Biological Warfare: Implications for Healthcare Institutions

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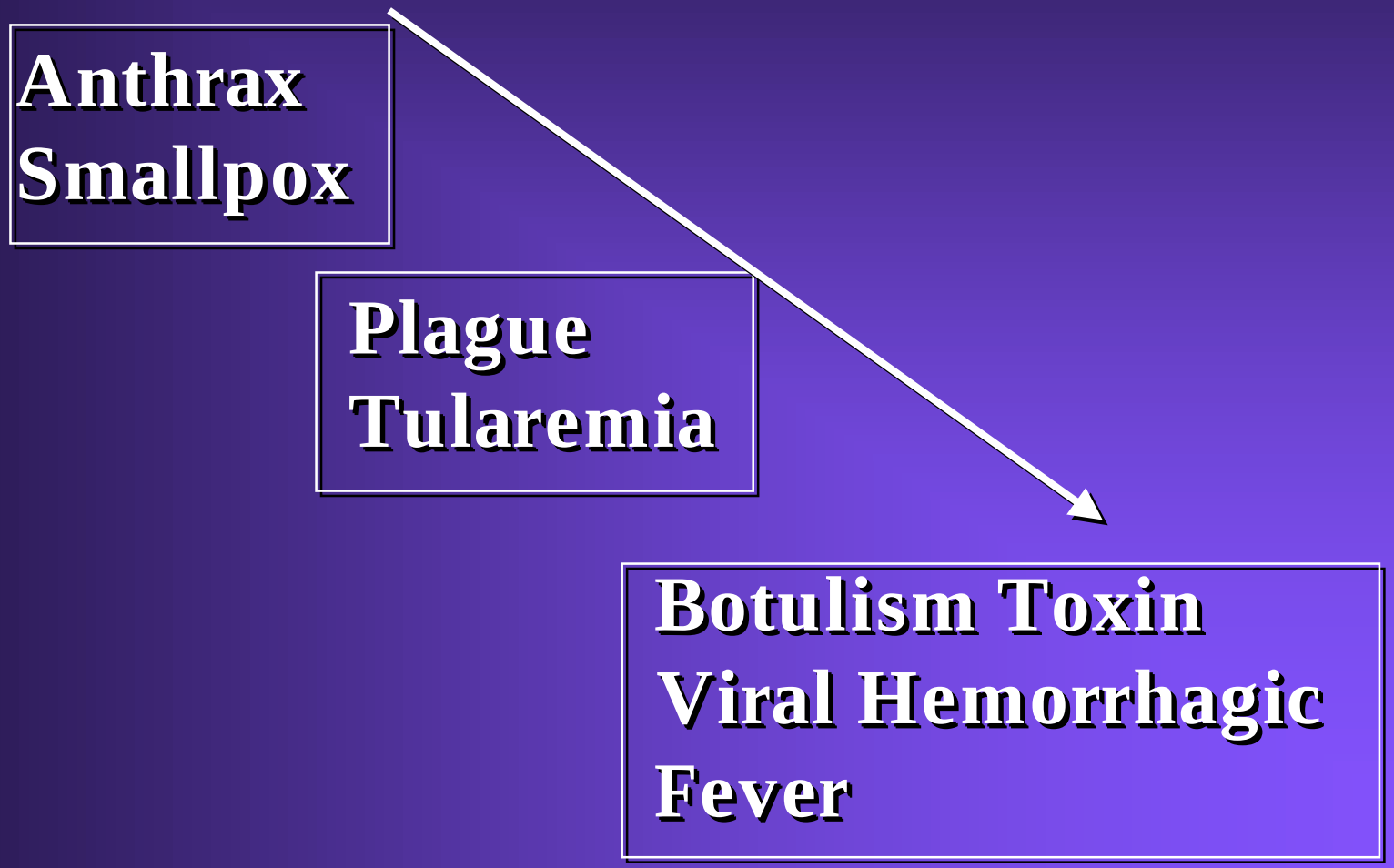
Goals

Describe the:

- Flexibility
- Resources
- Infrastructure

healthcare settings need to develop to respond effectively to an event and to meet patient care demands

Most Likely Agents of Bioterrorism

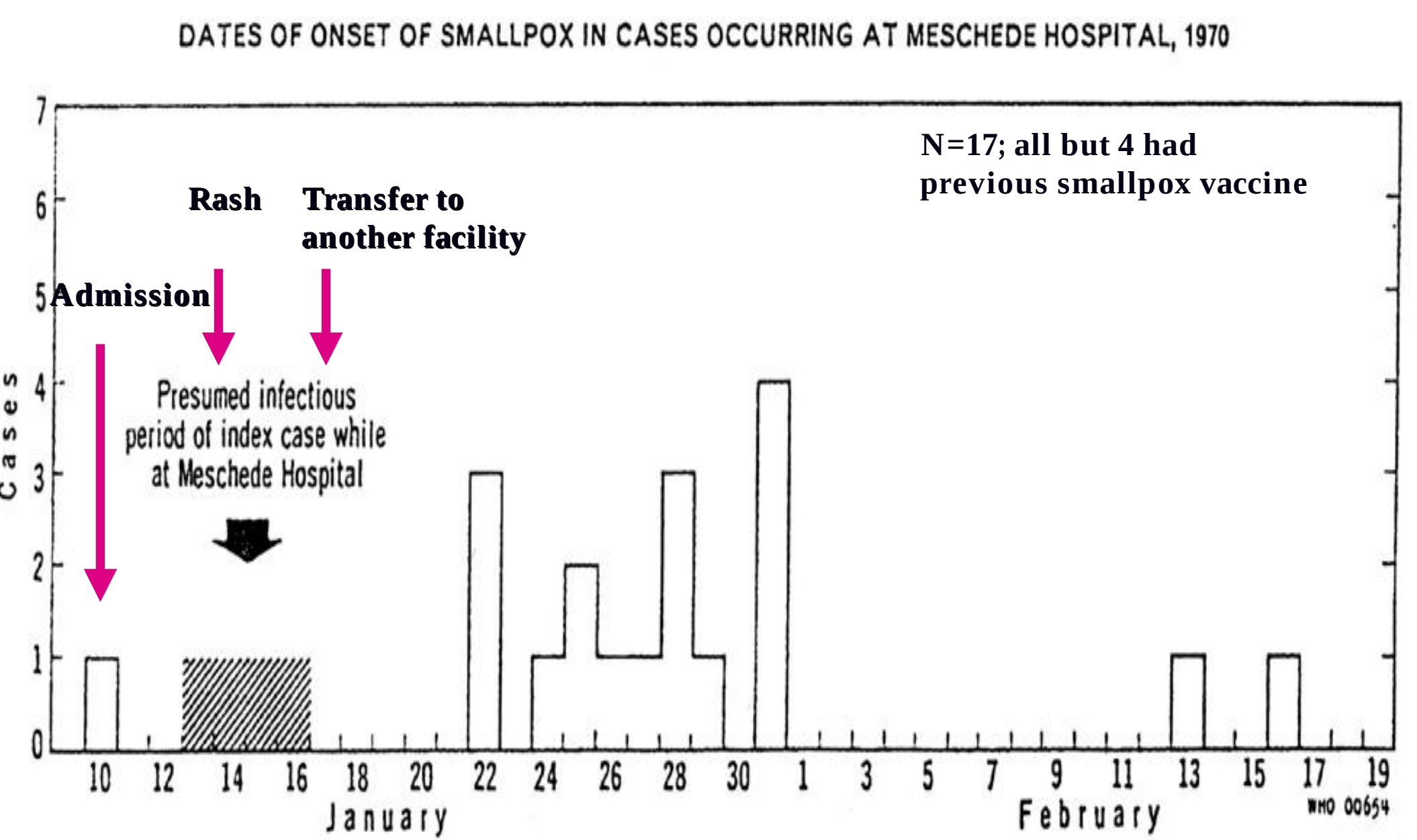


Healthcare response: issues

- Place attacked
  - Institution or “event” occurred elsewhere
- Type of attack
  - Overt vs. covert
- Resource utilization
  - Mass casualties vs random events
- Contagiousness of organism
  - Smallpox
  - Plague
  - Anthrax/tularemia/botulism toxin
- Personnel
  - Training
  - Protection
- Who’s in charge?
- Do proposed plans reflect the reality of medical care in 2002 and patient expectations?

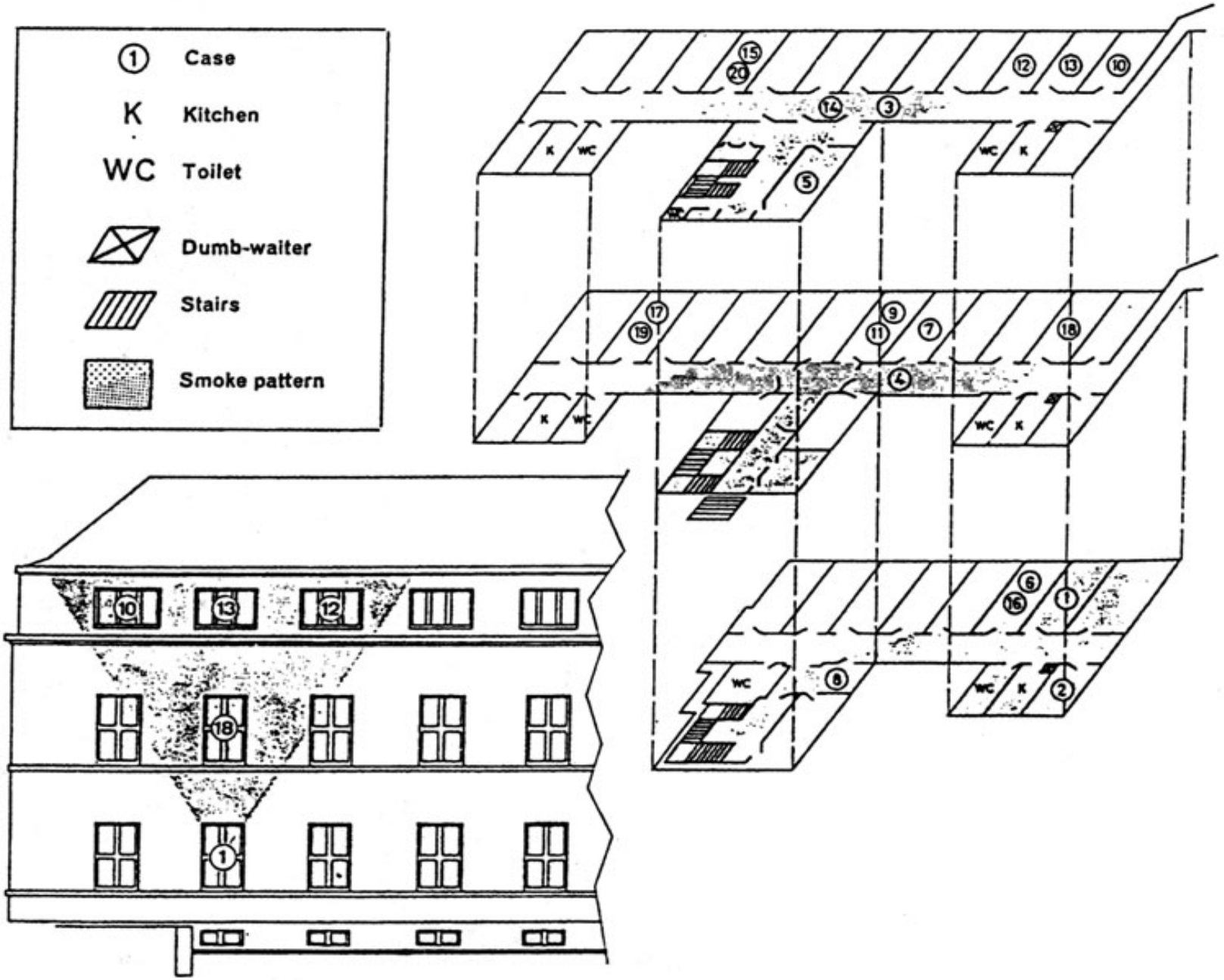
Healthcare response: 4 examples

- Meschede -- Smallpox
- Atlanta -- BT attack anthrax
- NYC-- Anthrax case
- Wash DC/NYC -- potential exposures



Reference:Smallpox article

FLOOR PLAN AND REAR ELEVATION OF MESCHEDE HOSPITAL SHOWING LOCATIONS OF ALL SMALLPOX CASES



Shopping Mall Scenario - Atlanta

- Anthrax aerosolized into the peach tree shopping mall ventilation system: 10,000 people are present and 9,000 are exposed; terrorist announces attack at 24 hours
- 90% of exposed started on antibiotics by end of day 2, 10% cannot be found initially
- Total number hospitalized 4950, total requiring ICU care 2925, total ventilators required 2601, actual (?) ICU beds 600
- Even a small scale bioterrorism event completely overwhelms city's medical care resources
- The 13,000 military beds deployed for the Persian Gulf War would STILL not provide enough ICU beds (only about 1300)

Anthrax case

- Manhattan Eye and Ear
- November 2001: 61 year old female employee diagnosed with inhalational anthrax
- no “known” exposures identified
- Hospital was closed
- 3,000 employees and patients were given prophylaxis w/ in 24 hours
- Investigation to determine if the hospital or mail were the source of anthrax

Random Anthax exposures

- Assess exposure
  - ➤Appropriate diagnostic testing
  - ➤Notification of public health authorities and ?? law enforcement
- Patient f/u
- Need for laboratory capability
- Fear in affected population
- Fear among hospital employees
- Overwhelming numbers of worried well
- Medication shortages

Healthcare Response: Elements

- Outbreak management
- Protection of healthcare workers, volunteers and patients
- Support and care of large numbers of critically ill medical and pediatric patients
- Control of “anxiety” and concern of families, employees, non-affected population
- Support our basic mission

Healthcare Response:

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Outbreak management

- **Identify** potential outbreak and contact public health and law enforcement authorities
- **Confirm** agent i.d. / diagnosis via laboratory techniques or with identified disease experts
- Develop a case definition (illness)
- **Identify** potentially exposed individuals
- **Prophylax/vaccinate** potentially exposed HCWs/patients
- **Control** movement of potentially exposed and ill
- Treat patients
- **Calm** the public and contain the outbreak

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Healthcare worker protection

- Two issues: protection and supply
- Standard precautions are a given
- Review agent characteristics to determine need for
  - patient isolation and/or cohorting
  - healthcare worker cohorting
  - barrier protections (masks, gowns / gloves)
  - masks with additional filtering (N-95 vs PAPR)
  - additional vaccination/antimicrobial prophylaxis
- ? Prophylaxis for family members

Containment

- Evaluate the facility
  - Capacity to care of victims requiring intensive care
  - Ventilation system characteristics
  - Security issues
  - Containment capacity-barriers and transport
  - Isolation capability (airborne isolation)
  - Laboratory (BSL-2 or 3) capacity

SAMPLE BUILDING AUDIT

FLOOR	PATIENT(PT) BEDS		HVAC	ELECTRICAL	MEDICAL GASES		ACCESSIBILITY	
	# BEDS	NEG. PRESSURE ISOLATION	100% OUT-DOOR AIR	EMERGENCY POWER	OXYGEN OUTLETS	VACCUUM OUTLET	EXIT TO OUTSIDE	EXIT TO OTHER BLDS
2ND	26	1	Yes	Yes	Yes	Yes		Yes
3RD	29		Yes	Yes	Yes	Yes		Yes

KEY

- **Negative Pressure Isolation Beds - Rooms are constructed to maintain negative pressure.**
- **100% Outdoor Air Systems - Areas having non re-circulating air handling systems.**

•**Facilities Management System** – Building having a computerized control automation system. System controls heating cooling and ventilation systems, mechanical systems, electrical systems, fire systems, security and elevators.
•**Emergency Power (Lighting & Receptacles)** – Buildings having emergency electrical power provided by on site generators.
•**Exist Direct to Outside -** Buildings and floors having stairs directly to outside.
Exit to Other Buildings - Floors having connection to other buildings on the same floor

Miscellaneous

- Special arrangements
  - Patient transport
  - Deceased management
  - Medical waste management
  - Specimen transport
  - Sterilization of equipment

Communication-Internal

- Back-up systems are essential-telephones (double system), pagers, email, with backup generators
  - On vs. off site
- Scheduled updates of employees, families, press
- Designated persons to speak with press
- Scheduled phone calls with colleagues

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Capacity and procedure review

- Inventory ventilators/dialysis machines
- Develop lists of necessary supplies and review supply
- Review laboratory capacity and determine where to send specimens --LHD/USAMRIID if warranted
- Develop fact sheets and policies for the care and treatment of communicable diseases
- Develop protocols to triage / treat patients
- Identify disease experts to help with diagnosis
- Develop approaches to panic & evaluation of environment
- Develop press releases
- Develop command and control structure and assign individual responsibilities
- Train healthcare workers to give smallpox vaccine

Pharmaceuticals/supply stockpile

- Pharmaceuticals
  - Ciprofloxacin
  - Doxycycline
  - Rifampin
  - Tetracycline
  - Gentamicin
  - ??Ribavirin
  - Dopamine
  - ? Cidofavir
  - Comfort agents
- Supplies
  - IV and fluids
  - Endotracheal tubes
  - Body bags
  - Ventilators
  - Masks/gowns/gloves/shoe covers/face shields
  - Beds and cots
  - Water

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Security

- Hospital Disaster Control Center
  - Links to city and state health and emergency services
  - Links to other healthcare institutions
- Hospital Entrances locked down
  - No visitors except parents or guardians (or per the hospital epidemiologist and Dir. of Pediatrics)
  - Patient egress -one exit
  - Essential employees can enter with appropriate badges
  - Parking garages closed to general public

Triage

- Separate from Emergency Department but in a building--close to main facility to transfer ill patients; need laboratory and radiology capacity
- Personnel
  - Dept of Medicine
  - Dept of Pediatrics
  - Radiology Techs
  - Respiratory Therapy
  - Pharmacists
  - Lab Techs

Healthcare Response: Are we ready???

- Outbreak management
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Challenges for Healthcare facilities

- To develop plans that includes non-traditional responders and links them tightly to public health officials and other facilities in the region
- To develop communications systems, stockpile drugs, and enhance diagnostics
- To lobby for funding to healthcare institutions
- To educate primary care responders and identify specialists - they are key to early identification, prevention and control
- To emphasize the importance of syndromic isolation and the role of infection control practitioners as this will be the single most important factor to containment

Flu pandemic: Then and now

1918 WHAT HAPPENED	YEAR	2001 WHAT COULD HAPPEN
1.8 billion	World population	5.9 billion
Ships, railroads	Primary mode of transportation	Jets
4 months	Time for virus to circle the globe	4 days
Gauze mask, disinfectants	Preventive measures	Vaccines
Bed rest, aspirin	Treatments	Some antiviral drugs
20+ million	Estimated dead	60 million?

Lessons from the past--Health system/Hospital Issues:

- Hospitals and Health systems are not viewed as part of the public health health infrastructure
- Will affect inpatient and outpatient resources--NOT a “first” responder problem
- Lack of training of non-emergency room healthcare workers
- Limited knowledge in the private/academic sector of mass casualty operations
- Hospital supply management is “just in time”

Healthcare Response:

Hospitals/healthcare providers will have to:

- Rapidly diagnose agent
- Triage large numbers of ill patients and worried well
- Isolate cases to prevent transmission, if appropriate (containment)
- Notify public health of suspected case or event
- Manage limited resources cost-effectively
- Manage mass casualties
- Protect healthcare workers
- Communicate internally and externally
- Take care of patients with other illnesses

Containment

- Initially – Standard precautions
  - ➢Surgical mask/isolation room on patient if respiratory symptoms
- Suspect contagious material - quarantine--”lock down”
  - ➢Smallpox, Viral hem fevers, pneumonic plague
  - ➢Group affect pts and exposed health care providers

Issues with transportation of contagious patients

US AMRIID Aeromedical Isolation Team: BSL4 isolation

Precautions by disease

Disease	Isolation	PPE	Cohort
Smallpox	airborne/	PAPR	yes-quar-
VHF	contact	N-95	entine
Plague	Droplet	mask	yes-care
Anthrax	none	none	yes-Care
Tularemia			
Botulism			

Notification--internal

- Hospital Epidemiology and Infection Control
- Directors of Emergency Department, Departments of Medicine, Pediatrics, OB/Gyn, critical care units
- Directors of materials management, security, pharmacy, respiratory therapy, social work, critical incident stress team

Notification--external

- Dir. Emergency Management, Your City
- Health Department
- State Bioterrorism Coordinator
- CDC Emergency Response Office
- Bioterrorism National Response Center
  - FBI, Army NBC response division