



NATIONAL INSTITUTES OF HEALTH CLINICAL CENTER

Public Health Service

Warren G. Magnuson Clinical Center
Mark O. Hatfield Clinical Research Center

Building 10, Room 6-2551
10 Center Drive, MSC 1504
Bethesda, Maryland 20892
clinicalcenter.nih.gov

June 10, 2010

D.A. Henderson, M.D., M.P.H.
Distinguished Scholar, UPMC
The Center for Biosecurity of UPMC
The Pier IV Building
621 East Pratt Street, Suite 210
Baltimore, MD 21202

Dear Dr. Henderson:

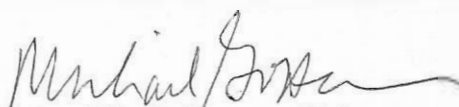
We are very pleased to confirm your invitation for the **Contemporary Clinical Medicine – Great Teachers** series, a component of NIH Clinical Center Grand Rounds. Your lecture will be on **Wednesday, November 10th, 2010**, from noon to 1 p.m., on the NIH campus in Bethesda, Maryland. As you discussed with Dr. Theo Heller, your general topic is **Current Events Surrounding Smallpox** but there is time to refine your topic and title.

Though the NIH is focused on uncovering new knowledge, the goal of this Great Teachers series is to bring up-to-date information on important clinical topics to clinical practitioners and research physicians. The viewpoint should be from the bedside and your emphasis on the practical. However, do not feel shy about imparting important new trends you see emerging in your area of clinical expertise. Please try to use novel teaching techniques, including those that engage the audience. In particular, we encourage you to consider including the presentation of a live patient or a patient history. If necessary, we will try to help you to find the right patient from our intramural program.

Grand Rounds are held in the NIH Clinical Center's Lipsett Auditorium, which accommodates about 250 people. The audience will include physicians, nurses, other health care providers, and researchers at NIH. Your presentation will be videocast and viewed by simulcast from off-campus sites. CME credit will be offered for your lecture and video of your lecture will be archived on the NIH videocast website. Approximately one month prior to your lecture, we will send you information about CME requirements for your lecture (disclosures, goals and objectives, etc.).

You will receive an honorarium and will be reimbursed for your travel expenses based on established government rates. This includes a round trip coach class fare, as well as parking and transportation to/from the airport. Additionally, you will receive a meal allowance based on the federal per diem for Bethesda. You also will be reimbursed for your hotel arrangements at the prevailing (standard) room rate.

Please feel free to get in touch with Dr. Theo Heller (301-404-7147); theo@intra.niddk.nih.gov or Dr. Frederick P. Ognibene (301-496-9425); fognibene@cc.nih.gov to discuss any details related to this lecture, including establishing a patient contact. We look forward to your visit.


Michael M. Gottesman, M.D.
Deputy Director for Intramural Research, NIH

Sincerely,


John I. Gallin, M.D.
Director, NIH Clinical Center

Smallpox: Death of a Disease

...end of an eradication campaign and its legacy

D.A. Henderson, MD, MPH

Johns Hopkins University Distinguished Service Professor
Professor of Medicine and Public Health, U. of Pittsburgh

Grand Rounds, National Institutes of Health

10 November 2010

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Financial conflicts of interest -- none

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Main objectives for the presentation

- To portray the principal clinical features of smallpox, a disease last seen in 1978 but a continuing threat
- To identify the principal landmarks of the eradication campaign and research contributing to its success
- To highlight the program's legacies and growing opportunities

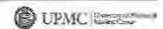
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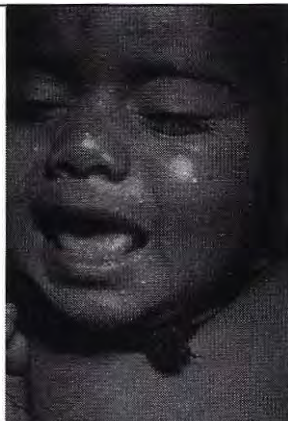
Smallpox, the disease

- Virus – face-to-face spread only during rash
- Man is the only host
 - Chain of infection going back more than 3500 years
 - Only disease with deities -- Asia and Africa
- Death rate was 30%
 - But permanent immunity among survivors
- A highly stable vaccine protects with one dose

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Day 3

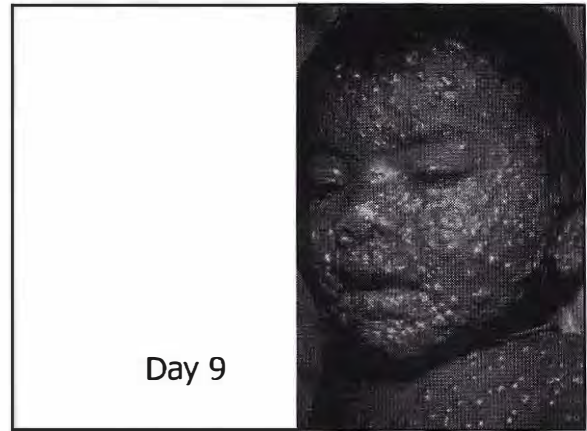


Day 5

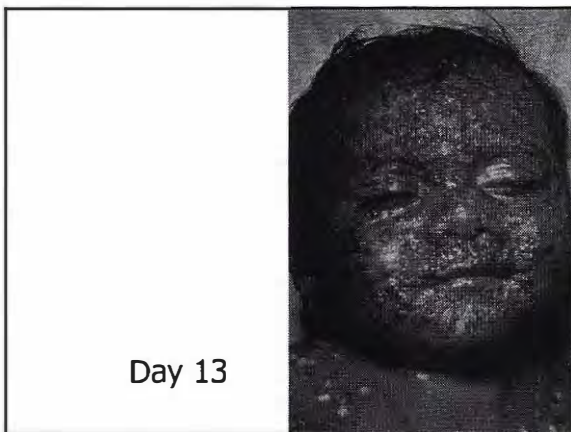




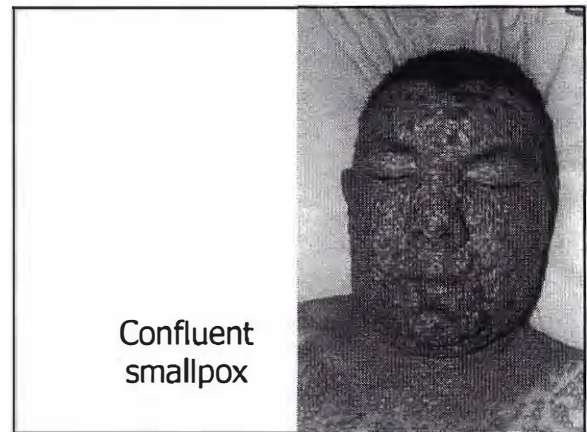
Day 7



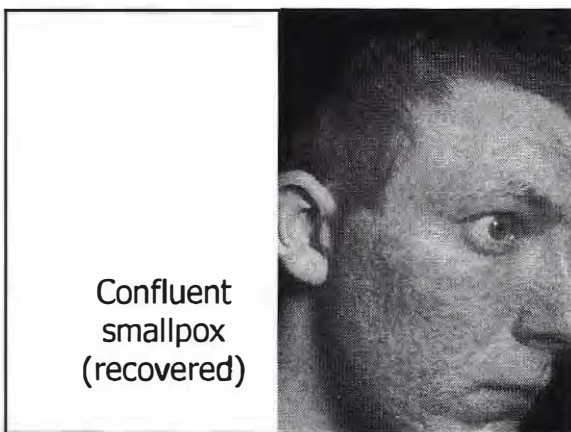
Day 9



Day 13



Confluent
smallpox



Confluent
smallpox
(recovered)

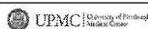
Global efforts to eradicate a disease

- Hookworm 1909-23 14 years
- Yellow fever 1915-32 17 years
- Yaws 1948-66 18 years
- Malaria 1955-73 18 years
- Smallpox 1967-80 14 years
- G. worm infection 1986- ? 24 years +
- Poliomyelitis 1988- ? 22 Years +

Vaccine Supply

- Heat-stable, potent vaccine is essential
 - Quality control of vaccine
 - No country to receive WHO assistance unless vaccine meets international standards
 - 42 labs producing vaccine
 - Independent international quality control
 - Labs in Netherlands and Canada
 - Development of national capacity
 - Production manual and research
 - On-site consultant assistance

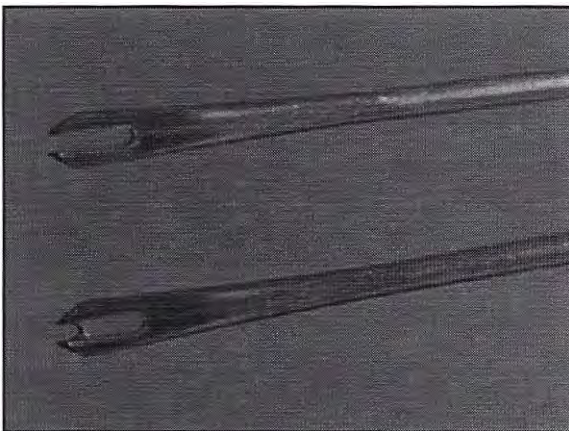
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Vaccination methods

- Research to find faster, better methods
 - Jet Injector gun
 - Bifurcated needle—multiple puncture method
 - One-fourth as much vaccine required
 - Training time -- 15 minutes
 - Easily sterilized and reused
 - Cost -- \$5 per thousand
- Target for coverage – 80%
 - Evaluation teams

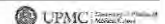
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Surveillance-containment strategy

- Operational plan
 - Surveillance – weekly report from all health units
 - Teams – to investigate and contain outbreaks
 - Epidemiological research on smallpox
 - The textbooks prove to be wrong
 - “Smallpox spreads like a prairie fire”
 - “Revaccination is needed every 3 to 5 years”
 - “Afghan women cannot be vaccinated”

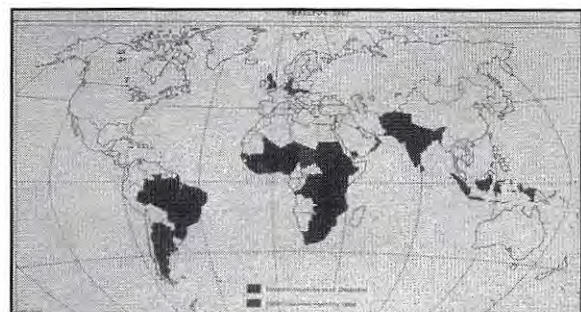
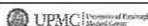
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Operational principles

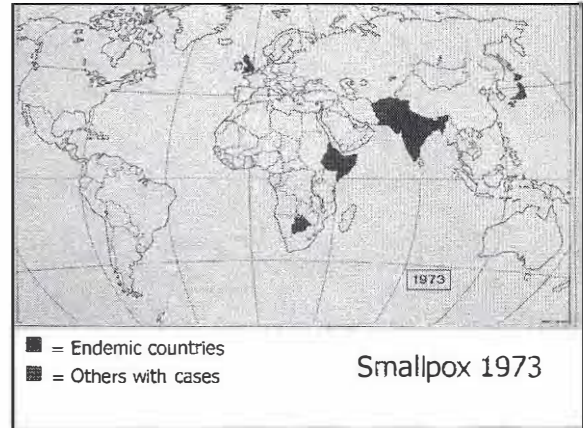
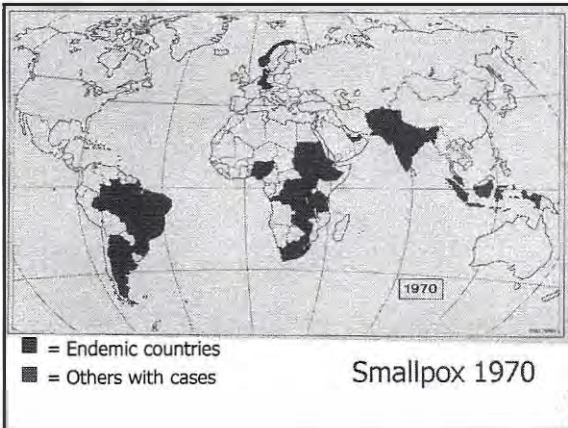
- Management strategy
 - Delegation of responsibility and authority
 - Adapt program to the country
 - Direct contact with the field– at least 1/3 time
 - Communicate regularly and frequently
- Red Tape
 - Inescapable but exceptions are always necessary

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- = Endemic countries
- = Others with cases

Smallpox 1967



India -- the pivotal challenge

1973-75

- India -- the "home of smallpox"?
 - Population -- 550,000,000
 - Surveillance-containment strategy--not working
- June 1973 -- search every village> every house
 - 130,000 health staff in 10 days
 - Results of first search -- October
- Spring 1974 -- the darkest days
 - Gas crisis + strikes by airlines, railway, health staff
 - India explodes a nuclear device
- Containment methods tightened

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Indian Independence Day

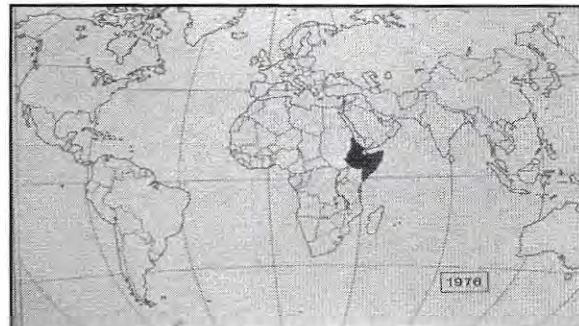
August 15, 1975

Prime Minister Indira Ghandi

- Salutes India on its 28th Anniversary of Freedom
- Announces India's freedom from smallpox for the first time in its written history

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= Endemic countries
= Others with cases

Smallpox 1976

The last strongholds

Ethiopia and Somalia

- Ethiopia
 - Country – twice the size of Texas
 - Largely highland – over 5000 feet
 - Health facilities serve 5% of 30 million people
 - Travel largely by donkey and on foot
- Emperor is assassinated; Marxist take-over
 - No foreign staff outside of Addis except smallpox teams
- Civil war, floods, famine, kidnapping, hostages
- Somalia – the final chapter

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Ali Maalin - 26 October, 1977



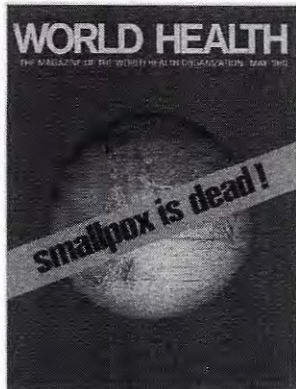
World Health Assembly --1980

- Declares solemnly that the world and all its peoples have won freedom from smallpox
- Smallpox vaccination should be discontinued in every country

• *Thirty-third World Health Assembly, 8 May 1980*

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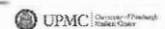


The legacy – beginning of the Vaccine Era

• The genesis

- African vaccine teams average 500/person/day with cooperative village leadership
One year = 400,000 vaccinations/4 person team
- Smallpox – the only nation-wide vaccine program
- Smallpox unit sponsors international meeting on recommended targets - 1970

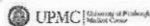
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Expanded Program on Immunization-1974

- A global program for vaccination for all children --smallpox, measles, DPT, polio
- Surveillance of vaccine-preventable diseases
- UNICEF and Rotary make this a high priority
- Target: 1990 – 80% coverage

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Vaccine coverage (%) -- the Americas

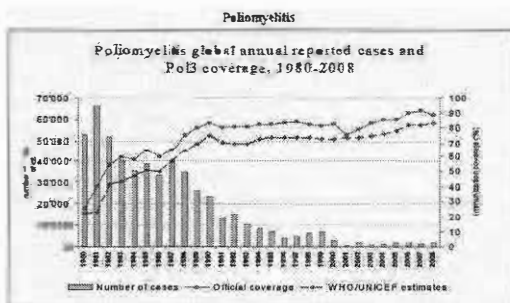
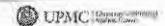
	1980	1990	2000	2008
DTP*	50	74	91	92
Measles	51	80	92	93
Polio*	57	75	90	92
HepB*	—	—	70	88
Hib*	—	—	75	90

* 3 Doses

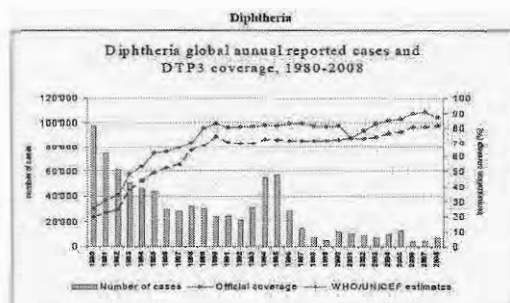
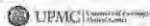
Transmission interrupted:

Polio (1991); Measles (2001); Rubella (2008)

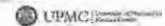
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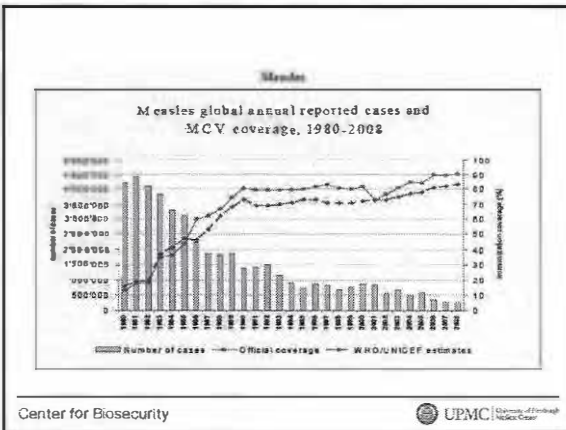


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Some lessons learned

- Vaccines – the best cost-benefit medical interventions
 - Critical vaccine elements
 - Efficacy
 - Potency
 - Heat stability
 - Ease of administration
- Management – surveillance based
 - Delegated responsibility, flexible, responsive to social setting
 - Quality controls
 - Simplification of reporting requirements

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Coda

- From *Smallpox: death of a Disease*.

“We are only beginning to realize the potential of public health...It is a field begging for fresh, resourceful ideas and a new generation of professionals who are not constrained by ‘knowing’ what can’t be done. So it was with so many who contributed so much to making smallpox eradication a possibility.”

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