THE CLINICAL SYNDROMES PRODUCED BY THE OFFENSIVE BIOLOGICAL AGENTS

Dr. Bogdan Cîrciumaru

“Matei Balş” Institute of Infectious Diseases

Bucharest, Romania

Some European Programs concerning Highly Infectious Diseases



EURO-NHID

- Countries with BIOS 3/4

Human resources

- HCW

EUropean Network of Infectious Diseases

ETIDE
European Training in Infectious Disease Emergencies

Preparing the staff

- Medical, paramedics

Infections/microorganisms with which to be concerned

- **CLINICAL VIRULENCE**

  HIGH MORTALITY

  HIGH MORBIDITY

  SOCIAL DISRUPTION

- **Microorganisms that ~always have high clinical virulence/highly pathogenic** (e.g. Variola virus, Yersinia pestis)

- fast evolving disease (infectious diseases emergencies)
- need a fast response
- could be used as biological weapons

Syndromic presentations

		Diseases									
		Anthrax	Plague	Tularemia	Melioidosis	Glanders	Botulism	VHF	Smallpox	Influenza	SARS
SYNDROMES	Respiratory	✓	✓	✓	✓	✓					✓
	Influenza-like	✓							✓	✓	
	Neurologic	✓	(✓)				✓				
	Cutaneous	✓	✓	✓	✓	✓		✓	✓		
	Sepis/Shock	✓	✓	✓	✓	✓		✓			
	Digestive	✓	(✓)	✓							✓

Isolation precaution:Basics

Standard ("blood and body fluid"):

- All patients
- Gloves+/-Gown+/-Mask with face shield/-safe injections+/-cough etiquette/+/-safe lumbar punctures
- Determined by anticipated HCW-patient interaction

Droplet

- Mask
- Sigle room/cohort patients
- Special air-handling & ventilation not needed

Contact

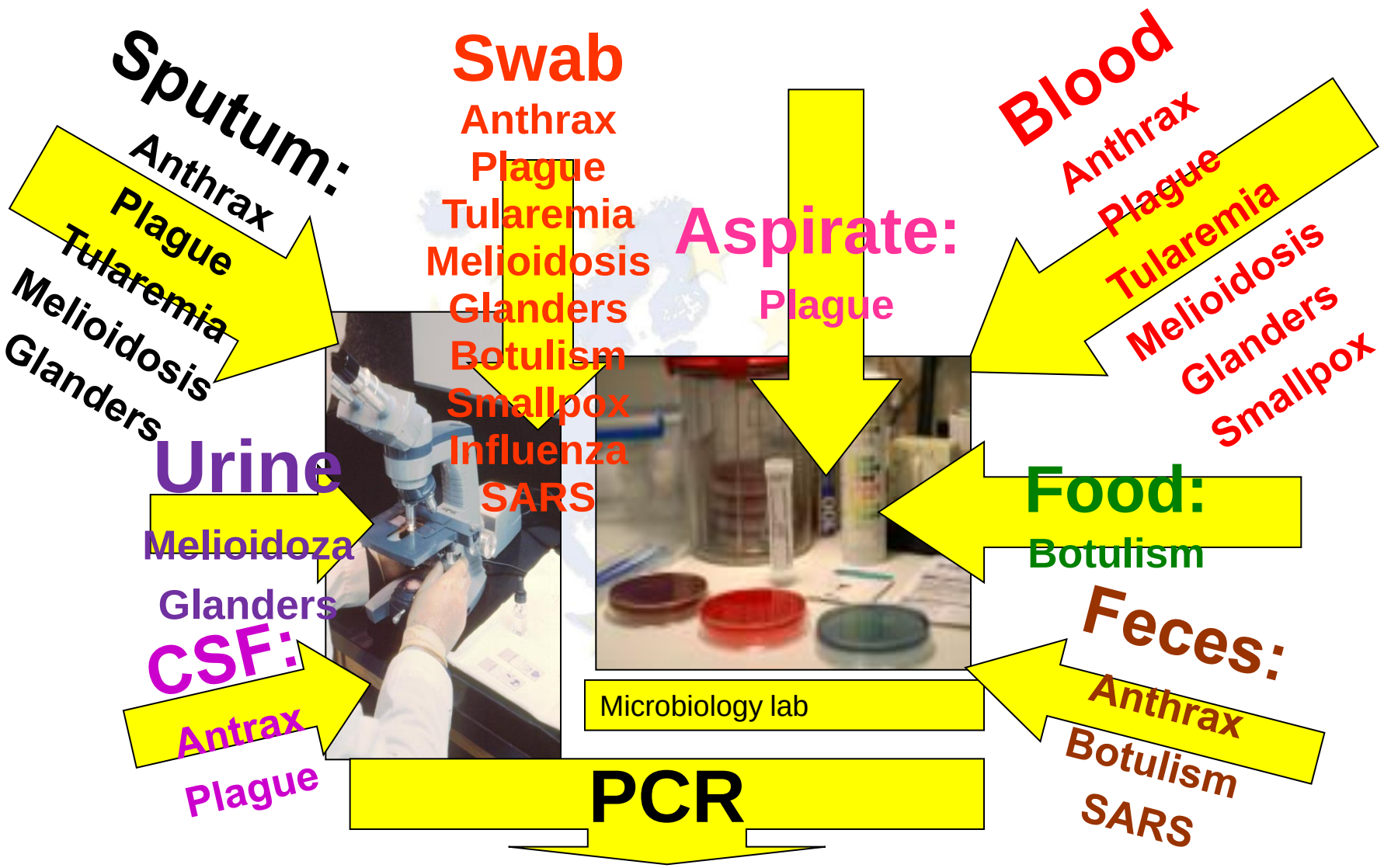
- Gloves
- Gowns
- Single room/cohort patients

Airborne:

- standard plus negative pressure room ("barrier") and N95 mask (e.g." duckbill mask")

Source: Nursing in the era of bioterrorism, CDC

Harvesting samples (Isolating)



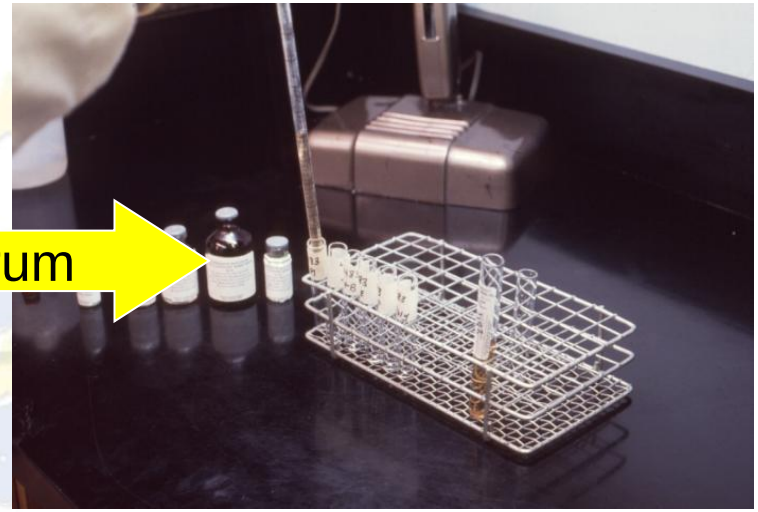
Harvesting samples (Immunology)



Blood



Serum



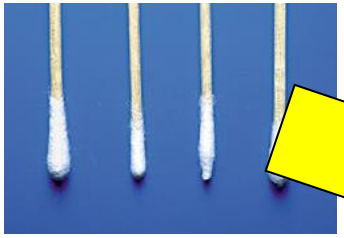
Anthrax, Plague, Tularemia

Melioidosis, Glanders, Botulism

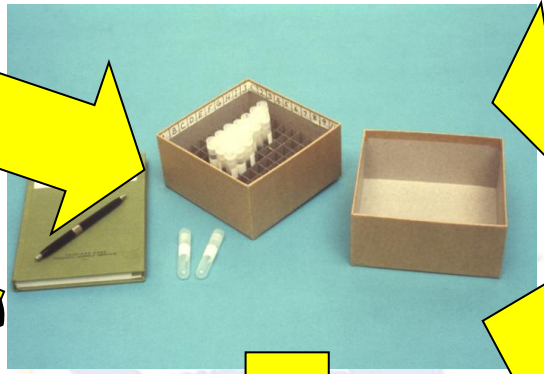
Smallpox, Influenza

Immunology lab

Harvesting samples-Toxin detection



Swab



Food



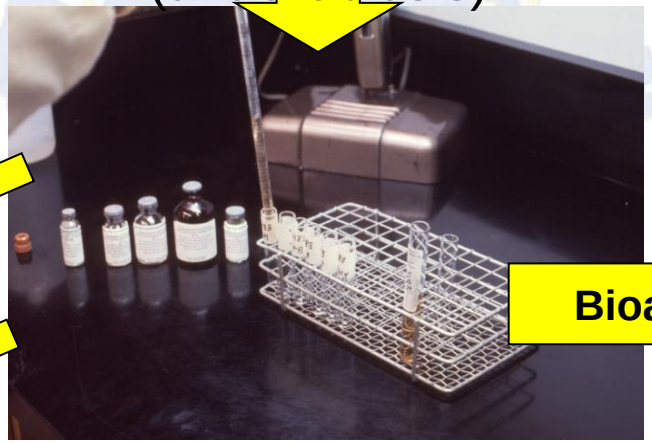


Blood (serum)

Feces



Transportation
(anaerobiosis)



ELISA

PCR

Bioassays



Respiratory syndrome

- Running nose
- Odynophagia
- Cough
- Dyspneea

+/-General symptoms: fever, chills, malaise

- Various degres of pulmonary involvement on Chets X Rays (CXR)

Respiratory infections (Transmission)

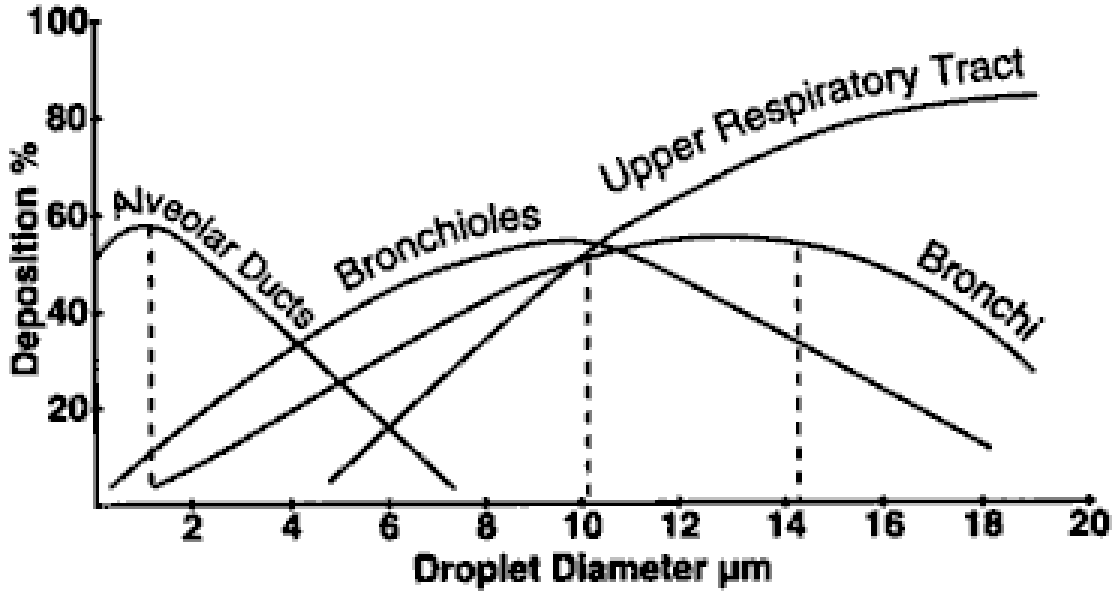


Figure 1-I. Droplet Size and Penetration of Respiratory Passages

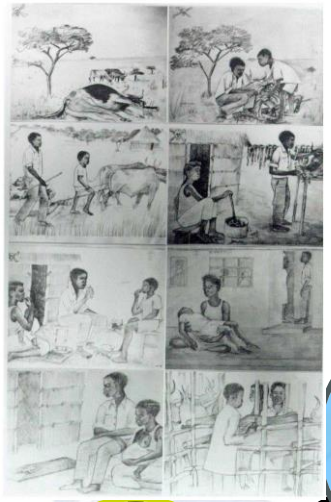
www.vnh.org

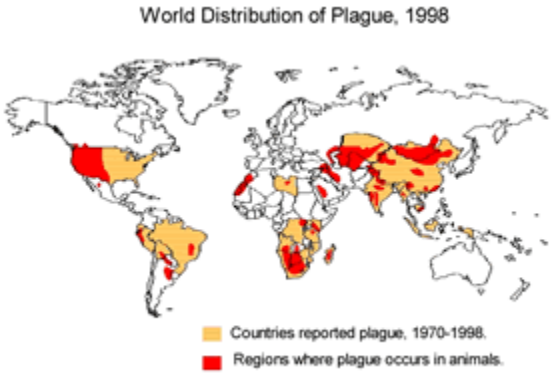
Respiratory syndrome-Transmission

	INHALED FORM/from	INFECTIOUS DOSE (ID_{50})	PERSON-PERSON	WEAPON
ANTHRAX	Spores	Few-10000	NO	✓
PLAGUE	Droplets (organisms)	100-500	YES	✓
TULAREMIA	Soil	1-10	NO	✓
MELIOIDOSIS	Soil **Contaminated dust**		((YES))	✓
GLANDERS	Droplets		((YES))	✓
SARS	Droplets Fomites (Airborne)		YES	✓

The natural focality (distribution)



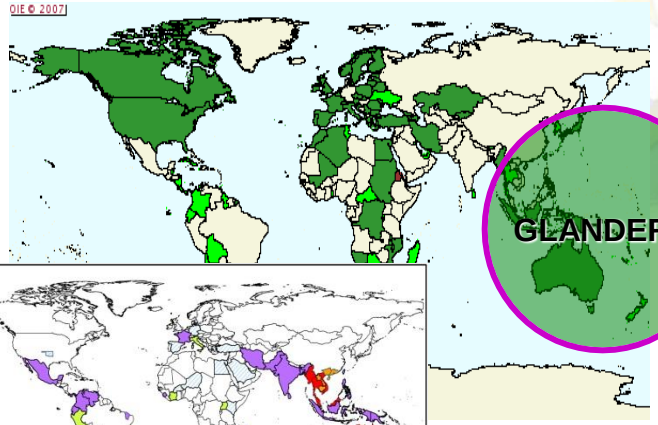




SARS

PLAGUE

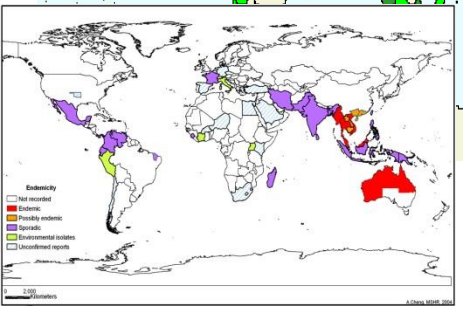
Epidemiology



GLANDERS

TULAREMIA

MELIOIDOSIS



- **Zoonosis(humans incidental)(„rabbit plague“, hamsters)**
- **Northern hemisphere (endemic areas)**

Respiratory syndrome-Anthrax

Incubation: <1-7d
(max.60d)
Typical appearence:
mediastinal widening

Evolution-Rapid:few days
Prognosis: very severe
(mortality >95%)

Complications: ARDS, sepsis



CDC Public Health Image Library

Respiratory syndrome-Plague

Incubation:1-4 d (max.6d)

Typical appearence: Billateral bronchopneumonia

Evolution:rapid 1-3d

Prognosis: (no treatment) mortality 100%

Complications: Severe sepsis/ septic shock/DIC (Black death),ARDS



Source: Nursing in the era of bioterrorism

Respiratory syndrome: Tularemia

Incubation: 3-5d (range 1-14d)

Radiological appearence: Variable (Atypical pneumonia)

Evolution:variable days-weeks

Prognosis (no treatment): Respiratory failure, death

Complications: pleural effusion pericarditis



Armed Forces Institute of Pathology, USA

Respiratory syndrome: Melioidosis/Glanders

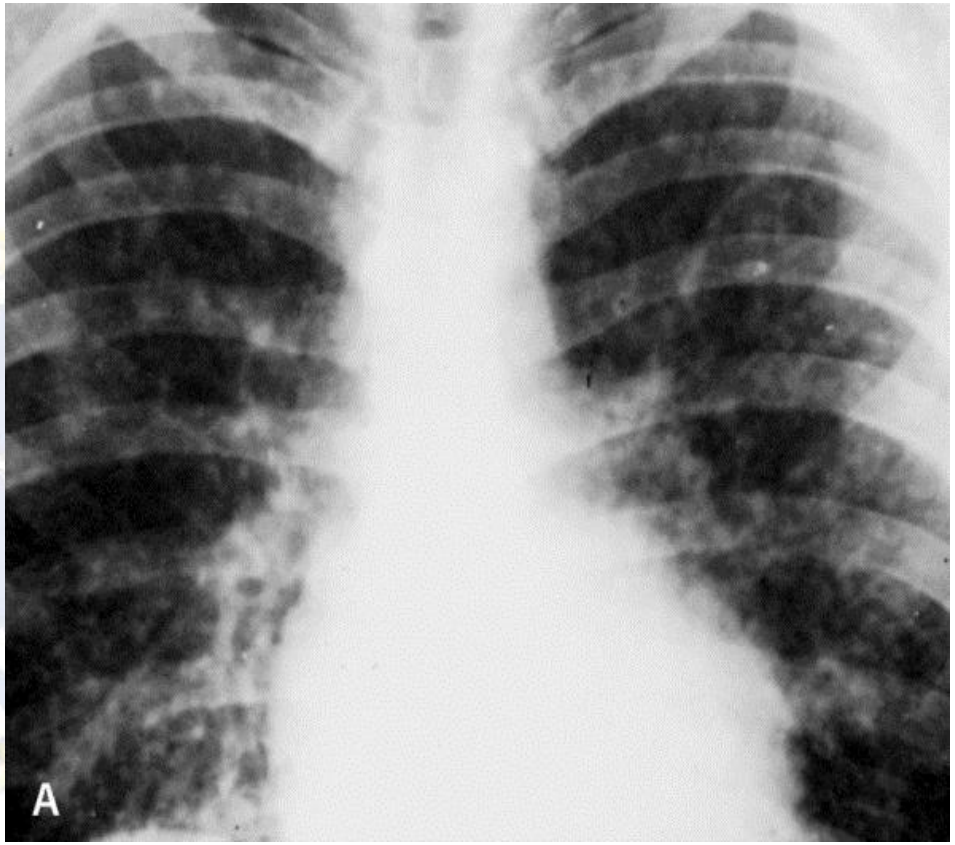
Incubation: 2-4d (max.years?)

Typical appearence: Infiltrates in the upper lobes (melioidosis), Consolidation,Cavitations

Evolution: variable days-months

Prognosis (with treatment): mortality 10%

Complications: Sepsis Chronicsequelae Relapses



Courtesy of Dr. A.E. James et al: pulmonary abscess in a fatal case of acute melioidosis. AFIP 69-5776 and *Radiology*, 1967

Respiratory syndrome: SARS

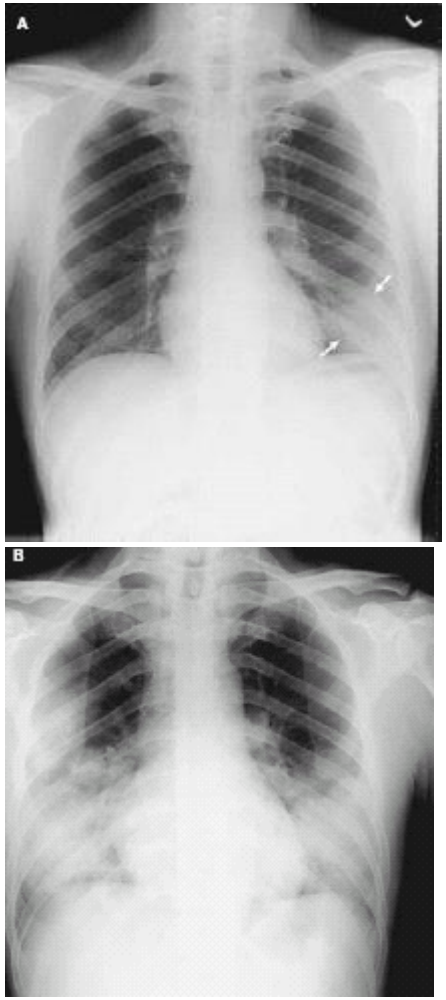
Incubation: 3-7d (range:2-10d)

Influenza-like syndrome +/-gastrointestinal followed by Respiratory syndrome

Evolution: Many cases-mild Others respiratory failure

Prognosis: mortality 15%

Complications: ARDS MODS

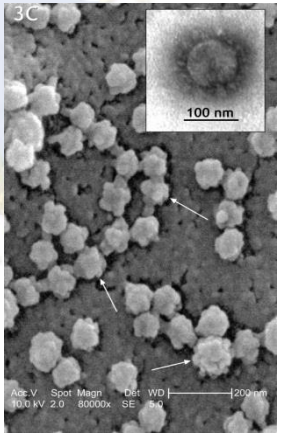


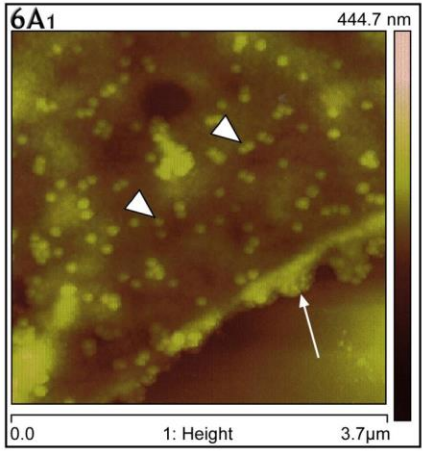
From: Jernigan, SARS: What every clinican should know, CDC

SARS/MERS-Etiology

- Coronaviruses: (common cold).
- RNA SARS-CoV/
- MERS-CoV (mutated coronaviruses)







CDC Public Health Image Library

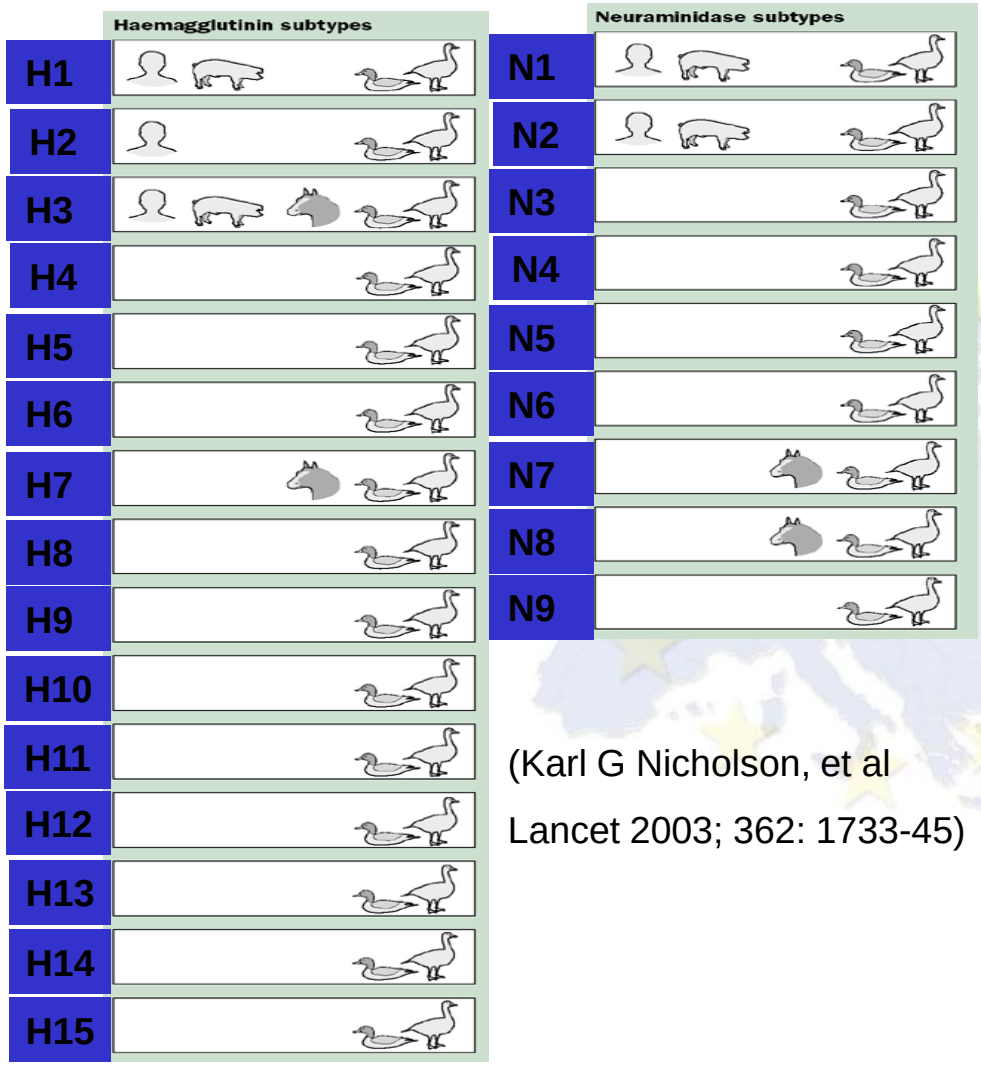
Respiratory syndromes: management

Disease	Etiology	Respiratory syndrome and	Treatment	Prohylaxis	
				Preexposue PRECAUTIONS	**Postexposure**
Anthrax	**Bacillus anthracis**	CXR:mediastinal widenning	Combine:Cipro+ PenicilinX60d Resistant to cephalosporins	Vaccine **STANDARD**	Disinfection: peracetic acid Antibiotic: Ciprofloxacin,Doxicicline, AmoxicilineX 60d
Plague	**Yersinia pestis**	CXR:billateral infiltrates	Strepto/ Genta	**RESPIRATORY**	Disinfection Single room Ciprofloxacin, DoxicicilneX7d
Tularemia	**Francisella tularensis**	CXR:atypical pneumonis	-Gentamicin or streptomycin (10 d) (Renal, ototoxicity) -Ciprofloxacin (14 d) -Doxycycline (14-21days)	**STANDARD** Vaccine	Disinfection Ciprofloxacin DoxyciclineX 14d
Melioidosis	**Burkholderia pseudomallei**	CXR: Infiltrates in the upper lobes (melioidosis), Consolidation, Cavitations	Betalactams Doxicicline	**STANDARD**	Doxiciciline Cotromoxazole X7d
Glanders	**Burkholderia mallei**		Sulfonamides Betalactam Doxycicline		
SARS	**(SARS-coronavirus)**	Influenza-like syndrome +/-gastrointestinal followed by Severe Respiratory syndrome	supportive+antibiotic +antiviral+steroids	**AIRBORNE**	Barrier isolation

Influenza-like-syndromes

- Abrupt onset of constitutional symptoms:
- Fever
- Malaise
- Myalgia
- Headache (eye tearing, burning, photophobia or eye pain)
- Chills
- Rhinitis, sore throat, cough (minimal)
- Children: otitis media, nausea, vomiting, febrile convulsions
- Elderly: lassitude, high fever and confusion

Sources of virus

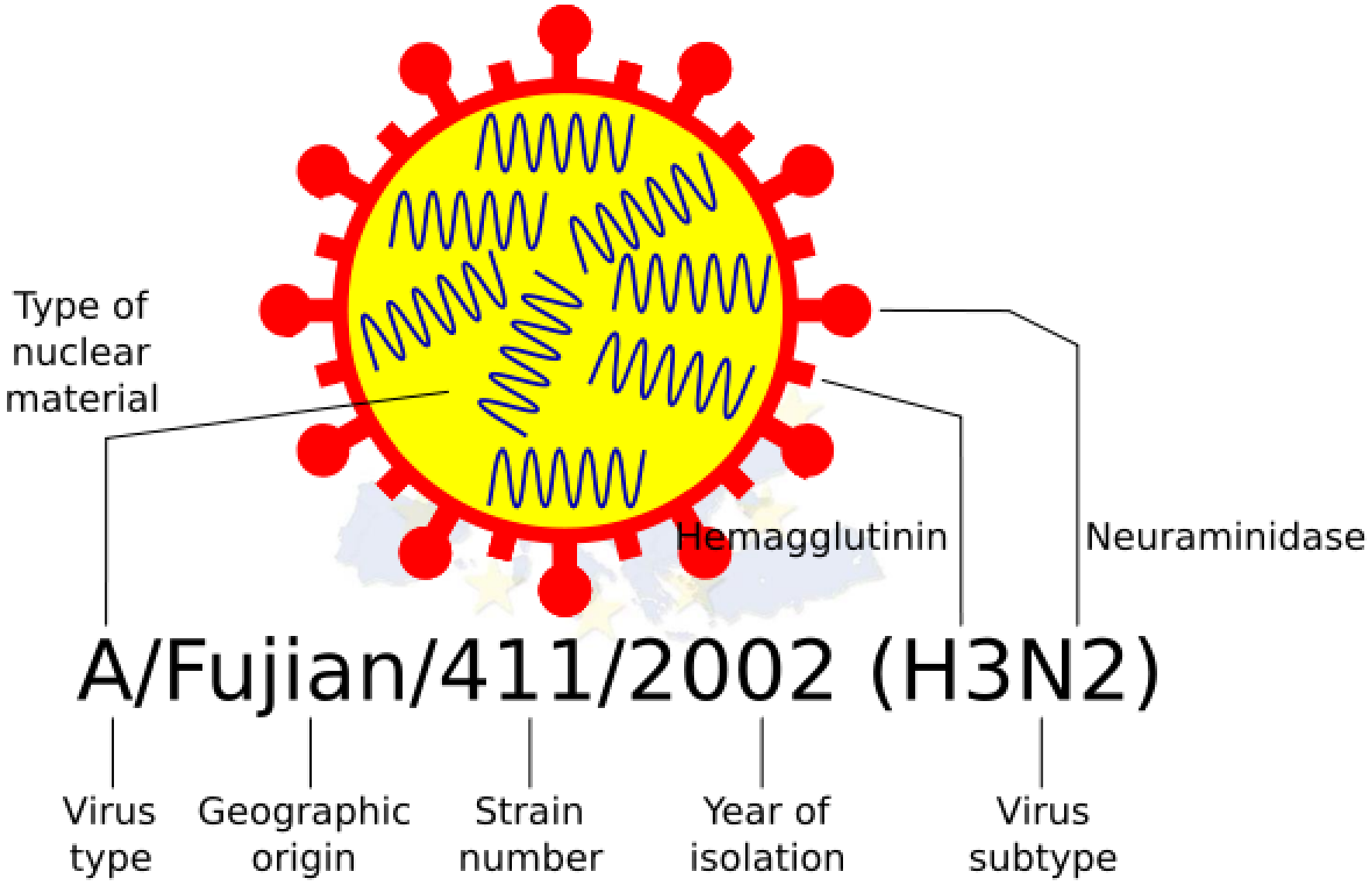


(Karl G Nicholson, et al

Lancet 2003; 362: 1733-45)

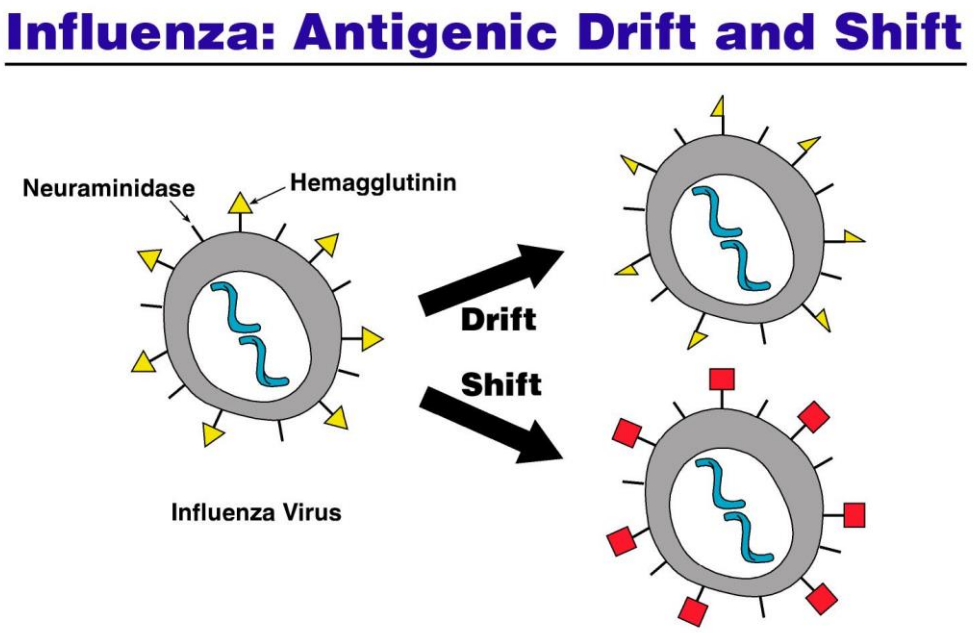
- The hosts are animals, birds, and humans.
- Many subtypes of Influenza A Virus (H and N).
- Three subtypes have caused human epidemics
  - **H1N1**
  - **H2N2**
  - **H3N2**

Influenza-Virus Nomenclature



Why consider influenza in an infectious disease emergency?

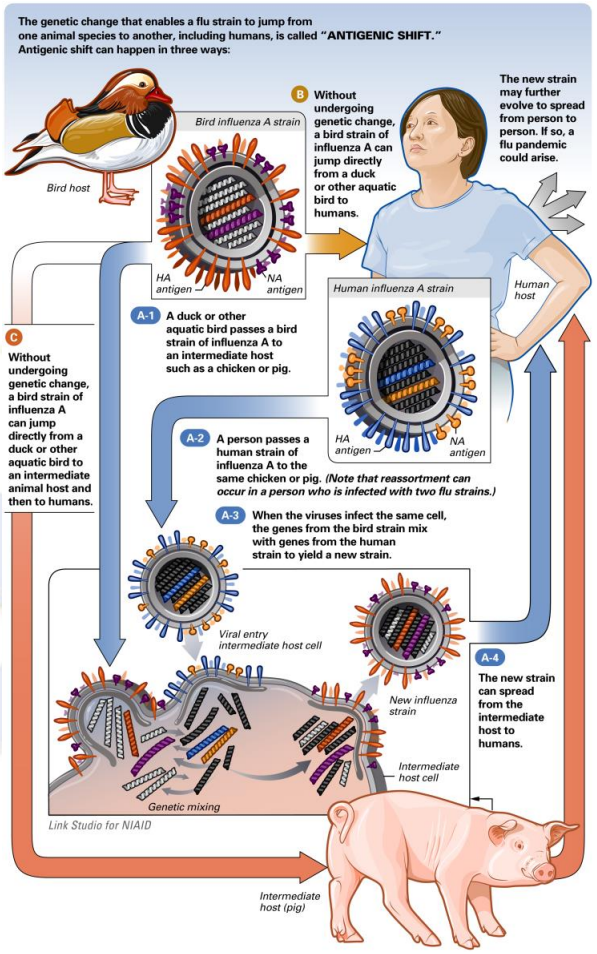
- The reality of avian (H5N1), swine influenza (H1N1)
- The concern of actual influenza A virus reassortment and shifting
- (A:H3N2, H1N1)
- Therefore: Another influenza pandemic could be unavoidable



http://cchealth.org/topics/pandemic_flu/school_action_kit/pandemic_flu_preso.ppt

The big concern-the antigenic shift

- Bird→Human
- Bird→Pig→Human
- Bird→Infected Human (Reassortment-New virus
- Bird, Human→Intermediate host(chicken,pig)→Reassortment (new virus)→Human



Influenza: epidemiology

- **Seasonal**: Peak: November to March (northern hemisphere), June to September (southern hemisphere)
- Worldwide distribution
- Outbreaks occur suddenly
- Flu spreads as **epidemics** (Types: A§B)
- Several great influenza **pandemics**:
  - 1918-19 “Spanish” flu
    - Caused 20-40 million deaths worldwide
    - A large proportion in healthy adults 15 to 35 years of age
  - 1957 “Asian” flu
  - 1968 “Hong Kong” flu
  - 1977 H1N1 influenza A virus subtype, “Russian”
  - **Avian (H5N1)**: from infected birds
  - **Novel flu viru-“Swine“ (H1N1)**

Influenza-modes of transmission

- Major transmission route: airborne large respiratory droplets
- Direct contact with fomites (inanimate objects)
- Airborne small(5 μm) (rare)
- Transmission from infected birds, poultry or pigs (less common) (avian, swine-”novel influenza viruses”)



http://cchealth.org/topics/pandemic_flu/school_action_kit/pandemic_flu_preso.ppt

Influenza-syndromic presentation

Influenza syndrome:

- Incubation:1-4d
- Fever
- Malaise
- Myalgia
- Headache
- Respiratory syndrome(mild)-most common with avian,swine influenza!



CDC Public Health Image Library

Influenza-Seasonal vs.New Pandemic

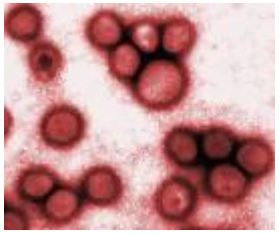
	Seasonal	New A (H1N1)
Incubation	1-4d	<7d(?)
Common clinical features	Constitutional	Respiratory (upper)
Occurence	Older	Younger
Clinical pattern	Moderate	Mild
Severe respiratory failure	Rare	~15% of hospitalised cases
Severe evolution	>65y	<50y

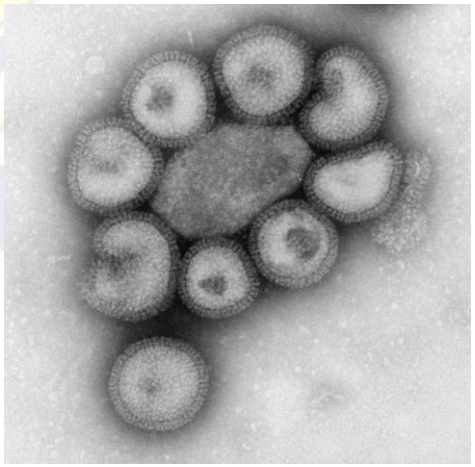
Influenza-Cold or flu?

Symptoms	Cold	Flu
Fever	Rare	Characteristic; high (102-104 deg. F): lasts 3-4 days
Headache	Rare	Prominent
General Aches, Pains	Slight	Usual; often severe
Fatigue, Weakness	Quite mild	Can last up to 2-3 weeks
Extreme Exhaustion	Never	Early and prominent
Stuffy Nose	Common	Sometimes
Sneezing	Usual	Sometimes
Sore Throat	Common	Sometimes
Chest Discomfort, Cough	Mild to moderate, hacking cough	Common; can become severe

Influenza-Etiology

- RNA viruses (Orthomyxoviridae family)
- Can mutate and cross species barrier such as fowl,swine to humans
- Influenza viruses types A, B, & C infect humans, A & B-widespread outbreaks,
- type A-most severe

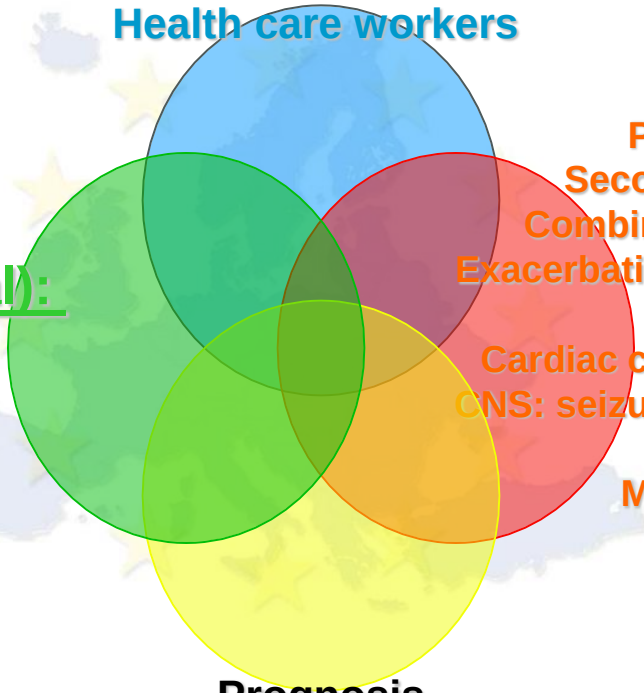




(CDC Public Health Image Library)

Influenza-Natural history

Risk categories:
Age >65 y<5y
Chronic illnesses
Immunodeficiencies
No access to health care
Crowded conditions
Health care workers



Complications
Respiratory:
Primary viral pneumonia
Secondary bacterial pneumonia
Combined bacterial-viral pneumonia
Exacerbation of chronic pulmonary disease
Non-respiratory
Cardiac complications: EKG, myocarditis
CNS: seizures (children), acute encephalitis
Reye's syndrome,
Myositis-/+myoglobinuria
+ rhabdomyolysis

Evolution(seasonal):
days
(max 1 w)

Prognosis
Seasonal: Self limiting (few days)
Pandemic: high fatality
Avian : type of virus (H5N1>death rate>50%)

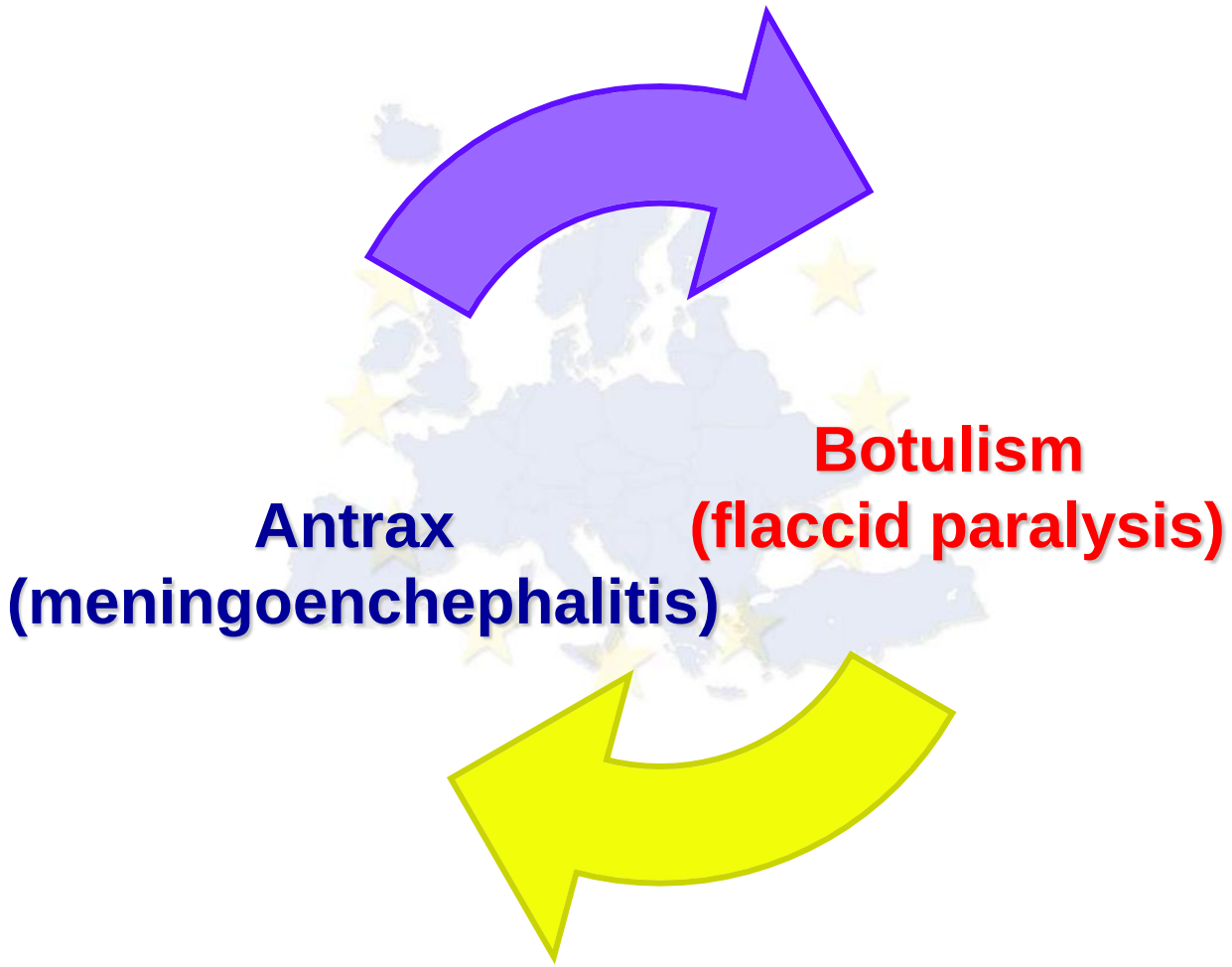
Influenza vaccination

- Seasonal vaccine
- Pre-pandemic➔used prior to pandemic declaration (Phase 3/4/5)
- Pandemic➔used after pandemic declaration (Phase 6)



INFLUENZA TREATMENT	PROPHYLAXIS	
	Pre-exposure **PRECAUTIONS**	**Post-exposure**
•Mild illness/not high-risk: symptomatic •If diagnosed<48 hours/high risk: -Oseltamivir: -Zanamivir: •Avian (H5N1)-antivirals+supportive	-Social Measures: Handwashing Respiratory hygiene Avoiding crowds -Vaccination -Antivirals **-Droplet**	-Disinfection, decontamination: standard disinfectants (cook the poultry) -Antivirals

Neurological syndromes



Neurological syndromes-Transmisson

	FORM	PERSON-PERSON	WEAPON
ANTHRAX	Spores	NO	✓
BOTULISM	Spores (toxin)	NO	✓

Neurological syndromes



Botulism

Incubation:6h-8d (<inhalation)

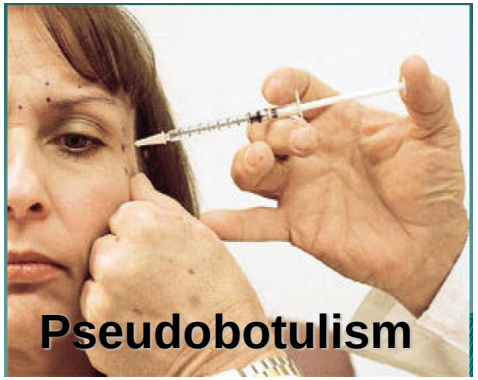
No fever
Diplopia
Dysarthria,
Dysphonia
Dysphagia
Flaccid descending
Symmetrical paralysis

Clinical Forms:









Evolution:
Flaccid paralysis-death (h-d)

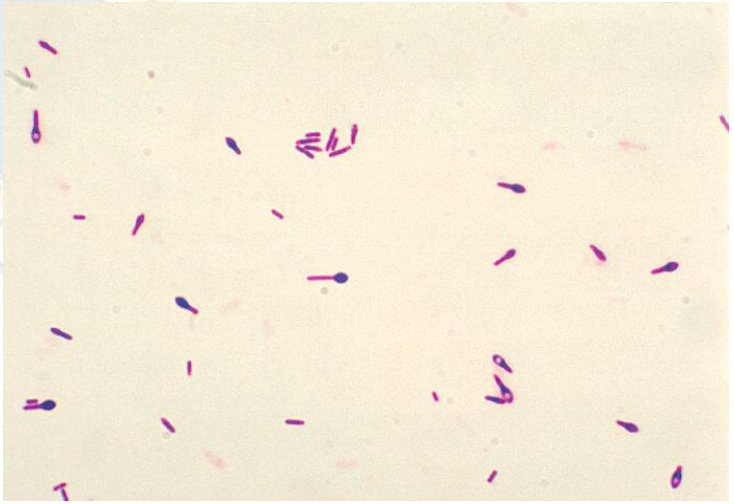
Prognosis:
Mortality:
60% untreated
<5% treated

Complications:
Aspiration pneumonia&infection
Respiratory distress
Long-lasting weakness
Nervous system problems <1 y

Botulism-Etiology

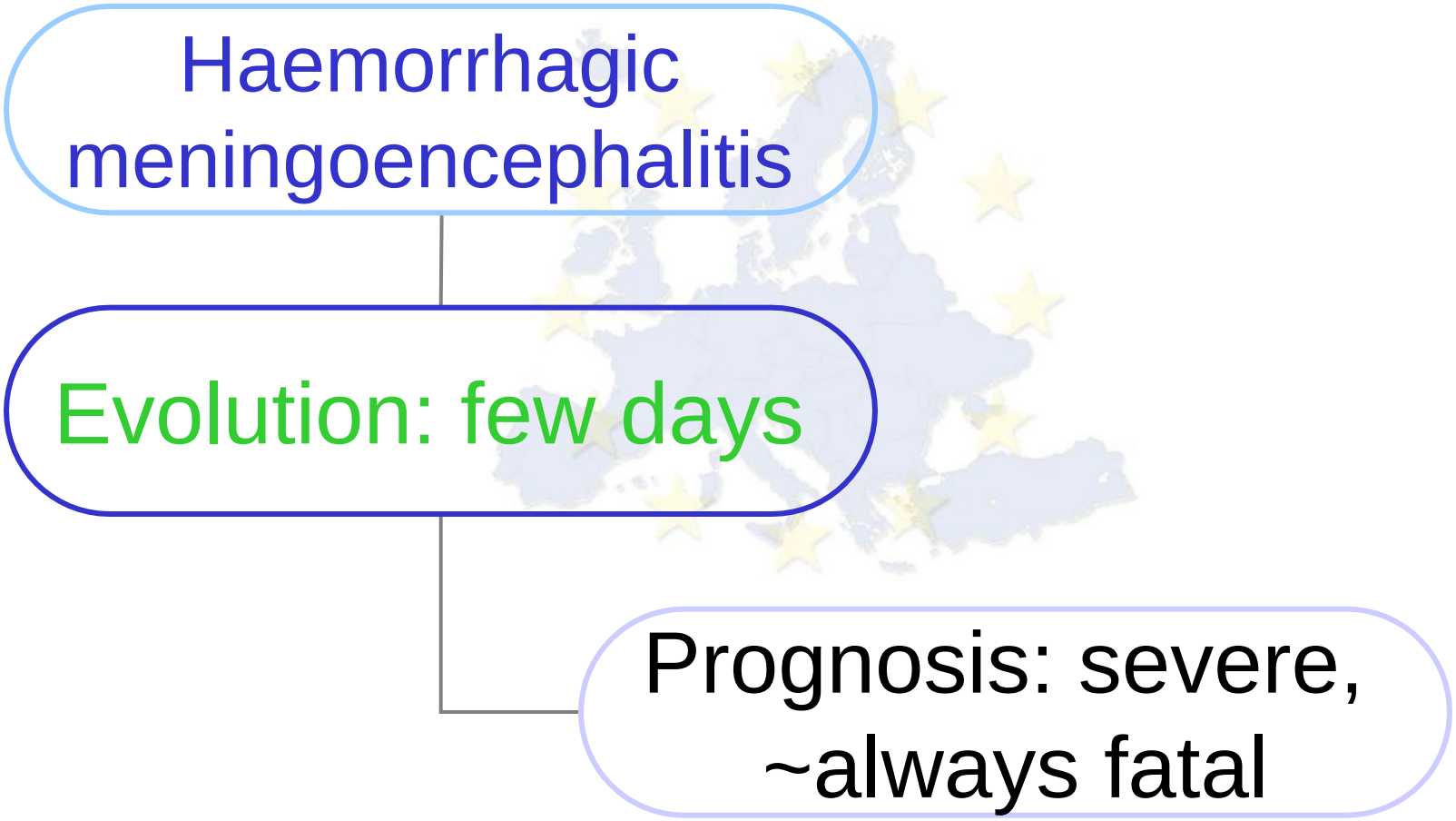
- ***Clostridium botulinum*** – ubiquitous spore-forming, anaerobic, Gram(+) bacterium in soils and marine sediments
- Straight to slightly curved rod with oval, subterminal spores
- All vegetative cells produce a potent botulinum neurotoxin (BoNT)
- 7 antigenically toxin types, A-G
- *A,B,E-pathogenic to humans*





Gram stain, culture CDC Image library

Neurological syndrome-Anthrax



Neurological syndrome:Management

Disease	Etiology	Clinical presentation	Treatment	Prohylaxis	
				Preexposue PRECAUTIONS	**Postexposure**
Botulism	**Clostridium botulinum**	No fever Diplopia Dysarthria Dysphonia Dysphagia Flaccid descending symmetrical paralysis	Botulinum antitoxin Suportive care	**Hygienic home canning** **Terminal boiling** **Vaccine?** **STANDARD RESPIRATORY (WEAPON)**	Disinfection/deco ntamination:woun ds, chlorinate water
Anthrax	**Bacillus anthracis**	Haemorhagic meningoencephalitis	Combine: Penicilin+cloramphen icole+Ciprofloxacin Resistant to cephalosporins	Vaccine **STANDARD**	Disinfection: peracetic acid Antibiotic: Ciprofloxacin,Dox icicline, AmoxicilineX 60d

Cutaneous syndrome-transmisson

	CONTACT	VECTOR	AIRBORNE	PERSON-PERSON	WEAPON
ANTHRAX	✓	NO	NO	NO	✓
PLAGUE	✓	✓	NO	YES	✓
TULAREMIA	✓	✓	NO	NO	✓
MELIOIDOSIS	✓	NO	NO	((YES))	✓
GLANDERS	✓	NO	NO	((YES))	✓
SMALLPOX	✓	NO	✓	YES	✓

Cutaneous syndrome-Anthrax

Transmission:
handling animal products
weapon

Incubation:
<1 to 7 days

CLINICAL: black eschar
indolent edema
+/-regional adenophaty
+/-fever

Evolution:
often self-limiting

Prognosis:
Untreated mortality
20% (treated v. rare)

Complications:
Malignant oedema
Sepsis



Source: Nursing in the era of bioterrorism

Cutaneous syndrome- Bubonic plague

Transmission:
Flea-bite
Handling infected animals

Incubation:
2-8 days

CLINICAL:Fever
Bubo (painful lymph node)

Evolution:
(days)

Prognosis:
Very severe
No treatment: mortality=50%
Treatment:mortality=5%

Complications:
Sepsis
Shock



www.cdc.gov

Cutaneous syndrome-Septicemic plague

Secondary:
bubonic, pneumonic
Primary

Incubation:
1-8 d

CLINICAL:Sepsis
Purpura
Peripheral gangrene
(Black death)

Evolution rapid:
<u>24-48h</u>

Prognosis:
<u>Very severe</u>
No treatment:
mortality=100%

Complications:
Shock



(CDC Public Health Image Library)

Cutaneous syndrome- Tularemia: Routes of infection

Natural reservoirs:
Rabbits
Sheep

Man infected:
Contact- infected animals
Arthropod bites

Natural vectors
Ticks
Mosquitoes
Bitting flies



www.cdc.gov



Tularemia-Syndromic Presentation

Syndromic	Incubation	Transmission	Clinical
Ulceroglandular (80%)	**2-5d (Range: 1-14d)**	**•Bite •Abraded skin**	•Constitutional symptoms • Local lymphadenopathy –tender, painful+/- fluctuant • +/- Tender papule or ulcer at site of inoculation
Glandular			
Oculoglandular		**•Eye inoculation (rubbing with innoculated hands)**	•Constitutional symptoms • Unilateral painful red eye • Eye exudate • +/- Corneal ulcer • Tender, swollen periauricular lymph nodes
Oropharyngeal		**•Ingestion**	•Constitutional symptoms • Sore throat • Exudate • Tender swollen cervical lymph nodes • +/- Pharyngeal/tonsillar ulcer/stomatitis
Pneumonic		**•Inhalation •Spread from primary site**	•Constitutional symptoms, sore throat • Dry cough, pleuritic chest pain, dyspnoea • Physical signs and CXR variable
Septicemic		**•Primary •Secondary from primary site**	•Constitutional symptoms • Nausea, vomiting, diarrhea, abdominal pain • Confusion, altered consciousness, coma • Septic shock, DIC, hemorrhage, ARDS

Tularemia- Clinical presentation

Evolution:
No antibiotics,
infection persistent w-m
Or progres to
pneumonic/septicemic

<u>Prognosis:</u>
No treatment: fatal ~5%
Treatment: fatal<1%
Severe as weapon (pneumonia, systemic)

<u>Complications:</u>
Pneumonia
Pleural effusion
Pericarditis
Meningitis
Osteomyelitis

Ulceroglandular (80%)

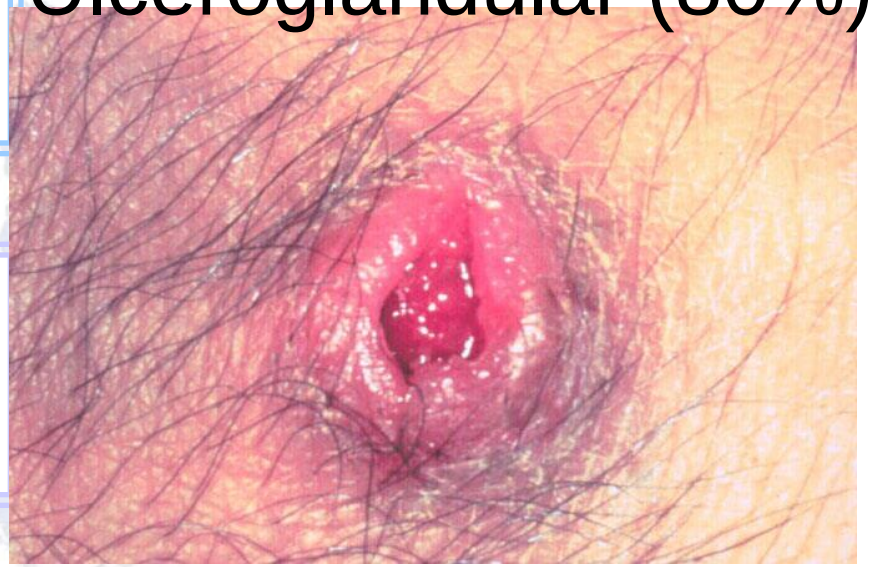
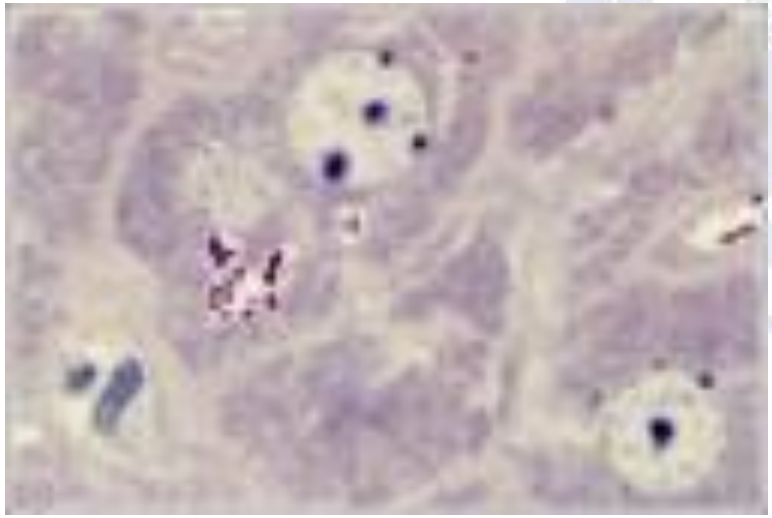
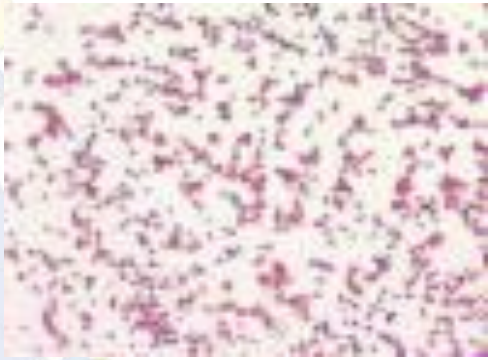


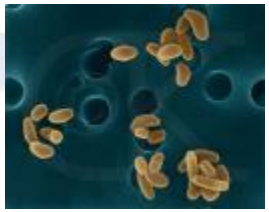
Image from “Textbook of Military Medicine; Medical Aspects of Chemical and Biological Warfare” 1997;505

Tularemia-Etiology

- *Francisella tularensis* (*F. tularensis*) is an aerobic catalase-positive, Gram (-) coccobacillus.







(CDC Public Health Image Library)

Melioidosis- Syndromic Presentation

Syndromic	Incubation	Transmission	Clinical
Acute local suppurative	Days-years (median 21 d)	•Inoculation of the skin	Nodular lymhadenopaty Lymphangitis Fever, muscle aches
Acute pulmonary (commonest)		•Inhalation	•Mild bronchitis-severe pneumonia •Constitutional symptoms: fever, muscle soreness
Acute septicemic		• primary •from a localised lesion (Immunodefficient: HIV, diabetes, renal failure)	Fever pus-lesions on skin •Headache muscle tenderness •ARDS disorientation •Diarrhoea sceptic shock
Chronic suppurative			Joints liver Viscera lung lymph nodes bones Skin spleen Brain
Innaparent (majority)			No symptoms

Glanders- Syndromic presentation

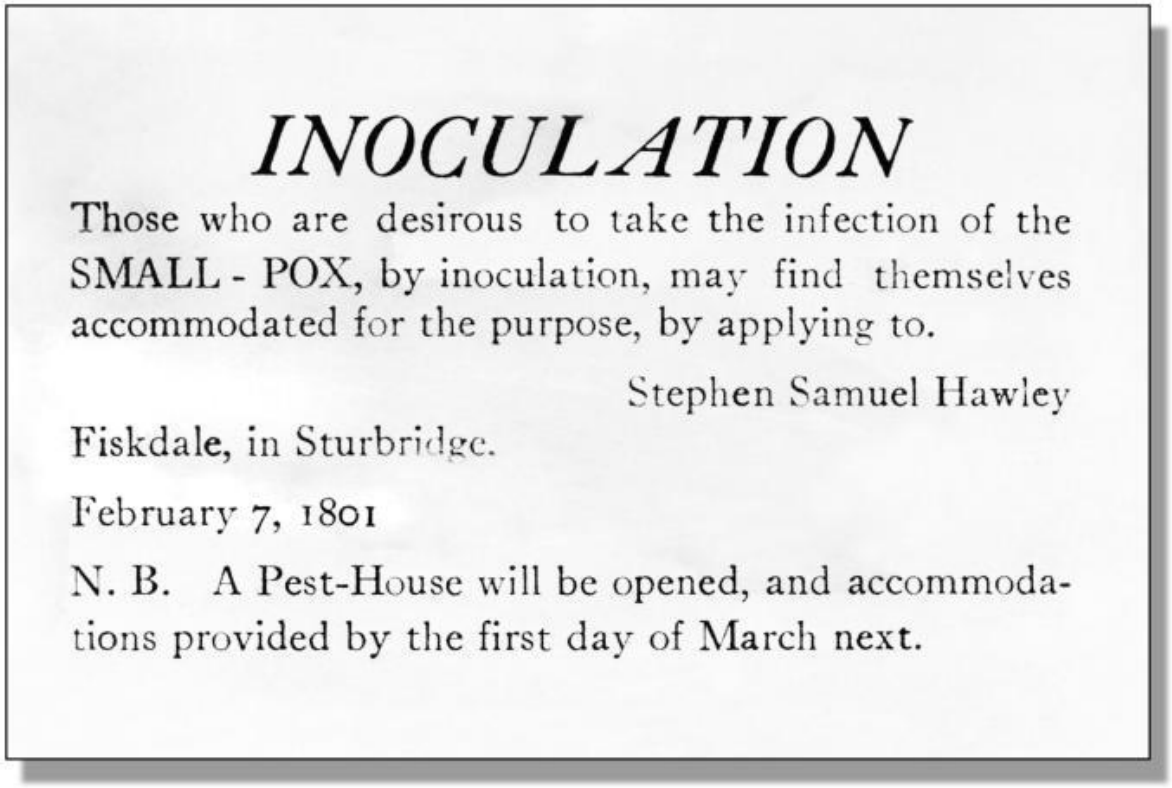
Syndromic	Incubation(d)	Transmission	Clinical
Localised cutaneous	1-5	•Direct contact with infected animals − Abraded skin −Mucous membranes	•Lymphadenopathy •Nodules(along lymph vessels,highly infectious exudate)
Pulmonary	10-14	•Inhalation of aerosolized bacteria •Hematogenous spread to lungs	•Pneumonia •Pulmonary abscesses •Pleural effusion
Septicemic	7-10	•Primary •Any site of infection can lead to sepsis (secondary)	•Fever, chills, myalgia, chest pain, rash, tachycardia, jaundice, photophobia, lacrimation
Chronic			•Multiple abscesses: muscles, joints, spleen, liver •Relapses common

Epidemiology (pox viruses)

Species	Host	Distribution	Disease
Molluscum contagiosum v.	Humans	Worldwide	Molluscum contagiosum
Orf v.	Sheep, goats,dogs	Worldwide	Orf
Pseudocowpox v. (milker´s nodules)	European cattle	Worldwide	milker´s nodules, localised skin lesions
Bovine papular stomatitis v.	European cattle	Worldwide	localised skin lesions
Cowpox v.	Cows, rodents, cats, zoo animals	Europe, Western Asia	Cowpox, localised pustular lesions

Smallpox (variola)-Epidemiology

- Eradicated since 1977(Last known natural case: Somalia in 1977)
- Success of vaccination campaign



INOCULATION

Those who are desirous to take the infection of the SMALL - POX, by inoculation, may find themselves accommodated for the purpose, by applying to.

Stephen Samuel Hawley

Fiskdale, in Sturbridge.

February 7, 1801

N. B. A Pest-House will be opened, and accommodations provided by the first day of March next.

Source: Nursing in the era of bioterrorism

Smallpox-Syndromic presentation

Transmission:
Airborne
Direct contact

Incubation:7-16days



Evolution
Prodrome 3-4 days
Enanthem day 3
Pocks days 4-7
Pocks heal and scab days 8-21
Immune Scars form over months

Prognosis:
Severe
30% mortality in unvaccinated

Complications:
Myocarditis
-Pneumonia
-Encephalitis
-Hemmorrage
-Bacterial superinfections

Source: Nursing in the era of bioterrorism

Smallpox-Modes of Transmission

- Weapon

- Can be aerosolized
- Highly contagious
- No effective treatment
- Vaccination ceased in 70’s
- Stable in the environment (contamination for months)

Smallpox-Differential Rx

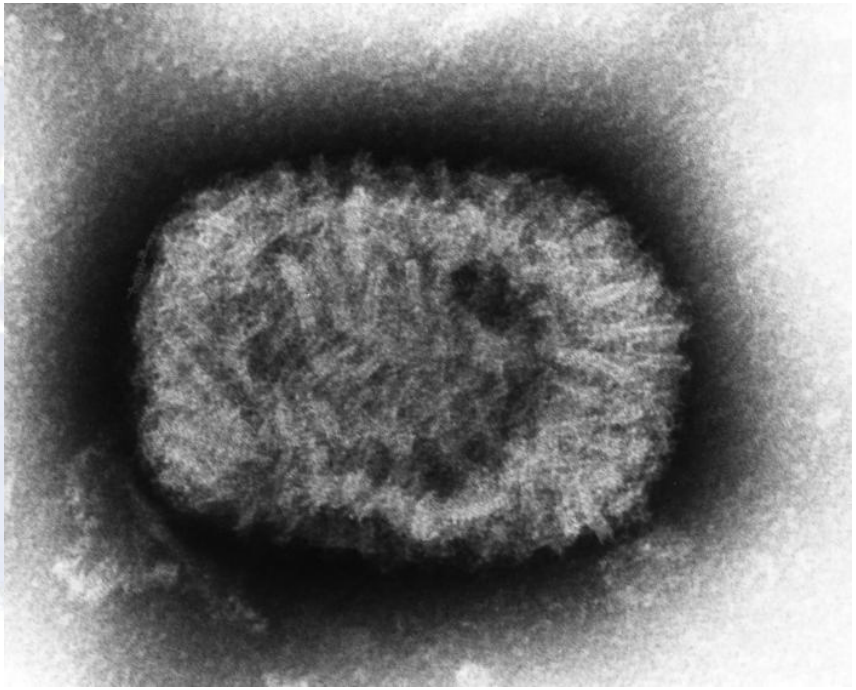
	Smallpox	Chickenpox
• Prodrome	yes	minimal or none
• Distribution	out to in	in to out
• Lesions	painful / deep	pruritic / superficial
• Progression	synchronous	asynchronous
• Palms / Soles	yes	no





Smallpox-Etiology

- Double-stranded DNA virus in the genus
- Variola virus (Orthopoxvirus)



CDC Public Health Image Library)

Vaccination-complications

- Vaccine is for **vaccinia**, a closely related and more benign virus
- Not known if previous vaccination is protective now
- **Not a benign vaccine: side effects and fatalities**
- Possibly MANY deaths if given to all
- Vaccine contraindicated in some, unless exposure has occurred:
  - Immunosuppressed (HIV / cancer/transplant patients
  - chronic steroid usage (eye drops)
  - eczema or chronic exfoliative skin disorders
  - pregnancy
  - age under 18
  - CARDIAC DISEASE- Mi's / Myopathy / Angina





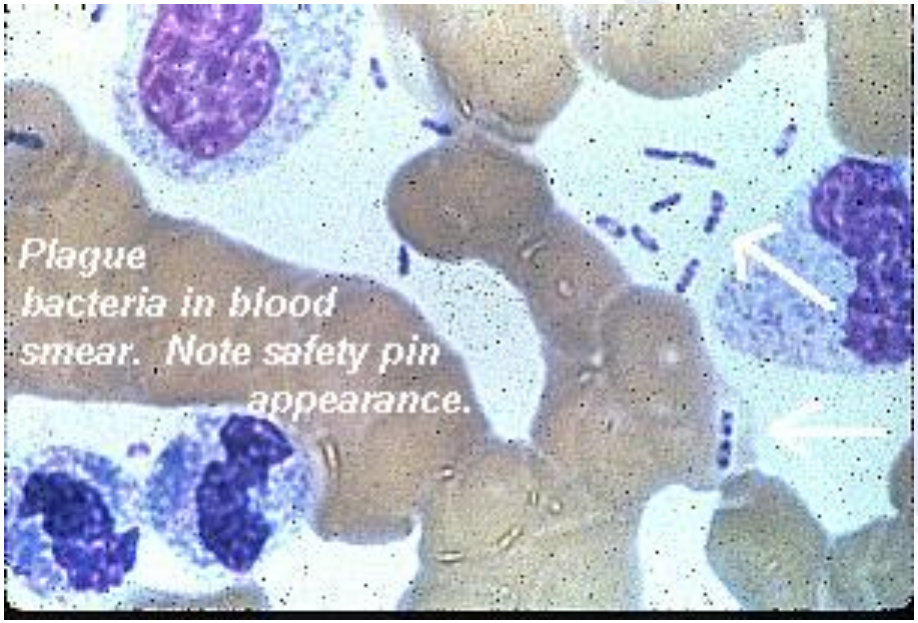
Cutaneous Syndrome:Management

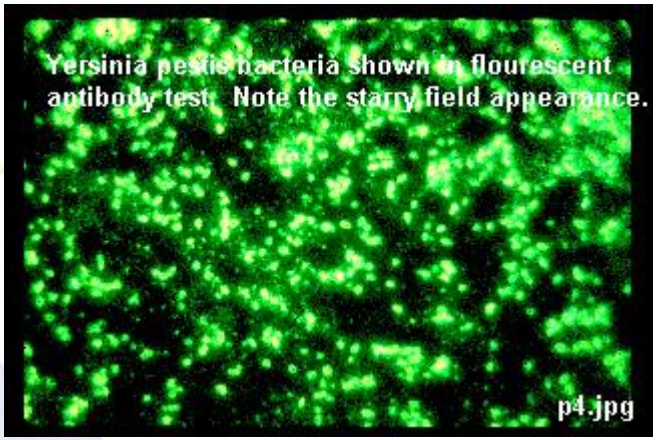
Disease	Etiology	Clinical presentation	Treatment	Prohylaxis	
				Preexposue PRECAUTION	Postexposure
Anthrax	**Bacillus anthracis**	Cutaneous anthrax	Ciprofloxacin, DoxicyclineX7d	**STANDARD**	Ciprofloxacin
Plague	**Yersinia pestis**	Bubo Necrosis (Black death)	Gentamicin Ciprofloxacin	**STANDARD**	Ciprofloxacin Doxicicline X7d
Tularemia	**Francisella tularensis**	Ulcero(glandular)	Aminoglicosides: streptoX10d Tetraciclines:21d	**STANDARD**	Ciprofloxacin Doxicicline X14d
Melioidosis	**Burkholderia pseudomallei**	Acute local suppurative	Systemic antibiotics:no aminoglicosides, ciprofloxacin Surgical dainage	**STANDARD (laboratorians BIOS III)**	Doxicicicline Cotrimoxazole X7d
Glanders	**Burkholderia mallei**	Localised cutaneous	p.o. amoxicillin/clav, doxycycline, TMP-SMX(X)60-150d		
Smallpox	**Poxvirus variolae**	Pocks, pustular, scabs,scars	**No effective treatment** (cidofovir?) Vaccinia immune globulin	**Isolate single room/Cohort patients** **Vaccinia Vaccine** **CONTACT AIRBORNE**	Vaccine

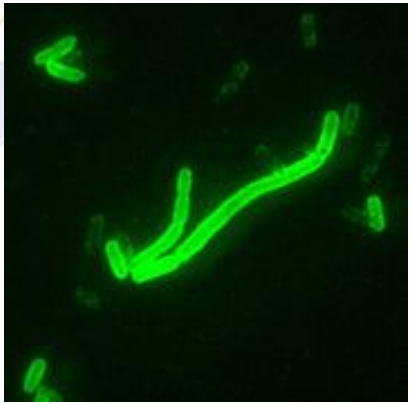
Generalised infections: Sepsis/Shock

- Plague
- Melioidosis
- Glanders
- Hemorrhagic Fevers

Plague-Etiology



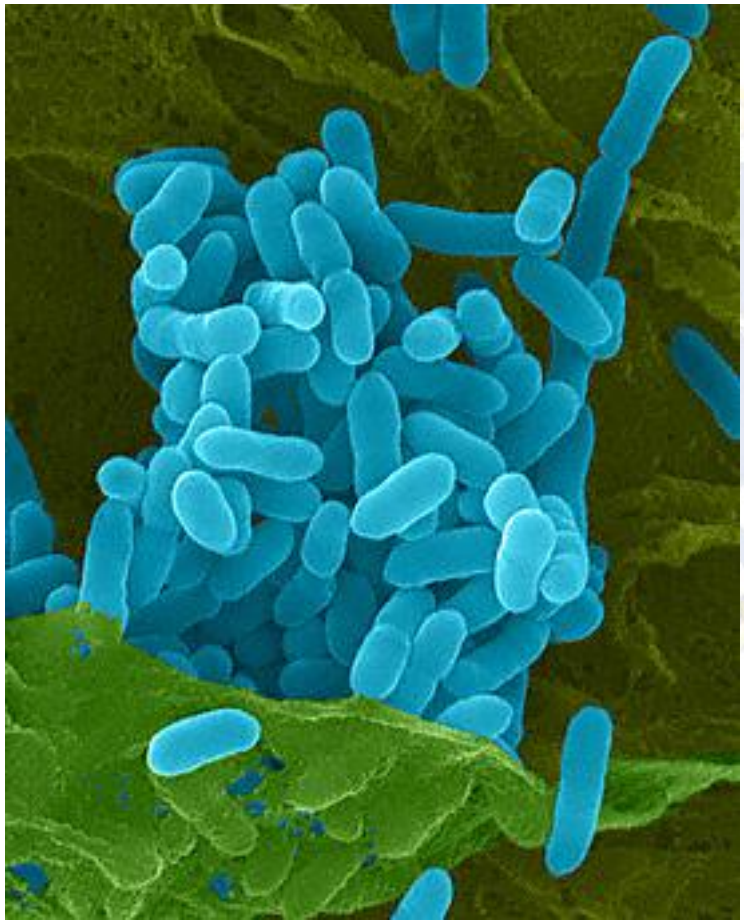




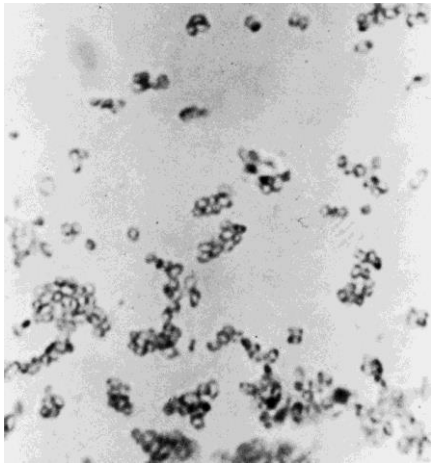
CDC Public Health Image Library

Melioidosis - Etiology

- Etiology: *Burkholderia pseudomallei* (Whitmore bacilli)-Gram(-) safety pin appearance



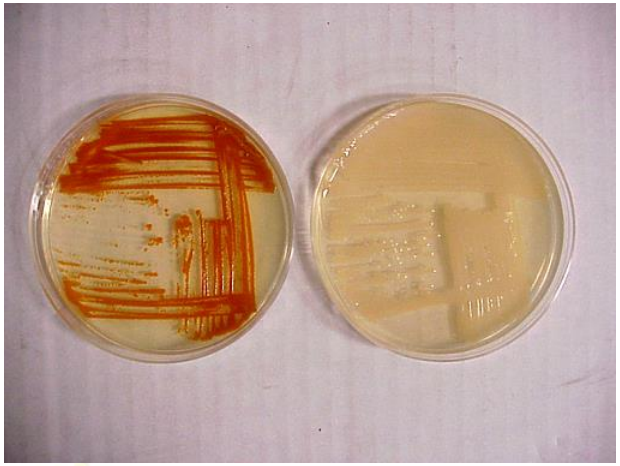




CDC Public Health Image Library

Glanders-Etiology

- *Burkholderia mallei*
  - Gram negative bacillus
  - Exists primarily in infected host
  - Withstands drying for 2-3 weeks
  - Killed by sunlight and high temp
- Related to *Burkholderia pseudomallei*
  - Cause of meliodiosis

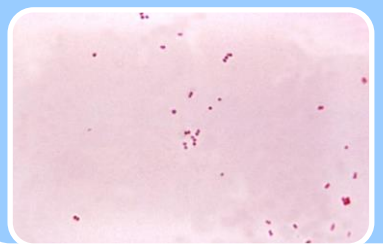


www.mbl.edu/animals/Limulus/ blood/bacilli.jpg.



www.cdc.gov

Hemorrhagic fevers (I)



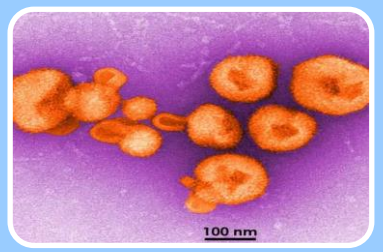
Meningococcal meningitis

- Neisseria meningitidis



Marburg, Ebola

- Filoviridae



Lassa

- Arenaviridae



Rift Valley

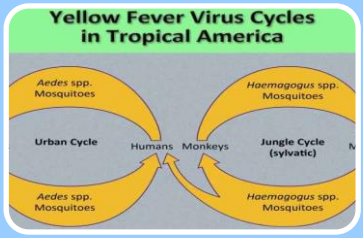
- Bunyaviridae

Hemorrhagic fevers (II)



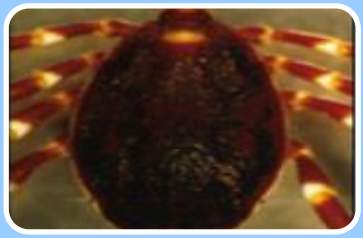
Hemorrhagic dengue

- Aedes aegypti



Yellow fever

- Flavivirus



Congo Crimean (CCHF)

- Bunyavirus



Hantaan

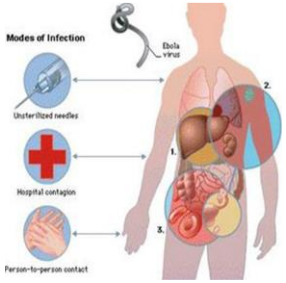
- Bunyaviridae

Hemorrhagic fevers (Ebola)

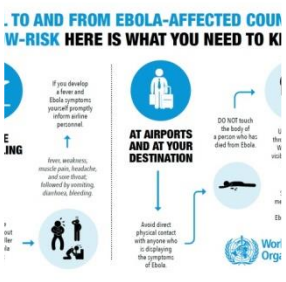
Fever +hemorrhagic syndrome +MODS



Transmission



Infographic



Prostration



Ebola virus (Filoviridae)



BIOS 4



Transportatio



Ward



PPE



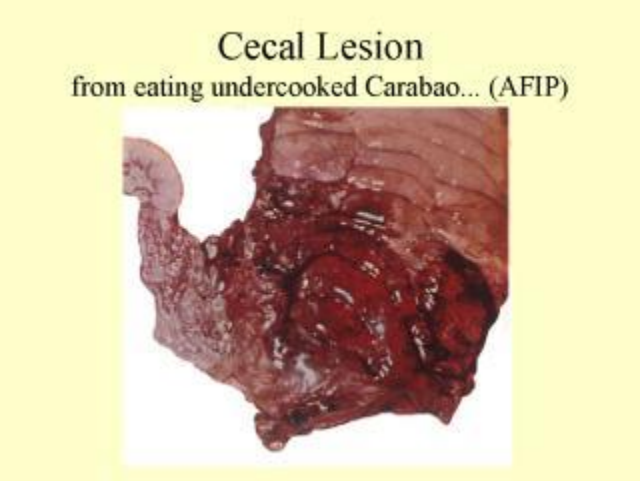
Digestive syndrome-Gastrointestinal Anthrax

- Digestive:

-Acute abdomen+bloody diarhoea+ascites+

septic shock

High mortality even with treatment



Intestinal anthrax-Armed Forces Institute of Pathology, USA

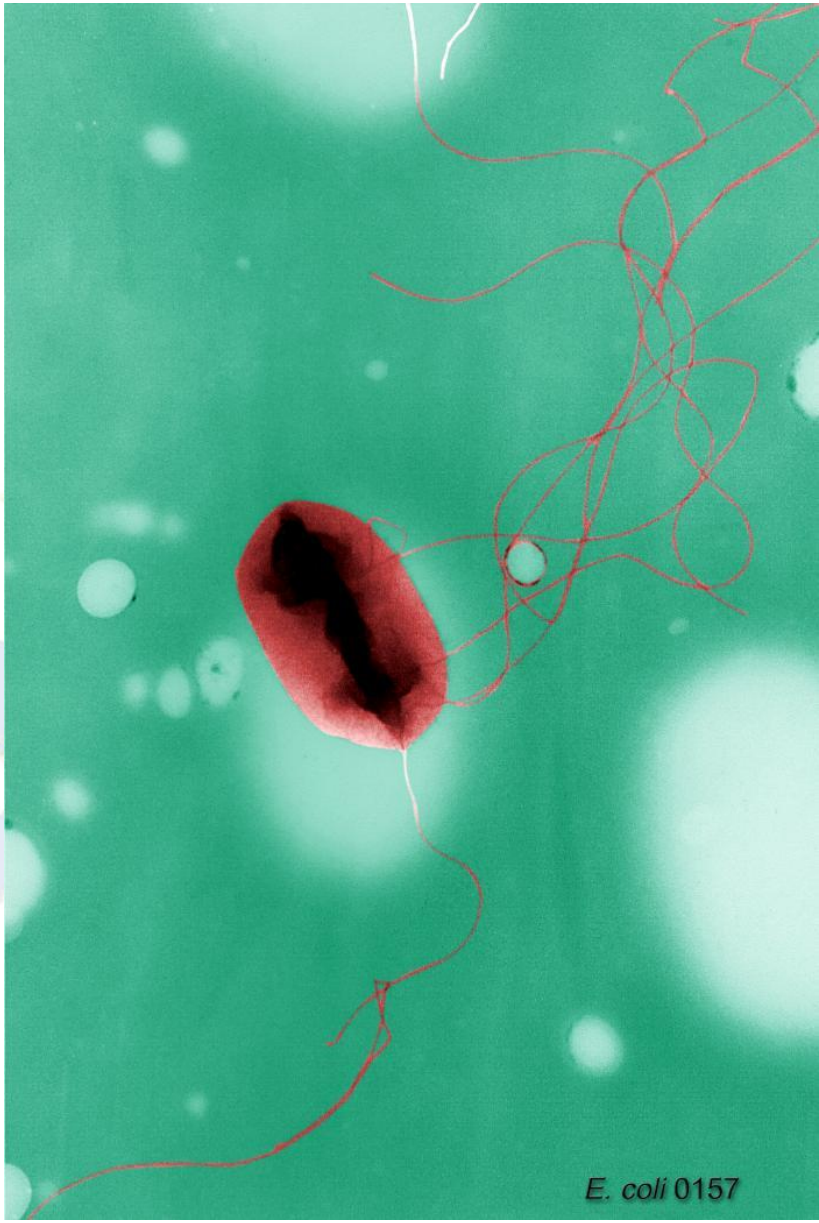
Digestive Syndrome - Oropharyngeal Tularemia

Fever, headache, myalgia, chills

- **Sore throat**
- **Exudate**
- **Tender swollen cervical lymph nodes**
- **+/- Pharyngeal/tonsillar ulcer/stomatitis**

Haemolytic Uremic Syndrome (E.coli O157:H7)

- **Escherichia coli**
  - **Pathogenic**
    - **Enterotoxigenic (ETEC)**
    - **Entero-invasive (EIEC)**
    - **Enteropathogenic (EPEC)**
    - **Enterohaemorrhagic (EHEC)**
    - **Enteroaggregative (EAgEC)**
    - **Diffusely adherent (DAEC)**
  - **Non-pathogenic**



The co-ordinated response (I)

	PARAMEDICS	TRIAGE NURSE	NURSES
Anthrax	**BW response integrated team(NBC)**	**Initial signs- Immediate, Acute pulmonary-expectant**	**Label ALL specimen/request forms 'high risk', warn laboratory in advance**
Plague	**Transport IMMEDIATLY to ID ward**	**Immediate,>24h of onset -expectant**	**•ISOLATE patient in SINGLE ROOM/restrict entry to essential personnel •STANDARD and RESPIRATORY infection control precautions (+PPE)**
Tularemia	**Summon a senior emergency medicine clinician**	**Delayed or Immediate (early stages of pneumonia)**	**Urgent ID assesmnet STANDARD precautions**
Melioidosis	**STANDARD precautions**	**Immediate/Delayed**	**Arrange clinical specimens lab transport to the according to local protocols for high-risk specimens STANDARD PRECAUTIONS**
Glanders			

The coordinated response (II)

	PARAMEDICS	TRIAGE NURSE	NURSES
Botulism	Transport to a ICU facilities hospital Endotracheal intubation/respiratory support available	•Immediate: Upper airway compromise, Respiratory failure by neuromuscular involvement Mild or gradually progressive symptoms-Delayed.	STANDARD precautions Inform ID physician/ local HPT
Smallpox	Ambulance used by case is not used again until decontaminated or diagnosis excluded	Most delayed Triage nurse and others close contacts with patient to remain in room with patient	•ISOLATE patient in SINGLE ROOM/restrict entry to essential personnel •STANDARD and AIRBORNE precautions (+PPE) •Ask other patients and their relatives/friends to remain until diagnosis confirmed or excluded
Influenza (avian=a)	•Precautions: droplet, wash hands •Take all respiratory diseases to a triage point	Risk factors/complications,a present-Immediate Immediate Otherwise-Delayed	•Restrict visits/ staff movement between units •Get vaccinated/ take chemoprophilaxis •HCW's with respiratory infection symptoms-excluded from work for the duration of the illness •Isolation facilities: cohorting •Isolation precautions: DROPLET+ STANDARD.
SARS	RESPIRATORY precautions	Pneumonia,ARDS-Immediate Other Fever/Respiratory syndrome-Delayed	ISOLATE patient in SINGLE ROOM,/restrict entry to essential personnel

Conclusions

- Bioweapon proliferation: a contemporary reality
- Genetically modified microorganisms
- The syndromic approach:

-ready and efficient answer to bioweapon threats

-practical and efficacious way to biodefense

- Proper strategically approach: the coordinated response (medical and social)
- Co-operation is necessary

Acknowledgements

- Health Protection Agency (UK)-www.hpa.org.uk
- CDC (Public Health Image Library)-www.cdc.gov
- CDC-SARS: What Every Clinician Should Know About Diagnosis and Management
- Dr. Barbara Bannister- ETIDE Pandemic flu and other respiratory viral outbreaks
- American College of Radiology-www.radiology.info.org
- MMWR-Update: Investigation of Bioterrorism-Related Anthrax and Interim Guidelines for Clinical Evaluation of Persons with Possible Anthrax-November 02, 2001 / 50(43);941-8
- MMWR-Imported Plague -New York City, 2002-August 8, 2003 / 52(31);725-728
- MMWR-Brief Report: Tularemia Associated with a Hamster Bite -Colorado, 2004-January 7, 2005 / 53(51 & 52);1202-1203
- MMWR-Laboratory Exposure to *Burkholderia pseudomallei* -Los Angeles, California, 2003-October 29, 2004 / 53(42);988-990
- MMWR-Laboratory-Acquired Human Glanders -Maryland, May 2000-June 23, 2000 / 49(24);532-5
- MMWR-Brief Report: Foodborne Botulism from Home-Prepared Fermented Tofu -California, 2006-February 9, 2007 / 56(05);96-97
- National Library of Medicine-www.nlm.nih.gov
- New Jersey Preparedness Training Consortium for Nurses-Nursing in the Era of Bioterrorism-www.nj-ptc.org
- Nursing in the Era of Bioterorrism
- OCM of the 3rd Euro-Global Confernce on Infectious Diseases 2016
- Wikipedia
- to the staff of the “Matei Bals” Institute of infectious Diseases, Bucharest, Romania