

# **Bioterrorism**

## **An Orientation for Providers of Medical Care -Part II**

New York City Department of  
Health

Bureaus of Disease Intervention

and

Medical and Professional Education and Training

# SMALLPOX

# Epidemiology of Smallpox (Variola)

- Epidemiology
  - Prior to vaccination, worldwide
  - Two forms: Variola major and Variola minor
    - Variola major case fatality 30%
    - Variola minor case fatality 1%
  - Rapid person-to-person transmission by aerosol droplets and direct contact; can also be spread by contact with contaminated clothing and bed linens
- WHO began campaign to eradicate smallpox in 1967
  - Last natural case, 1977, eradication certified in 1979
  - All vaccination of general populations ended, with waning of immunity worldwide; production of new vaccine in process

# Smallpox: potential as a bioweapon

- 1754 – 1767: British forces in North America distributed blankets used by smallpox patients among American Indians, leading to epidemics that killed > 50% of some affected tribes
- 1980's:
  - USSR produced smallpox virus in large quantities and adopted it for use in bombs and missiles
  - It is not known if research is continuing in the former Soviet Union or other countries to produce more virulent and contagious strains
  - Concerns over security of expertise and existing smallpox repository

# Smallpox Vaccine

- Live *Vaccinia* vaccine
- Before 1972, recommended for all children in U.S. at age 1 year
- Current U.S. vaccine stockpile is from 1970s, of questionable viability, very limited quantity
- Contraindicated in patients with eczema and immunosuppressing conditions or their close contacts
  - Administer vaccine with *Vaccinia* IG if required (epidemic situation)
- Current accelerated vaccine development program – 300 million doses planned for stockpile

# Smallpox – clinical course

- Incubation period: 12 – 14 days average (range 5 – 17 days)

## *Prodromal Symptoms*

High fever

Malaise

Prostration

Headache

Backache



Severe abdominal pain

Delirium

Vomiting

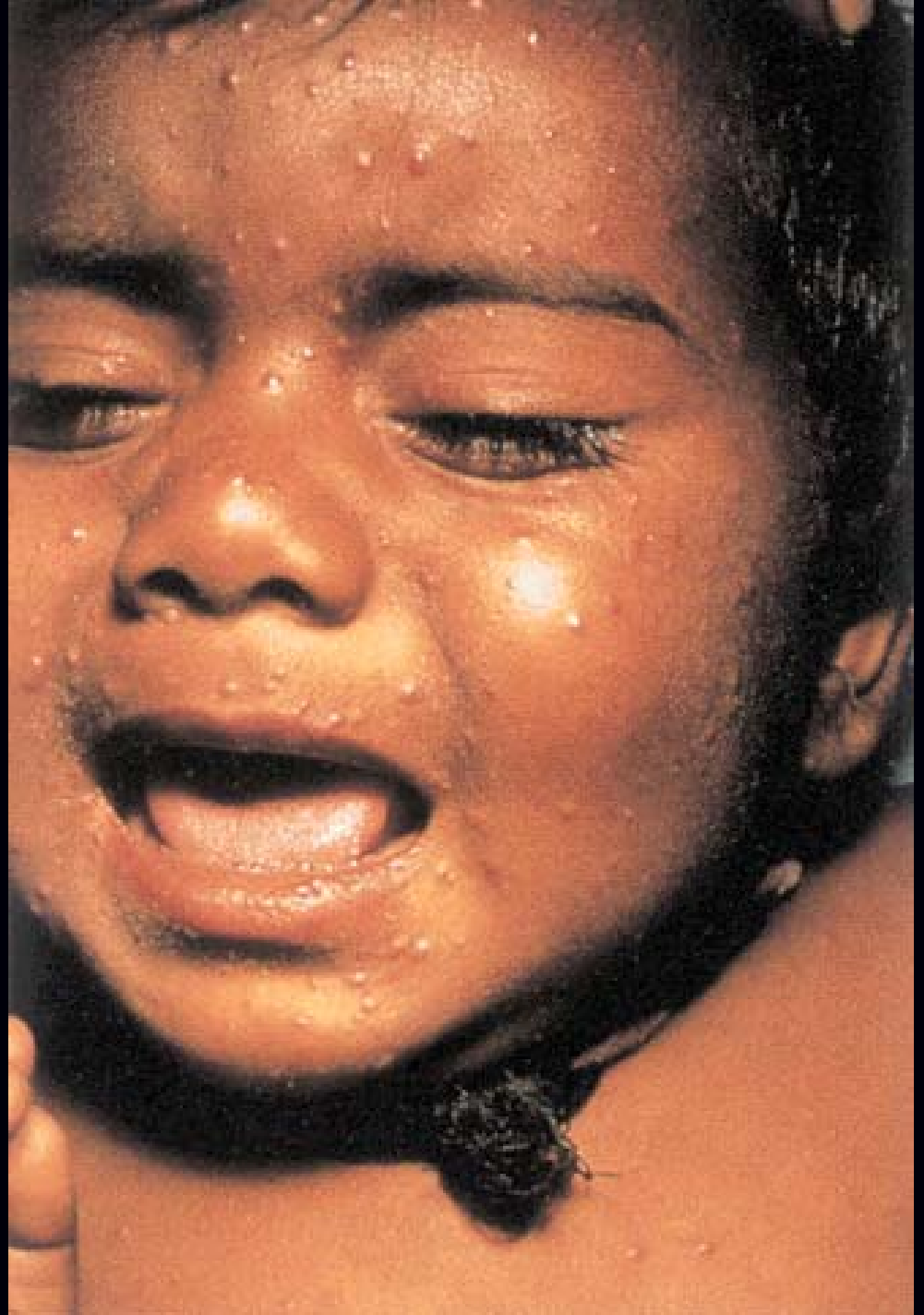
# Smallpox :

## *Exanthem*

- Maculopapular rash
- Starts on face, forearms, or pharynx (centrifugal distribution)
- Spreads to trunk and legs
- Lesions on palms and soles common
- Macules  vesicles  pustules
- Synchronous development
- Lesions deeply embedded in dermis - full-thickness lesion

## Variola Major

- Unvaccinated
- 3rd day of exanthem
- 12 days after exposure



## Variola Major

- 5th day of exanthem
- 14 days after exposure



## Variola Major

- 7th day of exanthem
- 16 days after exposure
- All lesions umbilicated and at the same stage of development



# Smallpox vs. Chickenpox

	<u><i>Variola</i></u>	<u><i>Varicella</i></u>
• Incubation	7-17 days	14-21 days
• Prodrome	2-4 days	Minimal
• Distribution	Centrifugal	Centripetal
• Evolution	Synch.	Asynch.
• Scabs form	10-14 days	4-7 days
• Scabs separate	14-28 days	<14 days
• Infectivity	Separation*	Scabbing**
– *	Isolate until all scabs <i>separate</i>	
– **	Isolate until all scabs <i>crusted</i>	

# Smallpox – Laboratory Diagnosis

- Specimens should be collected by staff wearing adequate personal protective equipment, for transport to a Level 4 Biosafety Lab
  - Vesicular or pustular fluid (for EM)
    - “Touch prep” on glass slide, or
    - Direct placement on EM grid
  - Unroofed vesicles or pustules (for PCR, culture, and immunohistochemistry)
    - Place in sealed specimen containers
    - Sample multiple anatomic areas
  - Serology

# Smallpox - Treatment

- Contact tracing around all suspected and confirmed case-patients
- Vaccination effective if within 4 days of exposure
- Supportive care
- Antibiotics for 2° infections

# Smallpox

## *Infection Control Issues*

- Smallpox is very contagious
- Person-to-person transmission occurs.
- Transmission by respiratory aerosols and fomites
- Respiratory and Contact precautions
  - Separate Room with negative airflow pressure, HEPA filtration to outside
  - Home isolation, when possible

# Keys to Response to Smallpox

- Surveillance
- Vaccination around cases
- Isolation

\*CDC Smallpox Response Plan and Guidelines, Draft 9/19/01

# Vaccine Prioritization

In a smallpox outbreak, the following high-risk groups will be given priority - persons:

- exposed to the initial release of the virus
- with face-to-face, household, or close-proximity contact (< 2 meters = 6.5 feet) with a confirmed or suspected contagious patient
- selected for direct medical or public health evaluation, care, or transport of confirmed or suspected patients

# Isolation/Quarantine: Suggested Pre-event Activities

- Assure local and/or state legal authorities are in place to allow public health intervention and implementation of quarantine/isolation
- Explore with authorities circumstances warranting implementation of quarantine
- Identify appropriate facilities to be utilized for isolation; establish procedures for activating them
- Identify personnel responsible for local/state coordination of quarantine and isolation
- Identify appropriate personnel (medical, maintenance, etc.) to staff/maintain facilities

# Type R Facility (Residential)

- Asymptomatic contacts
- May be the person's own home
- Fever surveillance for 18 days after their last exposure or until 14 days following successful vaccination (whichever comes first)
- Asymptomatic contacts may continue routine daily activities, must monitor temperatures and telephone health department twice a day

# Type X Facility (Uncertain)

- Vaccinated febrile contacts without rash;  
2 successive temperatures  $> 101^{\circ}\text{F}$  ( $38^{\circ}\text{C}$ )
  - If number is small, may house in Type C facility
- If rash develops during observation, move individual to Type C facility
- If rash *does not* develop within 5 days, release and complete surveillance at home

# Type C Facility (Contagious)

Infectious individuals (confirmed, probable, suspected cases)

- Potential to use any empty facility (motel, hospital, separate building of hospital, college dormitory)

# Type C Facility - Requirements

- Ability to provide medical care
  - Supportive care
  - Oxygen monitoring
  - Ventilatory support, cardiac and respiratory resuscitation
  - Basic laboratory evaluations
- Non-shared air ventilating systems that exhaust 100% of air to outside through HEPA filter OR location  $\geq$  \_ \_ mile from any occupied building

# General Hospital Admission

- A confirmed or suspected case of smallpox should only be admitted to a hospital that is otherwise being used for non-smallpox patient care if:
  - Facility has negative-pressure isolation room(s)
  - Anteroom used for changing protective clothing
  - Transfer to Type C designated facility ASAP

# Hospital Preparation - Smallpox

- Set up smallpox emergency planning team
- ER triage to isolate all febrile/rash patients
- Identify smallpox care team
- Provide/fit HEPA masks to all ER staff
- Test and ensure integrity of negative-pressure isolation rooms
- Review airborne and contact isolation precautions
- Identify isolation ward or building

# **Bioterrorism Preparedness**

# Biologic Disaster Planning

- Increase awareness among medical community re: potential impact of bioterrorist attack on hospitals and their partnership with public health agencies
- General disaster planning issues:
  - Training clinicians/laboratorians to recognize signs of a bioterrorist event
  - Treatment of mass casualties
  - Keeping track of the human cost and hospital impact
  - Identification of at-risk populations/ provision of mass prophylaxis
  - Communication (internal, across agencies/jurisdictions, with press and public)
  - Food, water, and shelter
  - Security

# **Bioterrorism Preparedness from the Hospital Perspective**

- Developing surge capacities to treat and manage mass casualties
- Identifying sources for key materials and personnel
- Training staff to identify rare diseases
- Mortuary needs
- Forging new partnerships and mutual aid pacts
- Drafting and exercising biologic emergency response plans

# Effects on Hospitals After an Event

- Inability to meet escalating demand:
  - Rapidly developing shortage of:
    - Space (critical and non-critical)
    - Staff (due to sickness and fear)
    - Medications
    - Ventilators
    - Mortuary space

# Hospital Disaster Planning Components

- Efficient command structure
- Need for Communications
  - With staff
  - With other hospitals
  - With regional, state, and federal agencies
- Security

Emergency conditions may last for weeks or months

# Mass Prophylaxis

- How many people will need antibiotic prophylaxis?
  - Risk assessment
    - Field investigation to identify when and where the event occurred
- From where will it come?
  - National Pharmaceutical Stockpile
    - 8 “push packages”
    - Availability within 12 hours
    - Each package:
      - PO prophylaxis for 360,000 people x 7 days
      - IV treatment for 6,000 persons x 7 day
  - Other sources?
    - National wholesalers
    - Manufacturers

# 2/3 of a Push Package



# Mass Prophylaxis

- How would it be distributed?
  - ~ 200 sites throughout city
- How many people would be needed for this mission?
  - 50,000 - 100,000
- How q