

External Briefing Document

Getting a Better Grade in Biodefense: A Review of the Biodefense Report Card

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Bio-Response Report Card

- Is there a role beyond the laboratory for biosecurity and biosafety in the Bio-Response to epidemic disease?



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Bio-Response Report Card

		Small Scale Non- Contagious	Small Scale Contagious	Large Scale Non- Contagious	Large Scale Contagious	Large Scale Drug Resistant	Large Scale Contagious
Detection and Response	↗	C	C	D	D	F	F
Attribution	→	D*	F	F	F	F	F
Communication	↗	B	B	C	C	C	C
Medical Countermeasures Availability	↗	B	B	D	D**	F	F
Medical Countermeasures Approval process	→	D					
Medical Countermeasures Dispensing	→	B	B	D	D	F	F
Medical Management	→	B	C	D	D	F	F
Environmental Cleanup	→	B	NOT APPLICABLE	F	NOT APPLICABLE	F	NOT APPLICABLE

<http://www.wmdcenter.org/wp-content/uploads/2011/10/bio-response-report-card-2011.pdf>



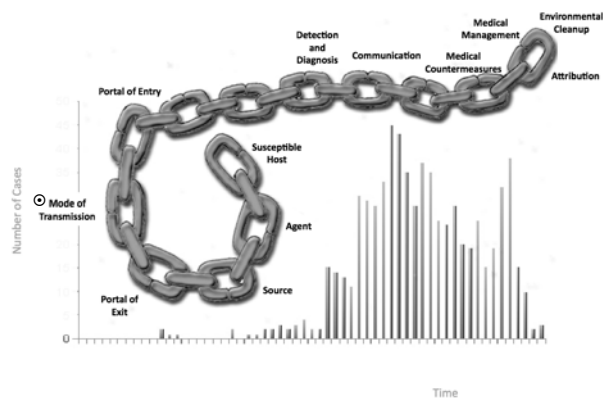
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Stopping an Epidemic - Breaking the Chain of Infection



DETECTION and DIAGNOSIS: "Current biosurveillance approaches do not involve or integrate data from entities outside of public health"



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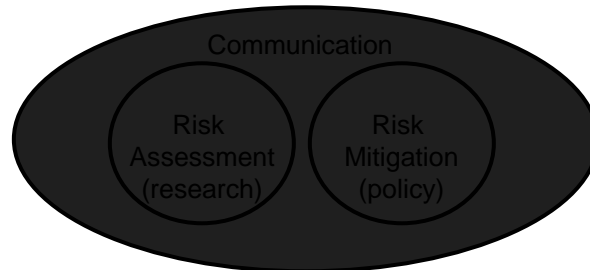
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Biosafety and Biosecurity in Veterinary Health

► Focus on Spread and Transmission of Disease:

- **OIE (Biorisk):** Focus on prevention and control of the spread of animal and zoonotic disease.
- **FAO Biosecurity:** Focus on bioexclusion or the elimination of disease and biocontainment or the prevention of transmission of disease from a colony, herd or flock.



<http://ftp.fao.org/docrep/fao/009/a0822e/a0822e00.pdf>



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Definitions of Biosafety and Biosecurity

► Focus on Spread and Transmission of Disease:

- **OIE (Biorisk):** Focus on prevention and control of the spread of animal and zoonotic disease.
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► Focus on Laboratory:

- **WHO Laboratory Biosecurity:** The protection, control and accountability for valuable biological materials (VBM) within laboratories, in order to prevent their unauthorized access, loss, theft, misuse, diversion or intentional release.
- **BMBL 5th Ed.:** Biosafety addresses the safe handling and containment of infectious microorganisms and hazardous biological materials for protection of laboratory workers, the community and the environment.

► Focus on Biotechnology:

- **Cartagena Protocol on Biosafety:** Need to protect human health and the environment from the possible adverse affects of the products of biotechnology.



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BS&S Report Card

	Laboratory Worker's Health	Public Health	Animal Health	Environmental Health
WHO Biorisk				
BMBL				
OIE				
FAO				
Cartagena Protocol	Not Applicable			



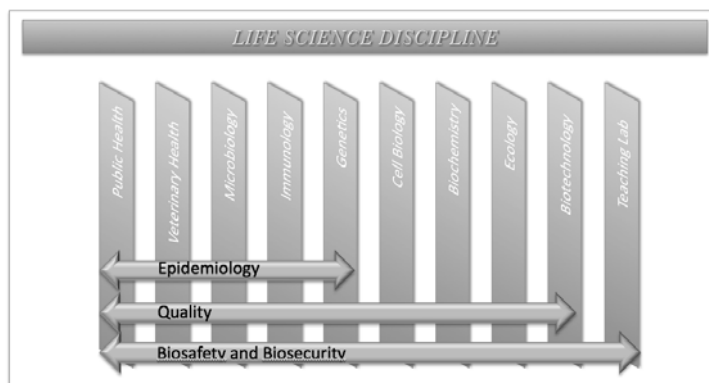
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Scope of Biosafety and Biosecurity in the Life Sciences



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Predicting Risks: (West Nile Virus)



- ▶ Risk mitigation procedures for overlap of human habitat with *Culex* sp.
- ▶ 3 Needle stick injuries during the Veterinary response
- ▶ Petting zoo remained open after tissues samples from birds came back positive for St. Louis Encephalitis



ChABSA
Chesapeake Area Biological Safety Association

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Filename/RPS Number

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Prioritizing Risk



- ▶ What are the most dangerous pathogens?
 - Biodefense definition
 - Microbiologists definition
 - Geneticist definition
 - Medical definition
 - Food industry definition
- ▶ What are the drivers of increased virulence

Walther and Ewald. Biol.Rev.(2004), 79:849



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Profiling Risk (Genetic profile of emerging pathogens)

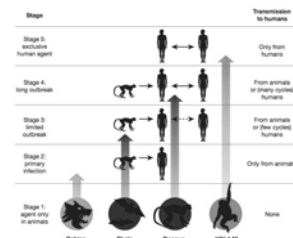


Figure 1. Illustration of the five stages through which pathogens of animals evolve to cause disease confined to humans. (See Box 1 for details.) The four agents depicted have reached different stages in the process, ranging from rabies (still acquired only from animals) to HIV-1 (now acquired only from humans).

- Genetic and phenotypic profile of emerging pathogen

Wolfe and Diamond Nature Vol 447, 17May2007



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Communication Risks

Thousands Flee Indian City In Deadly Plague Outbreak

By JOHN F. BURNS
Published: September 24, 1994

As many as 200,000 people have fled the city of Surat in western India after an outbreak of pneumonic plague that medical experts described as one of the most serious reported in the world in recent decades, officials here said today.

Less than 48 hours after the first confirmed death from the disease, officials in the industrial city said that 24 people had died and 137 others were being treated in hospitals. But unofficial reports, including accounts from doctors working in Surat, said that at least 100 people had died, and that the toll was expected to rise as house-to-house searches turned up scores of new patients.

Residents of Surat, a city of 1.6 million in Gujarat state, reported scenes of confusion and panic reminiscent of the plague outbreaks that devastated India before the advent of effective antibiotic treatment and insecticides in the 1960's.

The bubonic form of plague, which leads to the swelling of lymph nodes, is spread by fleas. Pneumonic plague, a fatal pneumonia, can result from the spread of plague from the lymph nodes to the lungs or can be transmitted by droplets in the air.

- Assessing Human Factors
 - Plague in Surat, India 1994

New York Times: <http://www.nytimes.com/1994/09/24/world/thousands-flee-indian-city-in-deadly-plague-outbreak.html?pagewanted=all&src=pm>



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Biotechnology Risks



Unsafe injections in the developing world: a review

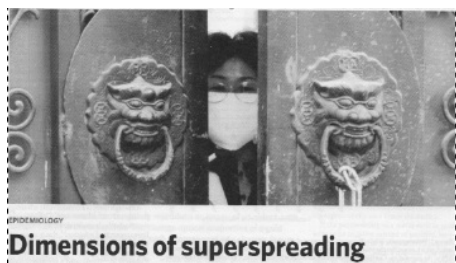
Table 3. Studies linking unsafe injections to transmission of bloodborne pathogens in developing countries

Pathogen	Year (reference)	Region	Country	Type of study	Proportion of infections attributed to unsafe injections, FIM ^a
Ditto	1979 (12)	Sub-Saharan Africa	Zaire	Outbreak	Major risk factor
	1981 (13)		Nigeria	Outbreak	Major risk factor
	1981 (14)	Middle East	Saudi Arabia	Outbreak	Major risk factor
	1981 (15)	Former Soviet Republics	Ukraine (Slovak)	Outbreak	Major risk factor
	1981 (16)	Asia	Indonesia	Outbreak	Major risk factor
Hepatitis C	1981 (17)	Middle East	Cyprus (Province of Tawad)	Population-based	Major risk factor
	1981 (18)		Egypt	Population-based	Major risk factor
	1981 (19)		Pakistan	Population-based	Major risk factor
Hepatitis B	1981 (20)	Asia	Cyprus (Province of Tawad)	Population-based, children <12 years	Major risk factor
	1981 (21)		Cyprus (Province of Tawad)	Population-based, children	Major risk factor
	1981 (22)		Proportion study, children	Population-based, children	Major risk factor
	1981 (23)		Cyprus (Province of Tawad)	Population-based	Major risk factor
	1981 (24)		India	Population-based	Major risk factor
	1981 (25)		India	Population-based, acute	Major risk factor
	1981 (26)	Former Soviet Republics	Ukraine	Outbreak	Major risk factor
	1981 (27)		Romania	Population-based, acute	Major risk factor
	1981 (28)		Republic of Moldova	Population-based, acute	Major risk factor

^a FIM stands for infection in population attributable risk (FIM). This figure was calculated on the basis of information provided in all (right above).



Public Health Threats



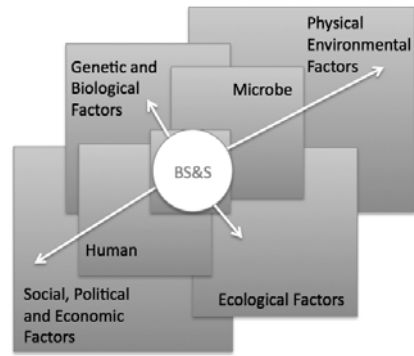
Nature Vol 438/17Nov2005

- Superspreaders
- 20% of the population responsible for 80% of disease



Role of Biosecurity in Public Health and the Bio-Response

- ▶ Leadership that sets clear priorities and engenders commitment and unity of effort,
- ▶ Mobilizing “whole of nation” response planning, and
- ▶ Sustained investment in purpose-driven science.



Convergence model of human-microbe interaction

Adapted from: Aragon and Reingold. Epidemiologic Concepts for Controlling Microbial Threats

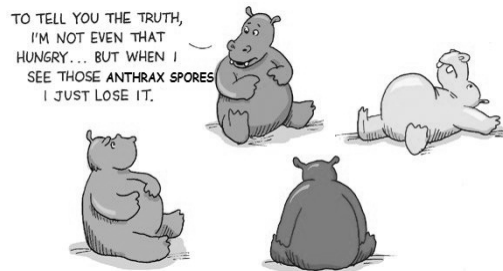


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