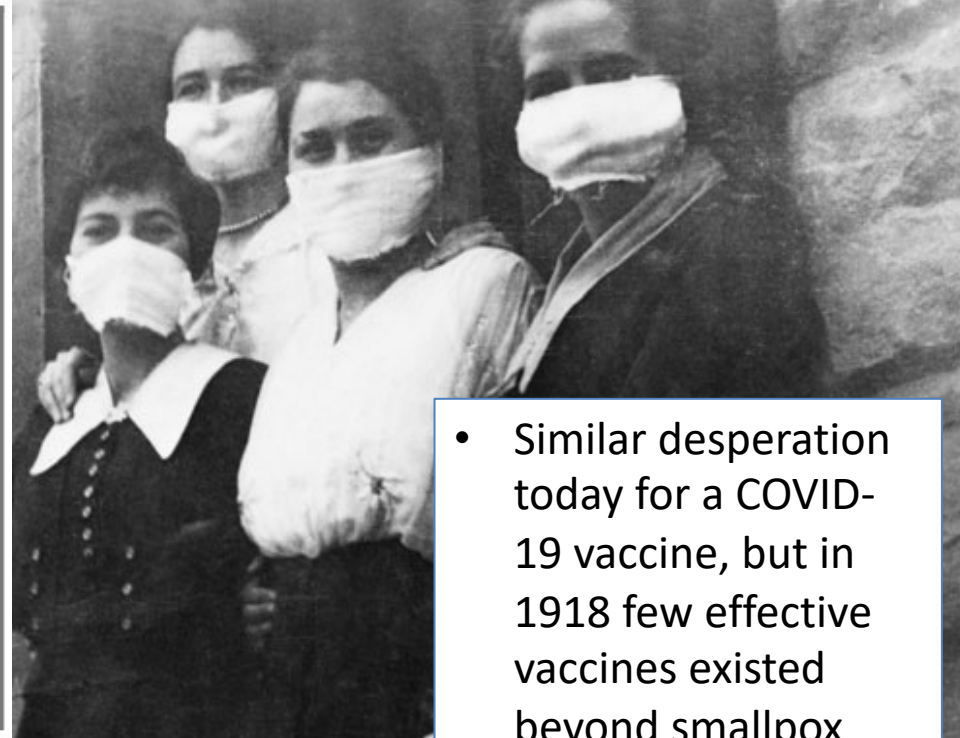
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Winnipeg Tribune, Oct 23, 1918, p. 3



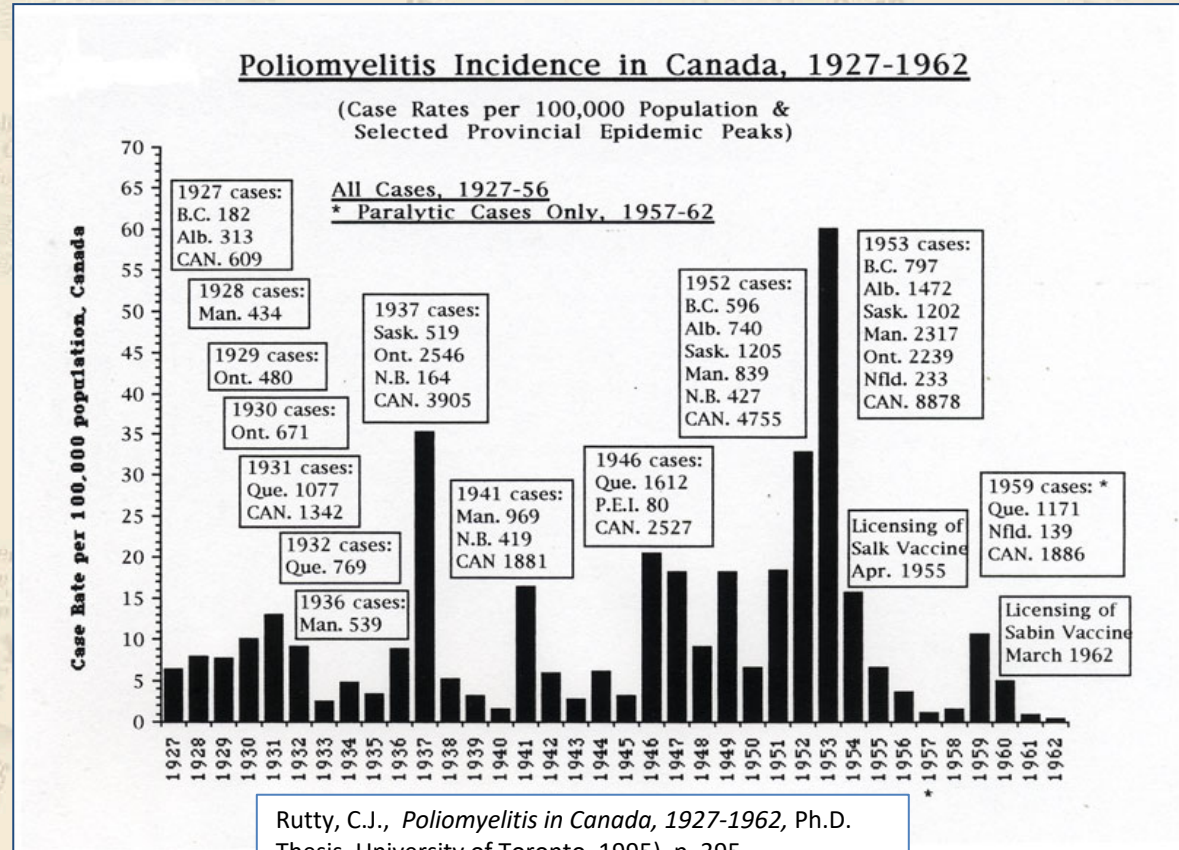
- Similar desperation today for a COVID-19 vaccine, but in 1918 few effective vaccines existed beyond smallpox vaccine, and preparation efforts were quite localized and unregulated

For more on the 1918 influenza vaccine story, see my article: <https://definingmomentscanada.ca/the-spanish-flu/research/>

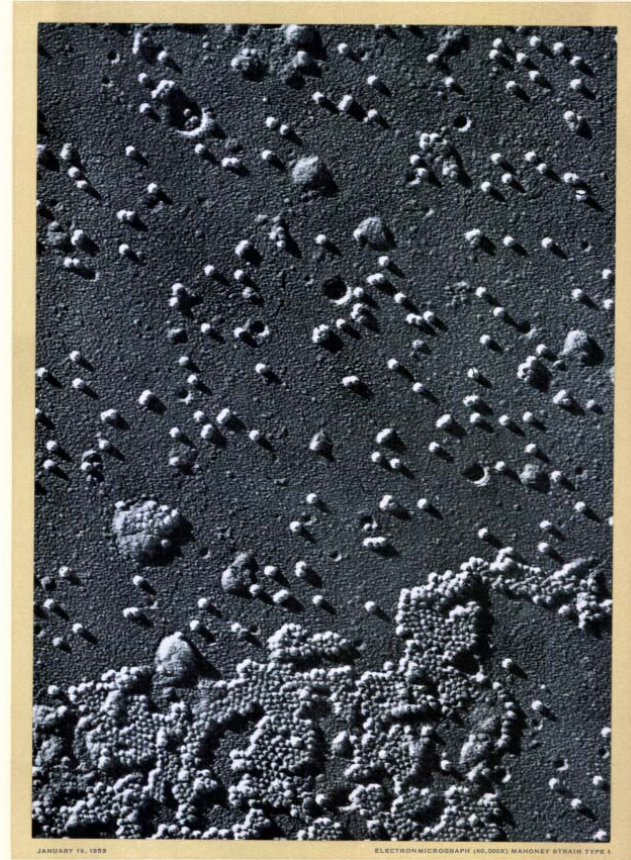
- By the late 1920s, as smallpox faded, and there was significant progress in preventing diphtheria (led by Connaught), the opposite was happening with poliomyelitis in Canada
- COVID-19 story most closely echoes the Canadian experience with polio epidemics



Library & Archives Canada



- Poliomyelitis virus can damage motor-neurons in the spinal cord, causing varying degrees of muscle weakness or paralysis
- Chest muscle weakness could impair breathing, requiring “iron lung” support
- Polio disease variability a common feature with COVID-19



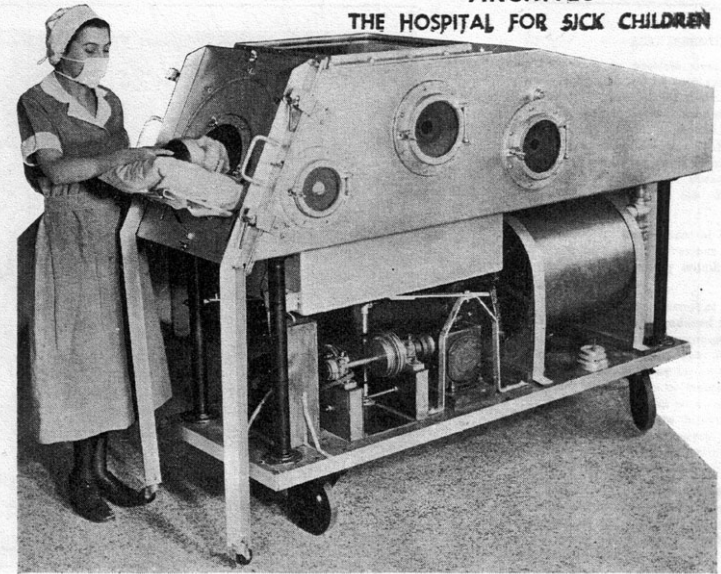
PARKE-DAVIS VIRUS LABORATORIES
The First Visualization of Polio Virus

- **1920s-50s** - Polio outbreaks and epidemics relentlessly increased until polio vaccines were widely available
- For unique epidemiological reasons, the middle class was particularly vulnerable
- However, during the polio epidemic era, much remained mysterious and misunderstood about “thecrippler”

THE HORIZON

ARCHIVES

THE HOSPITAL FOR SICK CHILDREN



“IRON LUNGS” SAVE CHILDREN’S LIVES

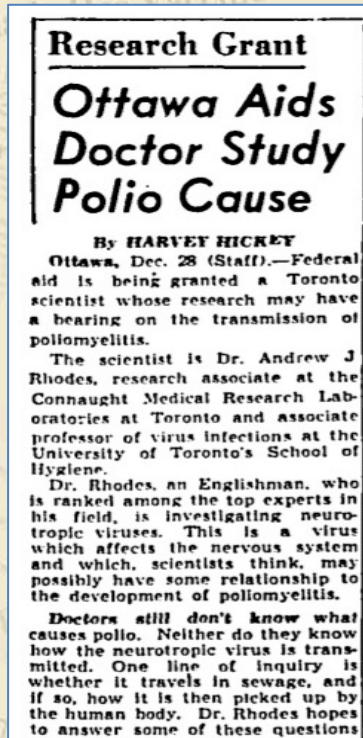
One of the 28 “Iron Lungs” made at the Hospital for Sick Children, Toronto, for use in the infantile paralysis epidemic.

VOL. 2
NO. 6

OCTOBER, 1937

PRICE
10 CENTS

- **1947-48** - Dr. Andrew J Rhodes, a leading virologist specializing in polio, was recruited from the UK to lead a comprehensive research program at Connaught Medical Research Laboratories to investigate the virology, epidemiology and clinical diagnosis of polio



Globe & Mail, Dec. 29, 1948, p. 11



Sanofi Pasteur Canada Archives



- Rhodes' research was funded by the National Foundation for Infantile Paralysis (U.S. March of Dimes), Canadian Life Insurance Companies, and newly established Federal Public Health Research Grants

- Fueled by substantial “March of Dimes” funds, a series of key discoveries accelerated progress towards a possible polio vaccine
- **1949** – Boston research team discovered method to cultivate poliovirus in tissue cultures
- **1949** – Connaught Labs research team developed “Medium 199”, the first synthetic tissue culture medium, originally for nutritional studies of cancer cells
- **1951** – Rhodes’ polio research team at Connaught discovered that “Medium 199” could be used to cultivate poliovirus in monkey kidney cells

Attack on Polio *born 12/9/51* Vaccine Search Thorough

By LEX SCHRAG

Toronto's research program in the battle against polio is faced with three routes to its objective. Early this month, Dr. A. J. Rhodes, University of Toronto professor of virus infections, attended the Copenhagen conference on polio which was jointly sponsored by Danish and U.S. associations. From the conference, he brought back to Toronto information which tended to support the theory on which Toronto researchers are working.

Dr. Gilbert Dalldorf of the New York State Department of Health reported to the convention on the Cocksackie virus—a virus named for the New York town where it was first isolated in 1947. While Dr. Dalldorf had been working on the Cocksackie virus—which produces most of the symptoms of poliomyelitis, but which does not paralyze—Canadian workers had noted a similar ailment in Toronto.

Later, Dr. Nelles Silverthorne and Dr. Patricia Armstrong led research in Dufferin County and at Orangeville, and a team of technicians, headed by Dr. Rhodes, isolated the Cocksackie virus in the Connaught Laboratories from samples obtained in Dufferin County. This was the first instance in which the Cocksackie virus was isolated in Canada.

The field work in Dufferin County has been continued through the past three years, together with the attendant bacteriological research at the Connaught Laboratories. This program has the financial assistance of the Canadian Life Insurance Officers' Association.

Globe & Mail, Sept. 25, 1951

- **1951** – Jonas Salk showed a formaldehyde-inactivated poliovirus vaccine could prevent polio in monkeys; used a traditional animal serum-based medium that would be unsafe for a human vaccine
- **1952** – Salk learned of “Medium 199”, which enabled the first human use of polio vaccine; successful test, but only on lab scale
- **1952-53** – Connaught biochemist, Dr. Leone Farrell (right), developed “Toronto Method” for large scale poliovirus cultivation
- **July 1953** – Connaught began to prepare poliovirus fluids for an unprecedented vaccine field trial

Sanofi Pasteur Canada Archives



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- Canada’s worst polio epidemic year was just starting...

Sanofi Pasteur Canada Archives



- From Manitoba west, especially, every province felt the full effects of epidemic polio at record or near record levels
- Prior to COVID-19, polio in 1953 was Canada's last epidemic national emergency
- Manitoba faced the worst crisis in the country, if not in the history of this disease

National polio numbers:

- 9,000 cases (59.9 per 100,000)
- 500 deaths

Manitoba:

- 2,317 cases (286.4/100,000)
- 91 deaths

Winnipeg:

- 763 cases (318/100,000)

Small In Number, A 'Fighting' Few, Stand Polio Siege

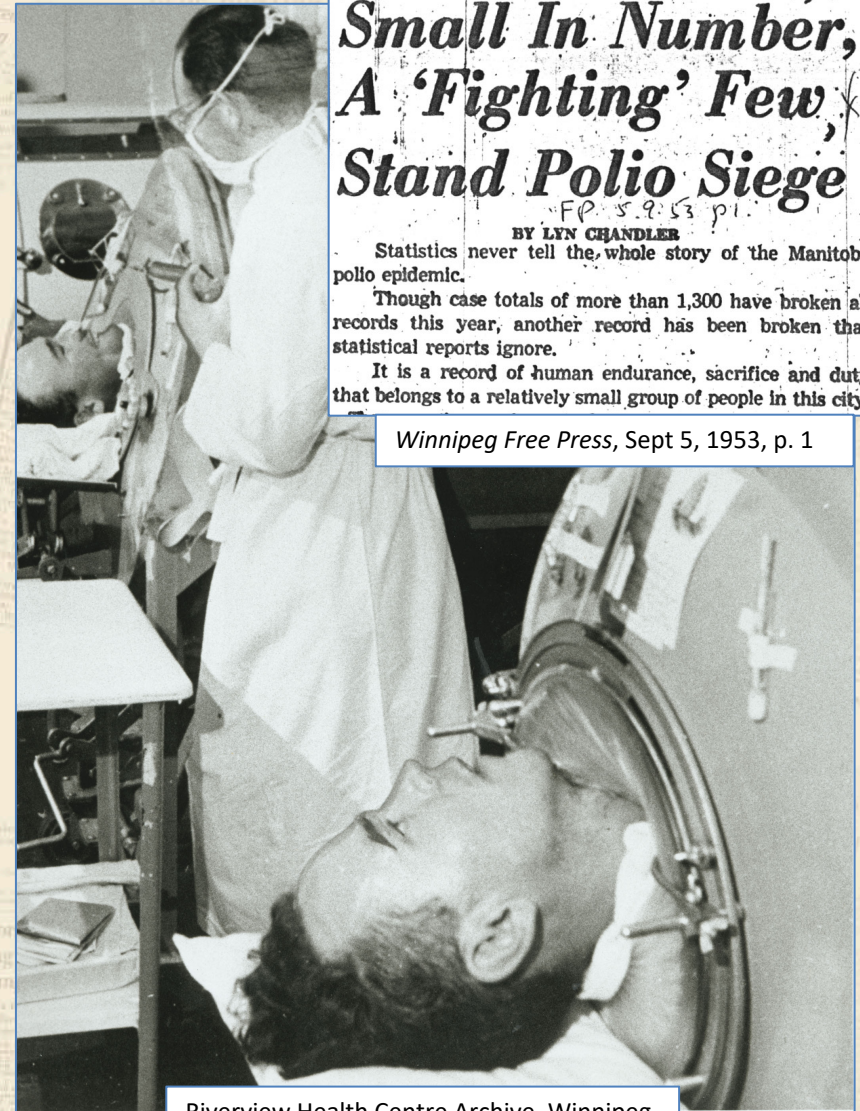
FP 5.9.53 p.1
BY LYN CHANDLER

Statistics never tell the whole story of the Manitoba polio epidemic.

Though case totals of more than 1,300 have broken all records this year, another record has been broken that statistical reports ignore.

It is a record of human endurance, sacrifice and duty that belongs to a relatively small group of people in this city.

Winnipeg Free Press, Sept 5, 1953, p. 1



Riverview Health Centre Archive, Winnipeg

- From Manitoba west, especially, every province felt the full effects of epidemic polio at record or near record levels;
- Prior to COVID-19, polio in 1953 was Canada's last epidemic national emergency
- Manitoba faced the worst crisis in the country, if not in the history of this disease

- In many ways the challenges associated with securing sufficient supplies of ventilators to manage COVID-19 patients very closely echoes the 1953 polio epidemic crisis and the urgent demand for iron lungs

Small In Number, A 'Fighting' Few, Stand Polio Siege

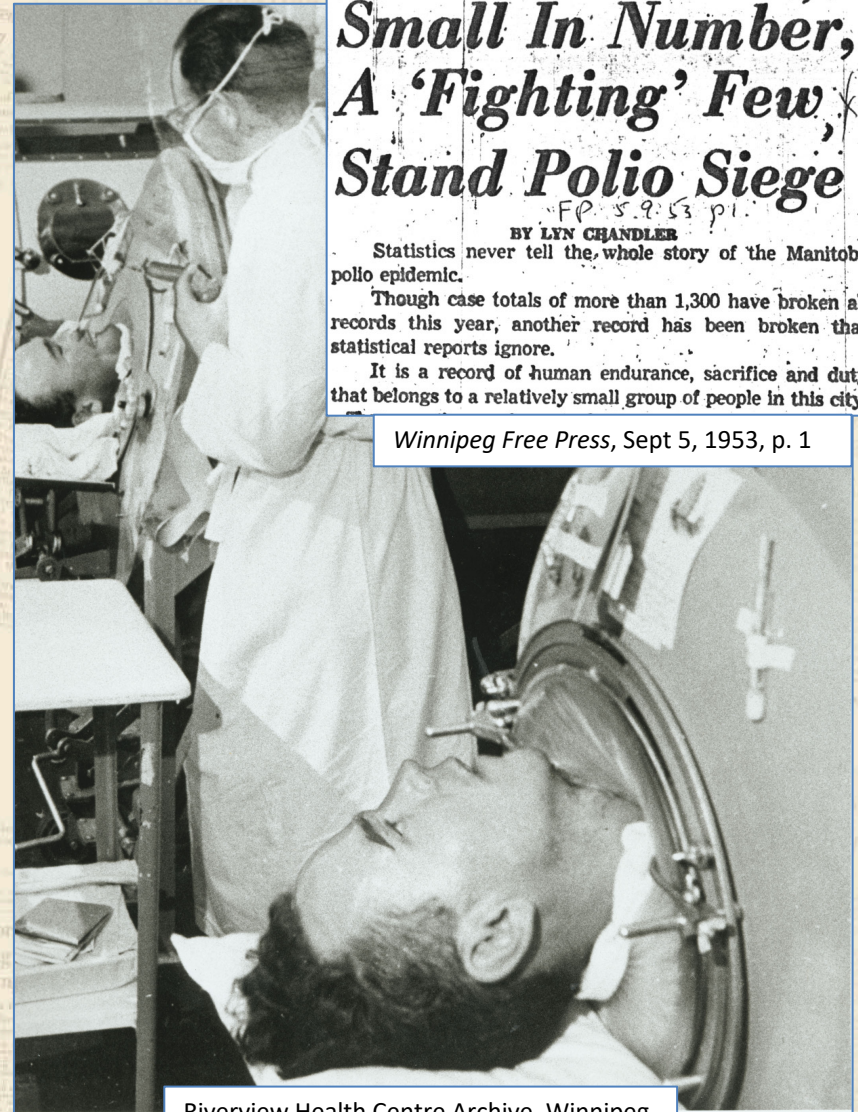
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Winnipeg Free Press, Sept 5, 1953, p. 1



Riverview Health Centre Archive, Winnipeg

- **1953-54** - While the polio emergency worsened, Connaught undertook -- as Salk described it -- the “herculean task” of producing over 3,000 litres of poliovirus fluids for what would be the largest vaccine field trial ever attempted
- The poliovirus fluids were shipped to two U.S. pharmaceutical firms for inactivation and processing into the finished vaccine

All Virus for U.S. Polio Inoculations Made in Connaught Laboratories

By KEN W. MacTAGGART

During the next eight weeks, one of the greatest projects in medical history will be launched. By June 1, between 500,000 and 1,000,000 children of Grade Two age in the United States will have been inoculated against poliomyelitis. In the weeks that follow, medical authorities the world round will be watching breathlessly.

of brews, tested various tissues. Boston had been able to keep the virus alive on rare, hard-to-obtain embryo tissues. Connaught tried others, suddenly came up with monkey kidney tissue, and delved back into years-old studies to re-discover that a fluid, labelled by its Connaught discoverers years ago as 199, met all the needs. It was costly; one of its 62 ingredients alone costs \$2,500 a bottle.

The National Foundation had

team is spread through two of its divisions: College St., opposite police headquarters, and Spadina, the venerable building on the crescent which was salvaged by the scientists. Some idea of the work entailed, with thousands of flasks and tubes used daily, is given by the knowledge that 20 people work steadily at the single job of cleaning and sterilizing the glassware.

Three times a week, a station-wagon with the license-plates of U.S. state arrives with a team



Sanofi Pasteur Canada Archives

- **April 24, 1954** – Trial began with 1,800,000 “polio pioneer” children enrolled across 44 U.S. states; Alberta, Manitoba and Halifax later joined the trial
- For this triple-blind field trial, children received either the vaccine, a placebo of Medium 199, or were observed

VOLUME 46

TORONTO, JULY 1955

NUMBER 7

Preparation of Poliomyelitis Virus for Production of Vaccine for the 1954 Field Trial[†]

L. N. FARRELL, W. WOOD, H. G. MACMORINE,
F. T. SHIMADA, AND D. G. GRAHAM
*Connaught Medical Research Laboratories
University of Toronto*

THE important demonstration of Enders, Weller and Robbins (3) that viruses of poliomyelitis proliferate in cultures of human embryonic tissue opened wide areas for study of the cause and prevention of this disease. When Rhodes and his associates showed (5) that the entirely synthetic nutrient Medium no. 199 devised by Morgan, Morton and Parker (6) can replace conventional tissue culture media containing antigenic material such as horse serum, a cell-free vaccine suitable for use in children became a possibility. Salk and his colleagues in fact used Medium no. 199 in tissue cultures to prepare their experimental formol-vaccine for inoculation of human subjects

Canadian Journal of Public Health, July 1955, p. 265



Time (Canadian Edition), March 29, 1954

- Meanwhile, Connaught prepared the full vaccine while the federal and provincial governments planned an all-Canadian observed-controlled trial that would start in April 1955, regardless of the U.S. results



- **April 12, 1955** – Unprecedented media attention to announcement of field trial results; vaccine proved to be 60-90% effective against the three antigenic types of poliovirus

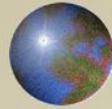


- Vaccine immediately licensed in U.S. and Canada
- In Canada, Salk vaccine distributed through a special federal-provincial free program for children and subjected to further study of its effectiveness

For more on the Canadian polio vaccine story see my articles (#7 and #8) in this series:
<http://connaught.research.utoronto.ca/history/>



- **1956-57** - A new pandemic strain of influenza virus quickly spread from Asia, prompting the first pandemic since 1918 and high global demand for influenza vaccine



Influenza Pandemic, 1957

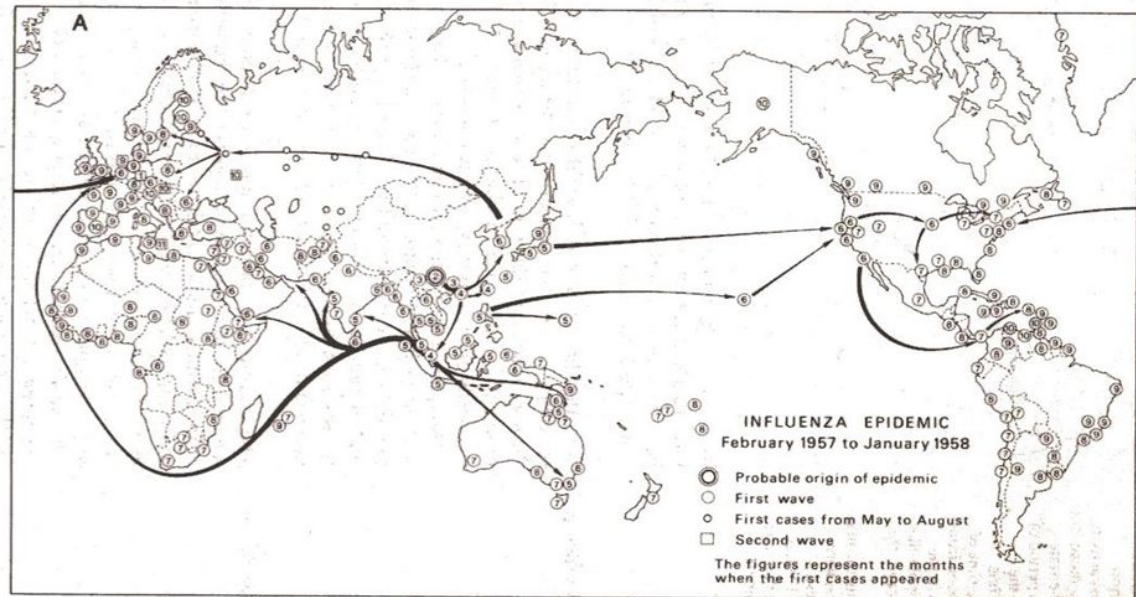
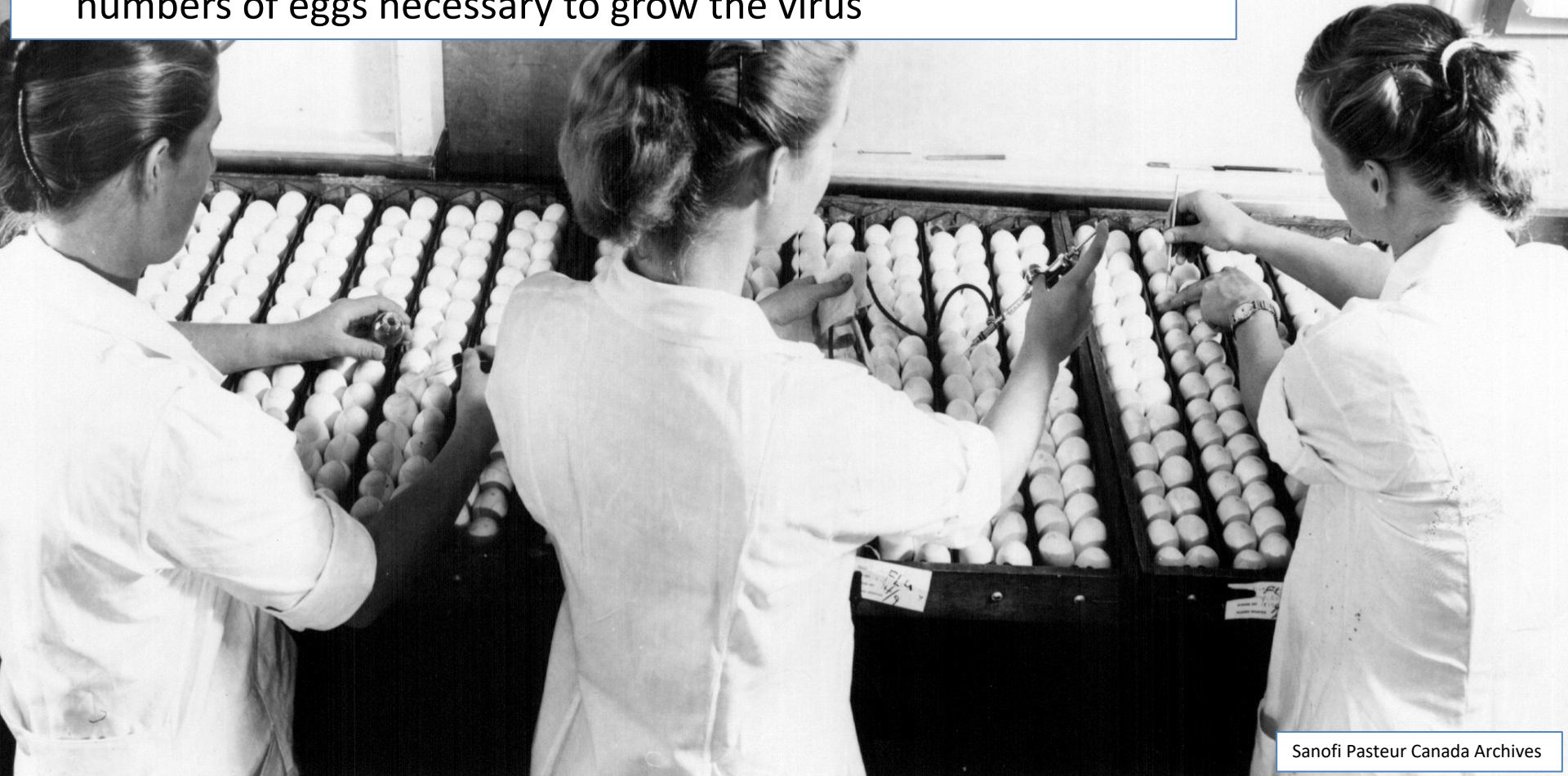


Fig. 2.7(A) Spread of the world influenza epidemic, 1957-8. Source: Stuart-Harris (1965, p. 103). (B) Diffusion of same epidemic on a local scale in northern England. Source: Hunter and Young (1971, p. 647).

- Improved influenza vaccine production methods enabled larger, but still limited, supplies in the face of sudden high public demand; the main limiting factor was sourcing the large numbers of eggs necessary to grow the virus



- **Summer 1957** – Concerned about limited vaccine availability, the Canadian government called Connaught with an urgent request for 500,000 doses to be used on a priority basis to protect armed forces and health services personnel



Ottawa Sharing Vaccine Costs With Province

Ottawa, Aug. 16 (CP).—Federal and Provincial Governments will pay equal shares of the cost of producing a vaccine for use in the event of an outbreak of Asiatic flu, Acting Health Minister A. J. Brooks, announced today.

The vaccine, being produced at Connaught Laboratories, Toronto, and the Institute of Microbiology at the University of Montreal, will be distributed on a per capita basis to provincial health authorities who will be responsible for conducting immunization programs.

Brooks said in a statement that "we anticipate that, in general, priority in the use of the vaccine will be for the maintenance of essential services."

While the Asian virus has not been identified in Canada, Brooks said, there have been a few small outbreaks of flu in this country.

The announcement said that following receipt of specimens of the Asiatic flu virus in Canada last June, an advisory committee representing the two laboratories and federal and provincial health departments laid the groundwork for an immunization program.

The two laboratories were to produce as much vaccine as possible within the limits of their present facilities.

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- The Institute of Microbiology at the University of Montreal was also asked to contribute to the urgent request for vaccine

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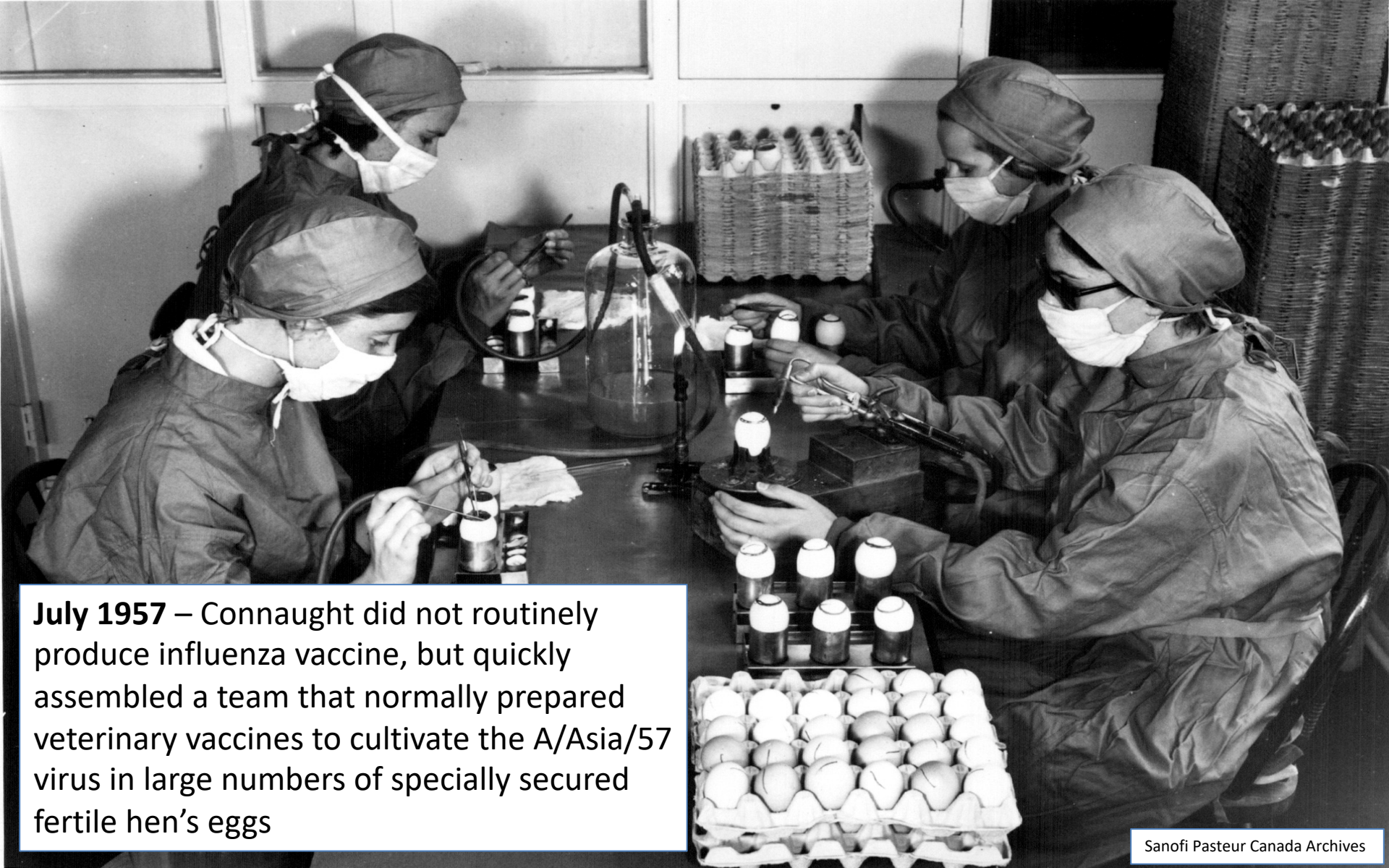
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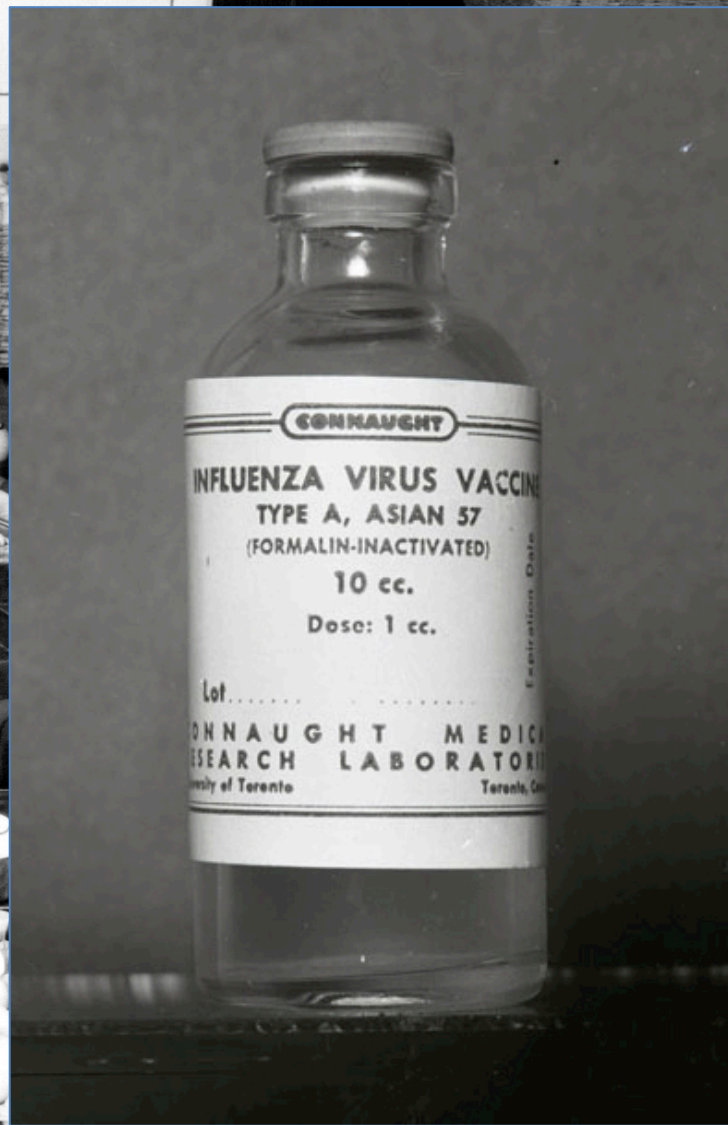


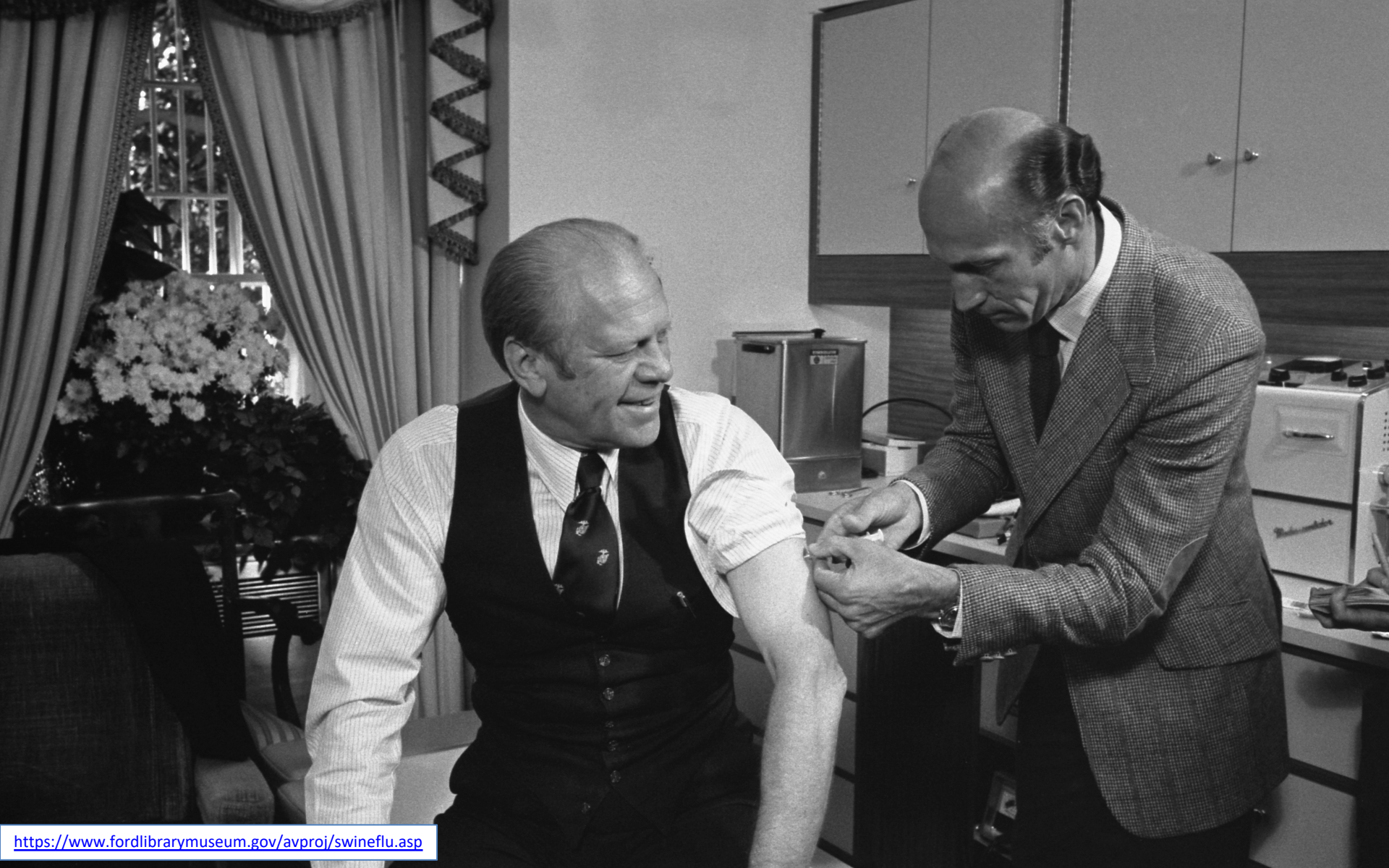


July 1957 – Connaught did not routinely produce influenza vaccine, but quickly assembled a team that normally prepared veterinary vaccines to cultivate the A/Asia/57 virus in large numbers of specially secured fertile hen's eggs



- After producing some 10,000 doses per week, the first vaccine was delivered to the provinces by early October

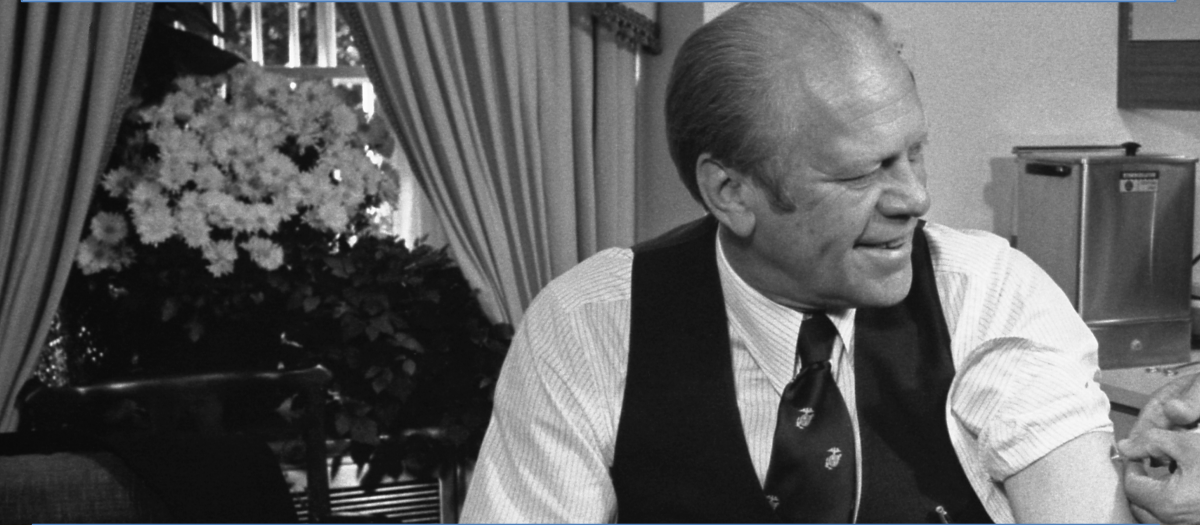




Feb 1976 - A new strain of Influenza A virus, popularly referred to as “swine flu,” caused an outbreak in among 273 of the 1,321 new army recruits at Fort Dix, New Jersey, with one death



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There were fears that the strain isolated from the fatal case was related to the one responsible for the 1918 pandemic, and that the young and middle-aged had little or no immunity

Fear 1918 killer flu making a comeback
Chicago Tribune (1963-Current file); Feb 20, 1976; ProQuest Historical Newspapers: Chicago Tribune
pg. 15

Fear 1918 killer flu making a comeback

New York News

WASHINGTON—Government scientists are afraid that four cases of influenza at Fort Dix, N.J.—one of them fatal—may signal the reemergence of the same virus that led to 500 million illnesses and 20 million deaths in the worldwide pandemic of 1918-19.

In a speaker telephone conference with reporters here, Dr. H. Bruce Dull of the federal Center for Disease Control in Atlanta said the Fort Dix virus—like the 1918 variety—has properties in common with the swine influenza agent.

“Whether this is significant or is merely a curiosity is unknown at this time,” he said, “. . . but it does have that aura from the past.”

THE PROTEINS IN the jackets of human influenza viruses are constantly changing or mutating as one strain runs its course and then hybridizes with the

jacket proteins of some species of animal flu virus, Dull explained.

What is worrisome, he said, is that—except for two cases known to have had contact with pigs which the Fort Dix cases did not—the swine proteins have not been isolated from human infections since the late 1920s when the 1918 strain entirely disappeared.

Should the new virus, which belongs to the so-called type A family, become a serious public health problem, Dull said, people under 50 probably would face greater risk than older ones because they can have had no previous exposure.

THIS IS A REVERSAL of the usual situation, he said, but does not necessarily eliminate the risk for the elderly since they are the most likely to develop complications if they do come down with the disease.

Chicago Tribune, Feb 20, 1976, p. 15

- **March 1976** – Taking advantage of a rare opportunity to mount a pre-emptive strike, President Gerald Ford committed the U.S. government to an unprecedented plan to immunize every American citizen against swine flu before November



Everyone in U.S. to get flu shots under Ford's plan

WASHINGTON (AP) — President Gerald Ford yesterday announced a \$135-million plan to vaccinate every U.S. resident against a deadly flu virus by next November.

"We cannot afford to take a chance with the health of this country," Mr. Ford said. He emphasized that at this point no one could determine the exact extent of the potential threat posed by a strain of flu known as swine influenza that could become epidemic here next fall.

However, the President said there was no cause for alarm because physicians and the drug industry are prepared to produce enough vaccine to protect the entire U.S. population of 220 million against the disease.

Flu kills 23 elderly
Page F3

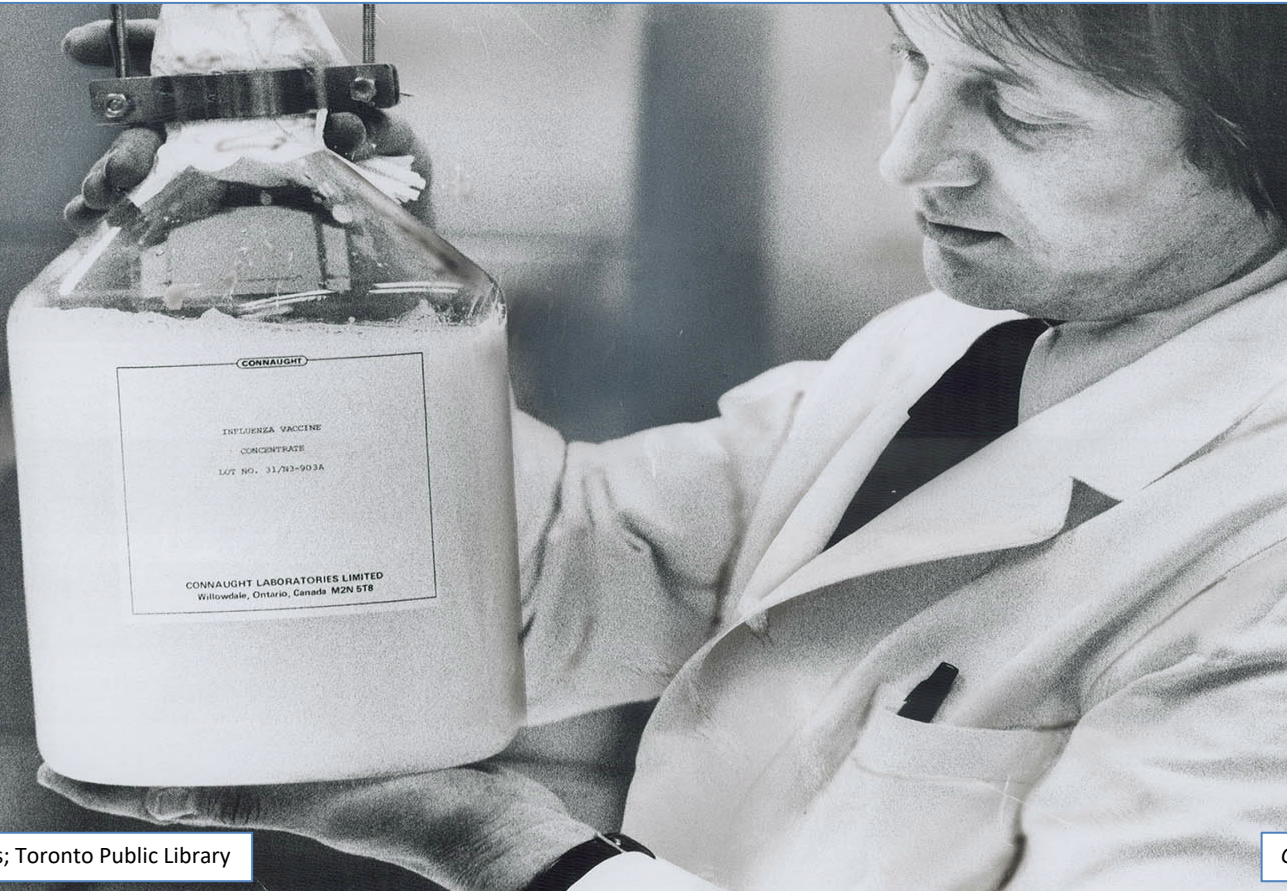
Concern first arose after a flu outbreak at Fort Dix, N.J., that killed a 19-year-old army trainee Feb. 4 and spread to about 500 other personnel on the post.

That was the first documented evidence that swine flu virus can be transmitted from person to person, although it had been suspected for some time. Isolated cases in the past have been traced to people living on farms with pigs, which frequently suffer from colds and influenza.

Globe & Mail, March 25, 1976, p. 1



- In Canada, federal health minister, Marc Lalonde, followed suit and approved an expedited swine flu immunization program, ordering 12 million shots, primarily for the chronically ill and people over 65 years-of-age



12 million flu shots for Canada

OTTAWA (CP) — The Government announced yesterday that selective immunization against swine influenza will be made available to about 12,000,000 Canadians next fall with priority for the chronically ill and people 65 or older.

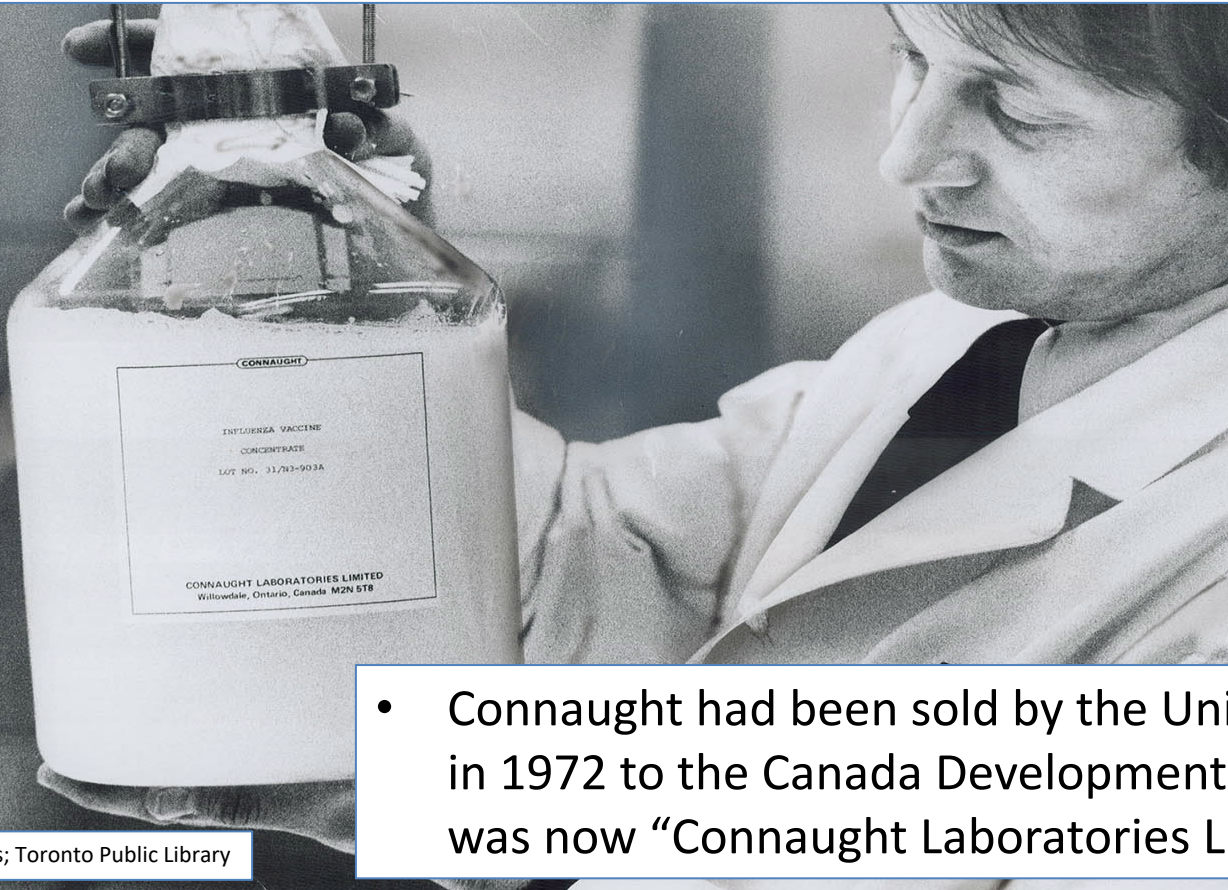
Health Minister Marc Lalonde said the vaccination program, to cost about \$9-million, would also be made available to people between 20 and 50. Priority in this group will be given to those responsible for essential services.

He said in the Commons he is acting on recommendations of the national advisory committee on immunizing agents, a group of experts in epidemiology.

- Connaught Labs was asked to provide vaccine, but limited time and equipment led to a plan to import vaccine in concentrated bulk form from vaccine companies in Europe and Australia, and then Connaught would process, test and fill it

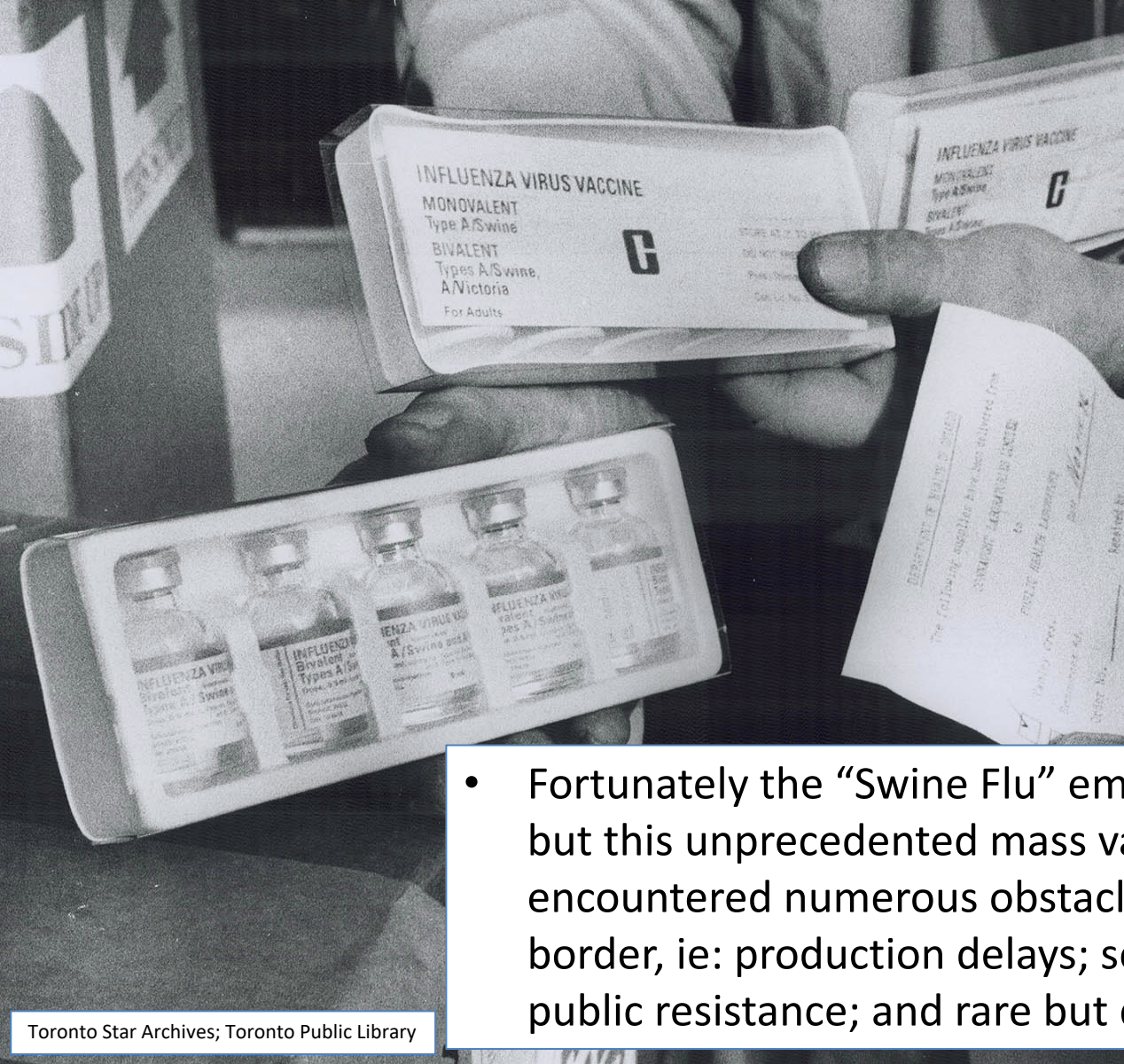


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- Connaught had been sold by the University of Toronto in 1972 to the Canada Development Corporation and was now “Connaught Laboratories Limited”





Swine flu.

An important message about Ontario's no-cost flu protection program.

There could be an outbreak of swine flu in Ontario this winter. The Ontario Ministry of Health has established a free vaccination program to help protect Ontario residents against the disease. Your Medical Officer of Health will be administering the program. Dates, places and times of clinics in your area will be announced.

Is vaccination compulsory?

No. The decision is up to you. We want you to know enough about the program that you can make an informed decision. No one knows the likelihood of catching swine flu if you are not vaccinated.

What is swine flu?

Swine flu is caused by a virus first identified at Fort Dix, New Jersey. It is believed to be similar to the one responsible for the 1918-19 world-wide influenza epidemic that affected one in six Canadians and resulted in 45,000 deaths in Canada. Swine flu is not caused by eating pork.

What are the symptoms of swine flu?

Swine flu symptoms are similar to those of all other virus flus: fever, chills, muscle aches and pains, headache and coughing. It takes one to three days from the time the virus gets into your system until you start feeling ill. The flu lasts two to seven days. But it can be fatal — sometimes within 24 hours.

How is swine flu treated?

Swine flu is treated with bed rest, fluids and drugs to bring down fever. There is no cure. That's why vaccination can be important: it can help protect you and keep the flu from spreading.

The Ontario Flu Protection Program

Who should be vaccinated?

Combined swine flu and Victoria flu vaccination is recommended for:

- people age 65 and older
- people age 20 and older who have certain chronic ailments such as diabetes, heart, lung or kidney disease.

For other people age 20 and older who want to be vaccinated, swine flu vaccine will be available at clinics.

Who should not be vaccinated against swine flu?

Don't be vaccinated if you are allergic to chicken eggs, chicken feathers or chicken, because you can get serious side effects.

If you have a fever, acute respiratory or other active infection, don't be vaccinated while you are ill.

You shouldn't have other vaccinations for two weeks before or after your flu vaccination.

How will you be vaccinated?

Vaccination will be given in the arm with the traditional needle or with a high-speed air spray. Neither method leaves a scar.

Will there be any side effects for those who should be vaccinated?

Most people will have no side effects from this vaccination. Serious side effects are rare, but

they can occur — as with any vaccination. Minor side effects can include a sore arm, headache, fever and aching muscles, lasting one or two days. If these minor symptoms persist, contact your doctor.

How effective is vaccination?

The vaccine is expected to protect from 80 to 90 per cent of those vaccinated. Protection begins about three weeks after vaccination and lasts approximately one year.

Will you have to pay to be vaccinated?

No. It's paid for by the Ontario Government.

Can you be vaccinated by your own doctor?

Using vaccine supplied by the Medical Officer of Health, some doctors will be vaccinating their own chronically ill patients — those with such conditions as diabetes, heart, lung or kidney ailments.

How can you help protect yourself?

- Get vaccinated
- Get plenty of rest and avoid becoming overexerted
- If you notice symptoms, stay at home and contact your doctor.

Better health for a better life

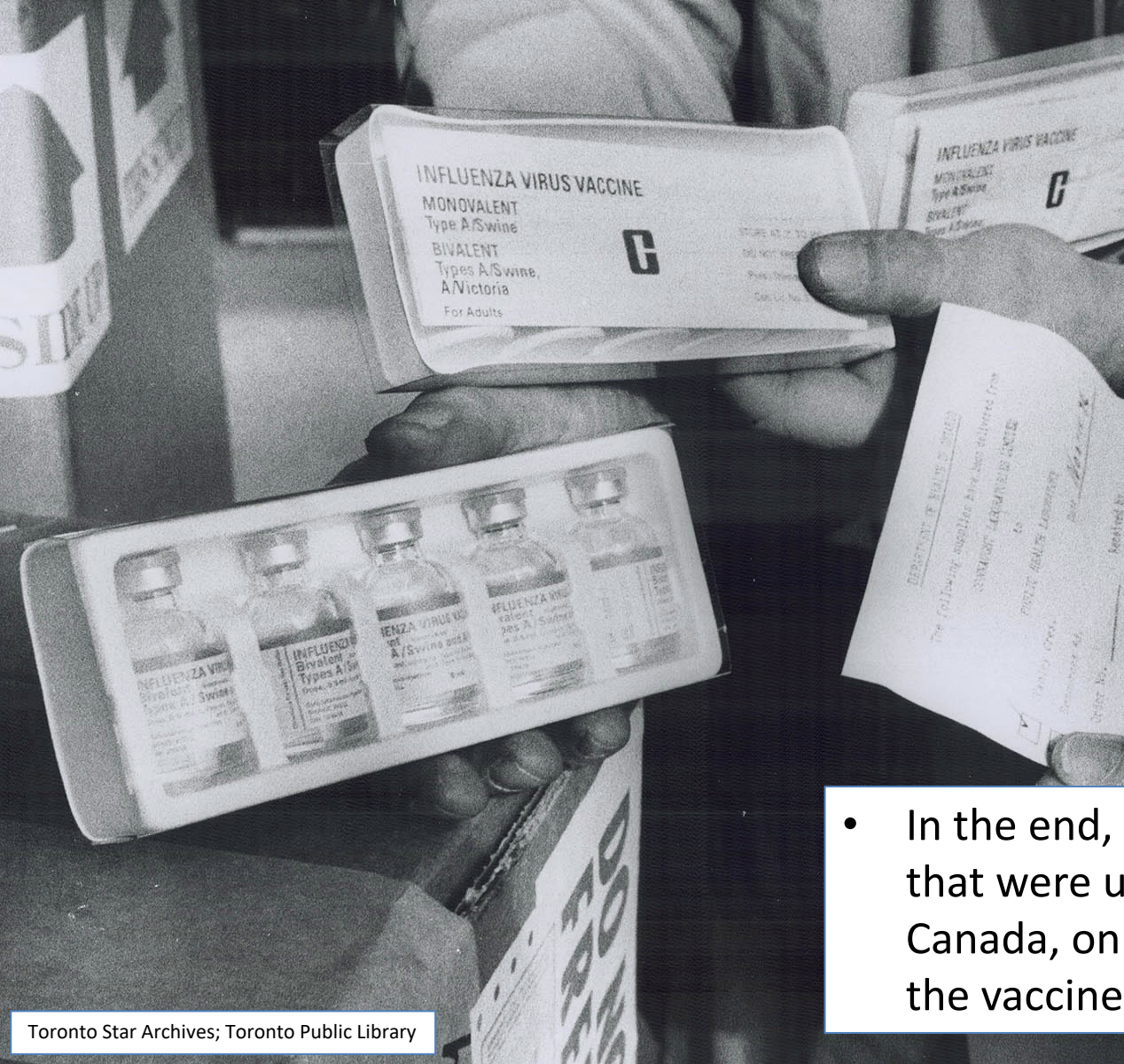


Ministry of Health
Ontario

Hon. Frank B. Miller, Minister

Toronto Star, Nov. 25, 1976, p. B10

- Fortunately the “Swine Flu” emergency did not materialize, but this unprecedented mass vaccination initiative encountered numerous obstacles on both sides of the border, ie: production delays; securing liability insurance; public resistance; and rare but disturbing adverse reactions



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Better health for a better life



Toronto Star, Nov. 25, 1976, p. B10

- In the end, out of the 10 million doses that were ultimately available in Canada, only about 800,000 received the vaccine

**H1N1
Flu Shot
Clinic Here**

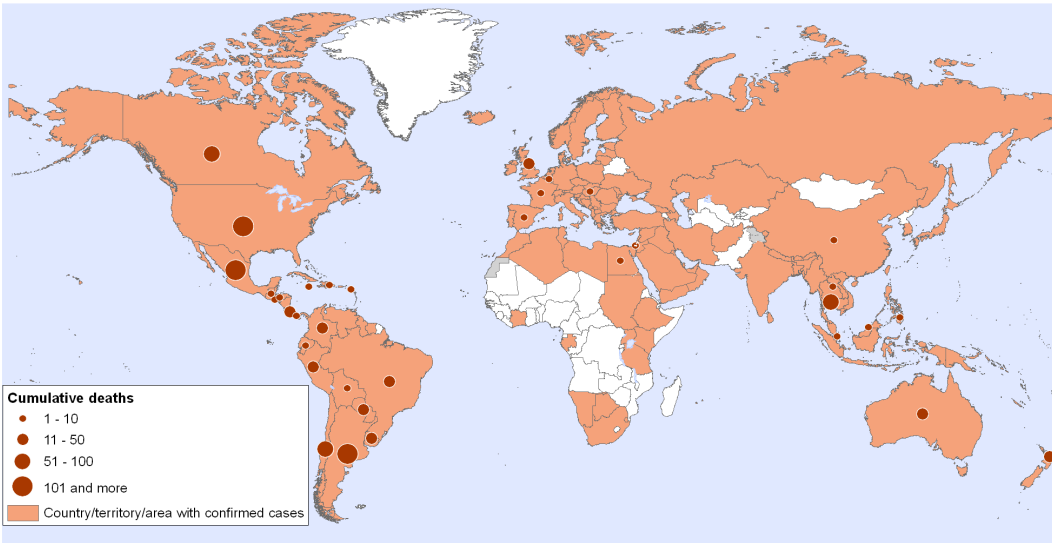
Winnipeg Regional
Health Authority



- **2009** – While the pandemic threat of “Swine Flu” did not materialize in 1976, the “H1N1” strain of “swine flu” very much did materialize globally and had a significant impact in Canada

Pandemic (H1N1) 2009
Countries, territories and areas with lab confirmed cases and number of deaths as reported to WHO

Status as of 31 July 2009



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization



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Map produced: 04 August 2009 13:00 GMT

2009 flu pandemic data

Area	Confirmed deaths
Worldwide (total)	14,286
European Union and EFTA	2,290
Other European countries and Central Asia	457
Mediterranean and Middle East	1,450
Africa	116
North America	3,642
Central America and Caribbean	237
South America	3,190
Northeast Asia and South Asia	2,294
Southeast Asia	393
Australia and Pacific	217

Source: ECDC – January 18, 2010^[147]

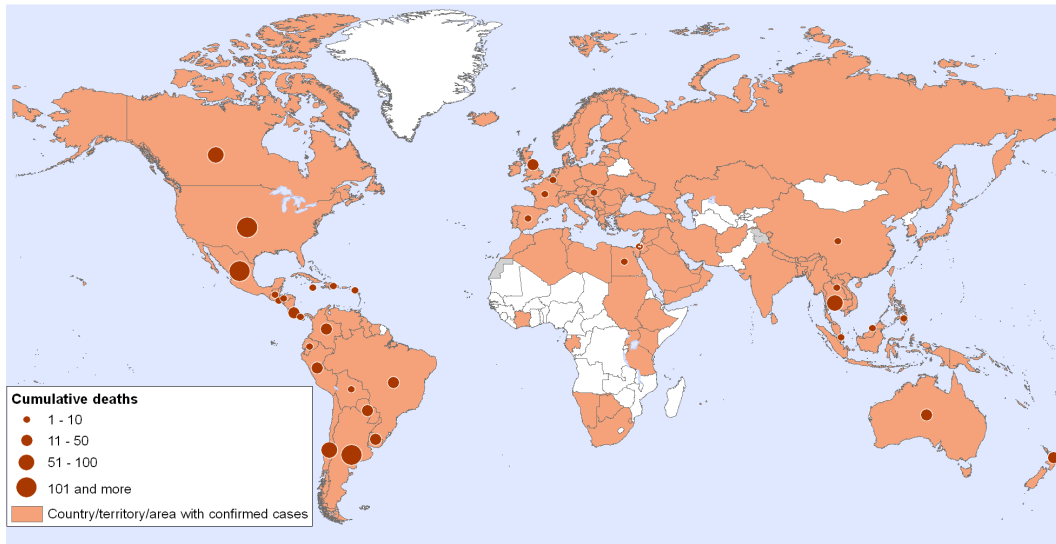
Further information: [Cases and deaths by country](#)

Note: The ratio of confirmed deaths to total deaths due to the pandemic is unknown. For more information, see ["Data reporting and accuracy"](#).

V • T • E

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- In Canada, there were over 10,000 confirmed cases and 428 deaths during the pandemic

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V • T • E

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- **April 24** – First confirmed H1N1 case in Canada
- **May 8** – First confirmed death in Canada from H1N1
- **June 10** – World Health Organization declared H1N1 a pandemic

- **May 27** – H1N1 virus seed strain provided to GSK Canada to begin vaccine production at its facility in Quebec
- Under the Canadian pandemic plan, GSK granted the full contract to supply pandemic influenza vaccine



- **July** – Initial H1N1 vaccine production slowed by low yields, pushing first vaccine delivery to September/October



FROM PAGE 1 » VACCINE

New virus strain not growing fast enough

» The new virus strain is not growing fast enough in the eggs used as a mainstay of flu vaccine production. Manufacturers report that the swine flu strains being used are barely producing half as much yield to make vaccines as the seasonal flu virus. If the problem persists, the vaccine wouldn't be immediately available for everyone.

The WHO said laboratories are generating new seed strains for manufacturers, and hoped the problem could be worked out in the coming weeks.

But Theresa Tam, the director-general of infectious disease and emergency preparedness for the Public Health Agency of Canada, said it was prudent to determine who will get the first doses. The agency hadn't been in touch with GlaxoSmithKline on the amount of vaccine that will likely be available to Canadians, nor a timeline. There is an understanding that at least some of the drug will be available by early November.

"The vaccines may not come all at once and we can't vaccinate everybody at the same time," Dr. Tam said.

- **Aug 6** – Health Canada formally places order for 50.4 million doses at a total cost of \$400 million (paid 60% federal gov't/40% provinces)

A4

News

The Globe and Mail, Friday, Aug. 7, 2009

Canada

THE H1N1 PANDEMIC

Canada to buy 50 million doses of flu vaccine

Federal government to cover 60 per cent of the cost, which will total more than \$400-million

BY HELEN BRANSWELL, TORONTO

Canada will purchase 50.4 million doses of pandemic flu vaccine, an amount that should be sufficient to protect all Canadians who want to be vaccinated against the swine flu virus, federal officials said yesterday.

The order was announced by Health Minister Leona Aglukkaq, who said the federal government would pick up 60 per cent of the more than \$400-million tab for the vaccine. She noted that provincial and territorial governments are responsible for 100 per cent of the cost of seasonal flu vaccine.

"This investment reflects the unique circumstances of the

situation as well as the gravity," Ms. Aglukkaq said.

The vaccine will be purchased from GlaxoSmithKline, which will make the product at its facility in Ste-Foy, Que.

David Butler-Jones, head of the Public Health Agency of Canada, said the size of the order should be sufficient to cover all Canadians who want and need pandemic vaccine.

It is not known whether one or two doses of vaccine will be needed to protect against the new H1N1 virus, though it is thought that older adults – who seem less vulnerable to the virus – may be able to get by with only one dose.

Dr. Butler-Jones explained

the federal math: There are 33.6 million Canadians. The federal pandemic plan suggests authorities should bank on 75 per cent of them wanting or needing vaccination. With 50.4 million doses, 75 per cent of Canadians could each get two doses.

But if only one dose is needed for some or all Canadians, different formulas could come into play.

The order size obviously allows for one dose for 100 per cent of Canadians, or one dose for all and a second dose for 50 per cent of the population, if studies show some people need two doses, Dr. Butler-Jones said.

Canada has the option of going back to request more vaccine if studies show two doses per person are needed and demand outstrips supply, he added. But he said that it was unlikely the order would be insufficient to meet the country's needs.

In fact, polling commissioned by the government suggests that at this point, only about 60 per cent of people might want pandemic vaccine. Only about a third of Canadians get a seasonal flu shot, Dr. Butler-Jones noted.

"We're ordering more," he said. "This is all hedging our bets to ensure that we err on the side of caution."

In fact, it is quite possible the country could find itself with excess pandemic vaccine on its hands, the chief public health officer admitted in an interview.

He said the government is talking with GSK about potentially turning back part of the order, if it becomes apparent Canada doesn't need 50.4 million doses. That would allow the company to start filling other countries' orders sooner, Dr. Butler-Jones said.

Canada has first access to vaccine produced at the Ste-Foy plant, having signed the world's first pandemic flu vaccine contract in 2001 with Shire Biologics, a previous owner of

the plant. GSK inherited the contract when it bought the facility in 2005.

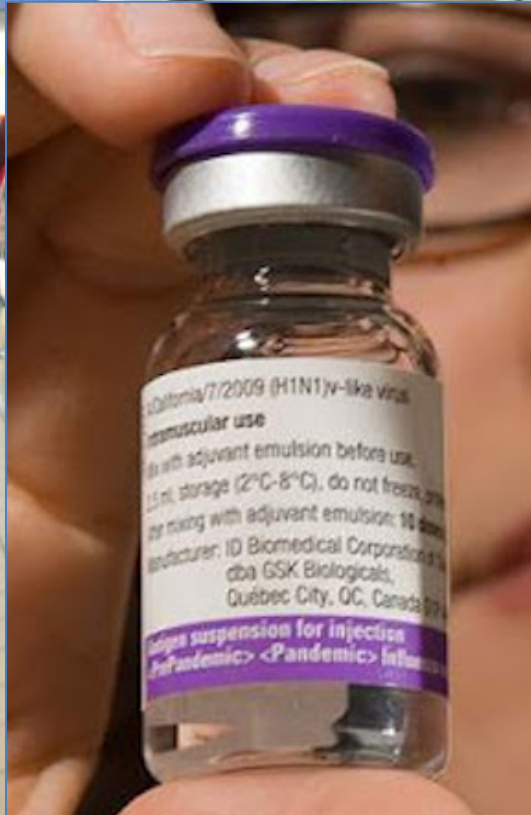
It is likely the vaccine Canada will purchase will contain an adjuvant, a compound that boosts the immune system's response to the vaccine. GSK has indicated it wants to sell adjuvanted vaccine and the World Health Organization has urged countries to use vaccine formulas that allow limited global supplies to be stretched as far as possible.

Canadian officials have repeatedly said they expect to start receiving supplies of the vaccine in late October or early November.

» The Canadian Press

- The delays coupled with continuing spread of the pandemic, raised public expectations and many questions about the vaccine's safety and effectiveness once given, especially if the pandemic had passed by then

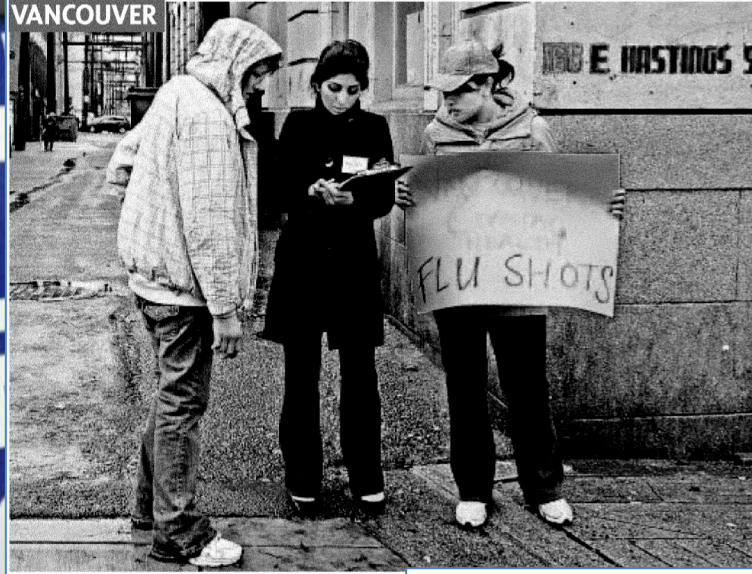
- **Oct 21** – Health Canada approves GSK's H1N1 vaccine just as a second wave of H1N1 cases hit
- **Oct 26** – The first H1N1 immunization clinics open across Canada; the largest immunization effort in Canadian history



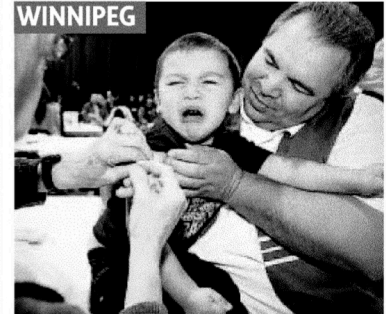
THE H1N1 PANDEMIC

Historic vaccine rollout begins as flu ramps up

VANCOUVER



WINNIPEG



QUEBEC



Globe & Mail, Oct 27, 2009, p. A1

- **Oct 27** – Sudden death in Toronto of an otherwise “healthy as can be” 13-year-old boy due to H1N1 galvanized media and public attention to the threat of H1N1 and sharply boosted vaccine uptake



H1N1 INFLUENZA
THE DEATH OF EVAN FRUSTAGLIO

A grief-stricken Paul Frustaglio doesn't know how he'll get by without his son Evan. 'Every day was a memory with my son,' he said. DEBORAH BAIC/THE GLOBE AND MAIL

Grieving father struggles with son's death

He was a healthy young athlete with a touch of asthma, and observers are shocked at how quickly he died

Globe & Mail, Oct 28, 2009, p. A17

- Ultimately, only 40% of Canadians received the H1N1 vaccine, although it was one of the highest uptakes in the world

THE H1N1 PANDEMIC

Flu-shot clinics struggle to keep up with demand

'We're a victim of our own success,' health official says as Canadians heed advice to get the shot, but the rush raises prospect of shortage

BY CAROLINE ALPHONSO
LISA PRIEST TORONTO
AND ROBERT MATAS VANCOUVER

Flu clinics across the country are facing the prospect of a shortage of the H1N1 pandemic vaccine over the next couple of weeks as Canadians heed the advice of public health officials and line up to get inoculated.

A second wave of the virus,

which has killed two children in recent days, has prompted Canadians to queue for hours at flu clinics.

The demand is encouraging to public health officials but it is also causing them to worry that they cannot keep pace as the initial shipments roll in.

Although Canada ordered 50 million doses of vaccine, only six million will be shipped to provinces and territories by

the end of the week. Communities in British Columbia, Manitoba and Ontario are concerned overwhelming early demand will outstrip supply.

In Winnipeg, where more than 30,000 residents have been vaccinated, the health authority's president said yesterday that lineups are not fading and the vaccine supply promised for next week "may be a little shy."

"At the rate we're going, if this continues next week, that probably wouldn't be quite enough," said Brian Postl of the Winnipeg Regional Health Authority.

Roland Guasparini, Chief Medical Officer of British Columbia's Fraser region, said clinics are just keeping pace.

"We're a victim of our own success," Dr. Guasparini said. » SEE 'DEMAND' PAGE 6

MORE COVERAGE

The city that got it right No frustrating lineups and no one turned away: Sault Ste. Marie sees flu-shot success as thousands are vaccinated by appointment PAGE 17 »

What to do in this state of confusion GLOBE LIFE »

What you need to know GLOBEANDMAIL.COM/H1N1 »

Globe & Mail, Oct 29, 2009, p. A1

H1N1
Flu Shot
Clinic Here
Winnipeg Regional
Health Authority



- This unprecedented effort also highlighted many issues, particularly related to the pandemic vaccine supply in Canada and the issue of vaccine hesitancy, especially among young adults

THE H1N1 PANDEMIC

Canada needs two vaccine suppliers, Ottawa admits

Official says 'there is no debate' about enlisting more than one flu-shot manufacturer in future pandemics to avoid current delivery delays

BY DANIEL LEBLANC
AND PAUL WALDIE

Canada needs more than one vaccine manufacturer to deal with future flu pandemics and to avoid production delays that have affected the fight against the H1N1 virus, federal officials say.

"There is no debate. We all feel that when the time will come to renegotiate, we will go

to tenders on a two-part contract to ensure maximum flexibility," said a senior official who has been working directly on the file.

While the Harper government has applauded GlaxoSmith-Kline Inc. for making more than 6 million doses so far at its facility in Ste-Foy, Que., a number of officials involved in the crisis said Canada deserves a second producer in the future.

Had that been the case this time, one manufacturer could have worked on the production of vaccines with the adjuvant additive, while the other one could have produced non-adjuvanted vaccines for pregnant women.

GSK was forced to make changes to its production line in mid-course, which caused delays in the delivery of vaccines to the provinces.

The official said that a simple stroke of bad luck can endanger thousands of doses of vaccine, and that it's better to "be safe than sorry" when it comes to production matters.

The GSK contract dates back more than a decade when health officials across Canada began planning for a pandemic, and mass inoculations, in the wake of an avian flu scare.

» SEE 'VACCINE' PAGE 8

THE ETHICS OF FLU

Jumping the queue is OK for a few

Employees of Canada's sole vaccine manufacturer got their flu shots along with their spouses and kids - with the nod of medical ethicists. It's part of most pandemic plans to put front-line health workers at the top of the list, but the struggle lies in deciding who gets priority in the first place. Michael Valpy reports.

STORY, PAGE 8 »

Globe & Mail, Nov 6, 2009, p. A1

Flu Shot
Clinic Here

Winnipeg Regional
Health Authority



Canada's Emergency Vaccine Responses Legacy

Influenza 1918

- Broad willingness to be bold in the face of a pandemic emergency and limited knowledge

Influenza 1957

- Federal leadership to secure vaccine, yet limited capacity to produce it quickly

Influenza 1976

- Heightened U.S./Canadian cross-border sensitivities surrounding potential pandemic threat and rapid large-scale vaccine response

Influenza 2009

- Strong Canadian vaccine initiative complicated by slow production and roll-out that enabled public hesitations to grow

Polio Vaccine

- Highlights a strong and bold legacy of innovation and collaboration in vaccine development that persists in Canada
- Also persistent, however, are limits in vaccine production capacity and efficiencies to meet the emergency challenges surrounding providing a potential COVID-19 vaccine(s)

