Date	Dec 9 1993
Author	DA Henderson
Title	Eradication of smallpox: The role of CDC
Event	Symposium: Anniversary of the Medicine Division
Event Sponsor	National Library of Medicine
Event location	Bethesda MD
Notes	
Publ as	

NATL LIBS OF MEDICINE
DEC 9 93

Erad. of Spx – Role of CDC

The CDC's role in spxx erad. was, let it turned out, a pivotal one, as I shall relate – how it became involved and what transpired represents as much a case history in serendipidity as deliberate planning. But to jump ahead to the end of the story

In May 1980, the WHA, in a specially convened plenary session, passed a resolution:

① Declares solemnly
② No vaccination.

This was the concluding chapter in the determination of a disease whose history dates back at least 3000 years, almost certainly emerging from an animal reservoir to afflict man some time after the emergence of the first agricultural settlements ~10 000 years ago – continuing chain of transmission

③ Pharoh Ramses V Died as a young man 1157 B.C.
Note edema; Hopkins observations

Smallpox was 20th century after century the most lethal of all infectious diseases known to man –
Spread in any climate and, indeed, in any season
Case-fatality rates of 25% to 40% and more. Beginning – Central Europe
Everyone susceptible until recovery from the disease?
Only disease incorporated into the culture of specific deities

④ Sapona
⑤ Sitla Mata

⑥ McCauley –
Reference – the scarring + dairymaids

⑦ Ed Jenner – 1796 1st vaccination

⑧ Campus Lecture -

One of the greatest discoveries in medicine -

Vaccination spread across the world, transformed by arm to arm inoculation

~~[illegible]~~ Eventually discovered that the vaccinia virus could be grown on the skin of a calf ~~Gradually, better methods for produc~~ and gradually methods were found to purify vaccine preparations and to make them more thermostable.

By the early 1960's, the industrialized countries had all become free of the disease but smallpox continued to ravage parts of Latin America, sub-Saharan Africa, the Indian subcontinent and Indonesia.

All countries continued to vaccinate their troops.

Vaccination certificates.

What was the disease like

⑨ ⑨ Smallpox case

⑩ ⑩ ↓

⑪ ⑪

⑫ ⑫ Blindness

⑬ BLANK

Until 1962, CDC's interest in smallpox had been largely a passive one - basically, to be responsive to the request of state health authorities should they need help in the investigation and control of smallpox or, for that matter, any other disease. There were no EIS officers assigned to work in smallpox and no research or operational programs.

(13) SLIDE t.b.m.

Four circumstances served to change this state of affairs —

1) Concern about smallpox importations
2) Concern about the complications of smallpox vaccine
3) The development of the jet airplane.
4) The measure of measles vaccine — that I will explain need to

The outcome of CDC's responses to these challenges eventually precipated the global erad. program which began in 1967 was to

Throughout the 1950's, there had been periodic importations of smallpox into Europe but beginning in 1961 coupled with major epidemics of smallpox on the Asian subcontinent & increasing air travel brought a total of 14 importations within a period of little more than 18 months — During the winter of 1961-62 there were 5 importations into the U.K. over just two months resulting in 67 cases and 27 deaths. Many were health care providers.

~~CDC created, reorganized a smallpox surveillance unit to become familiar with~~ and began sending ~~U.S.~~ officers to participate. For ~~the~~ U.S. physicians at that time, had never seen smallpox and fewer still had had any experience in control of an outbreak. — and such was the case at CDC.

Thus, in 1962 a smallpox surveillance unit was created with Don Millar as Chief with the express intent of training a small cadre to be on call should an epidemic occur. The first call came a year later in the person of a 14 year old boy who travelled from Brazil to New York and proceeded by train to Toronto. He was febrile on arrival and shortly after he developed the rash. ~~smallpox~~. A coordinated plan for surveillance and control was developed with Canadian authorities; over 1200 persons were placed under surveillance — fortunately no further cases occurred but the need for expertise in smallpox control was reaffirmed.

Concern about vaccine complications arose as a result of the efforts of ~~Meredith~~ the late Dr Henry Kempe, then serving as director of a national referral center for patients with complications of smallpox vaccination.

Troubled by the severity of the complications and well aware that no cases of smallpox had been seen in the U.S. for more than 10 years, he became an ardent,

as others,
indeed emotional advocates for stopping all smallpox vaccinations. CDC, ~~knew~~ doubted that they were anywhere near as frequent as Kempe believed, and knew of some vaccine complications, ~~but~~ expanded ~~believed~~ the risk justified the benefits. ~~More~~ Definitive ~~Needed~~ data were lacking, however, & so the smallpox vaccination was expanded and, (to document the case.

under the direction of John Neff and Mike Lane, carefully conducted national surveys were undertaken.

X The development by the U.S. Army of the jet injector ~~for vaccination~~ was the third of the four precipitating events

④ Jet injector.

It was designed originally to deliver a subcutaneous immunization. By modifying the design of the head, largely intradermal immunization was possible ~~but~~ the conventional route of smallpox immunization - but the question was whether it would work in practice and, if so, what dose of vaccine was required. The Army contracted with CDC ~~was~~ to carry out these studies — first in the U.S., then in Jamaica, Brazil and Tonga. The studies proved eminently successful — as many as 1000 persons per hour could be vaccinated with this device, using only 1/4 to 1/3 the amount of vaccine required for conventional administration.

Thus, within a three year time frame 1962-65, CDC's smallpox and smallpox vaccine activities had expanded from nil to an active unit comprising some 4 (full-time) epidemiologists.

(15) Millar, Foege, LANE t.b.m

~~DELETED~~ ~~The definitive last step~~

The fourth and the most definitive of the events leading to smallpox eradication (curiously) arose as a result of the (fortuitous) licensure and beginning use of measles vaccine. The story begins in 1960 when the MOH of Upper Volta visited NIH's Division of Biologics Standards. Hank Mayer was then working (work) on the Edmonston B strain vaccine ~~which~~ the vaccine, which (frequently) caused high (a) fever and so its use was contemplated with a simultaneous inoculation of ~~gamma~~ immune globulin. (aware of the severity of measles in African children,) The Minister Paul Hamburger, was eager to have measles vaccine used in his country ~~as soon as~~ (however,) All recognized that simultaneous administration of both measles vaccine and immune globulin was both logistically difficult and (for too) costly. ~~Could the concept of~~ Could the vaccine be given safely without gamma globulin? (in Upper Volta with injection of the vaccine in a small trial ~~of~~ of 1000 children.)

16 SLIDE

In 1961, Mayer and Leo Kaplan (Upper Volta) showed it could.

The Minister (then) asked that all children be immunized; AID agreed to fund this effort and in late 1962, (Mayer) ~~the~~ led an effort which vaccinated 900 000 children between 6 months and 6 years of age. Soon (French West African) neighboring countries clamored for vaccine and AID agreed to support (those) programs.

One team from each of 9 countries trained in late 1963 for national programs to begin in late 1964.

At this point NIH withdrew from the scene.

SLIDE - MALAWI.

CDC was asked to provide an epidemiologist for 6 weeks to assess progress — to be AIDS "eyes and ears". Selected for the project was a young EIS Officer — Dr. Larry Altman — now known as Lawrence Altman of the New York Times. In a series of dispatches from the field, Larry chronicled an unbelievable litany of problems.

- Large, costly custom-built vehicles (U.S.-supplied) which were more often bogged down in the sand than moving on the road, most of them ~~outfitted in Spanish~~ with prominent signs painted on the sides identifying the program — but in Spanish, rather than French.
- Several blew up and burned — the cause, as it was discovered, was that the flames for the built-in refrigerators was next to the gas tank.
- And — as they say — This was only the tip of the iceberg!

Larry's 6 weeks extended to 6 months as he sought to bring order out of chaos.

(17) SLIDE - LARRY'S RETURN

AID's enthusiasm for the project was undiminished, however, as they decided to extend the program to 4 additional countries. They asked CDC to provide 9 epidemiologists for 6 months each tour.

(18) .DE

This posed a problem to us. Nine epidemiologists represented a significant portion of our own available manpower. Moreover, we had real doubts about the program itself. A measles vaccination campaign would serve to diminish measles cases temporarily but once stopped – and AID planned only to provide for 4 years of assistance – susceptible newborns would again be infected and little would have changed. And None of the countries, on their own, could afford to continue the program, primarily because of the expense of the vaccine. This posed for us a quandry. To our minds, the program was not sound health policy – but – we were anxious to continue a broader collaboration with AID in international health ventures. It was difficult to reject it out of hand.

And so we countered with a proposal that we would support the measles immunization campaign in the countries as a part of Region-wide smallpox eradication – measles control effort. (This would offer some level of permanency of the Note: ō smallpox in N. Africa) This posed a real problem to AID. Nigeria – > half the population of the entire region. – policy of economic aid only.

The proposal went forward in July 1965 but little happened. AID strenuously objected. Then, serendipity prevailed. The U.N. was celebrating International Cooperation Year; the President told the U.S. to make some sort of specific gesture in this cause and convened an Interagency Task Force to develop ideas; PHS staff from the Surgeon General's

and suggested it as a specific response the Proxy might make

officers surfaced the West African proposal, and on November 23 1965, the program finally was announced. AID was told to support it.

19 Press Announcement

A part of the proposal was a forecast of smallpox incidence over the course of the program.

SLIDE 20 p. 866 SEP

The program ~~had been~~ was planned to begin in January 1967, 13 months from the time of decision. As preparations moved frantically ahead – recruiting and training of some 60 staff, ordering supplies and equipment, obtaining individual agreements from each of the 19 countries — preparations were being made by the U.S. and U.S.S.R. to jointly sponsor a resolution at the May 1966 WHA to commit 2.5×10^6 for an intensified global eradication effort.

Opposed by many developing countries.

Indeed — in this country — Rene Dubos. (Man Adapting – 1965)

"Even if genuine eradication of a pathogen or a vector on a worldwide scale were theoretically ~~possible~~ and practically possible, the enormous effort required for reaching the goal would probably make the attempt economically and humanly unwise .... Public health administrators, like social planners, have to compromise with the limitations of human nature. For this reason and many others, eradication programs will eventually become a curiosity item on library shelves, just as have all social utopias"

The Director General made it clear that he was not supporting
Indiana in the Assembly.
The budget eventually passed by two votes – the narrowest margin ever for a
budget reduction of the Assembly.
Decision on 10 year goal.
DG contact to SG.
— DAT assigned.

(21) Slide 1967 — 3 locations 10-15 / 2-2.5 !
Strategy: Vaccination 80% +
Surveillance - containment -

SLIDE – Every Case a failure

(23) 1970 — CDC/Marcon - reference laboratory

(24) 1973
Note: CDC involvement
Search
1975

(25) 1975 :
(26) "Only Ethiopia"
(27) Roads
(28) Pan MADRID — 10 yr. / 9 mos. / 26 days.

~~The~~ Total expenditures on the program by the international community amounted to $100 million.

Such is a brief recapitulation of some of the events of a 15 year period between 1962 and 1977.

The simple fact, however, is that ~~without the simple~~ without the actions taken by CDC, I think there is no question but that even today, small pox would present a continuing menace and the U.S. would be ~~and~~ spending close to ~~five~~ 500 million dollars a year in vaccination and in guarding against importations.