

Rational Strategies

- Interventions of choice
Economic, social and other non-medical countermeasures
- Interventions of last resort
Medical countermeasures

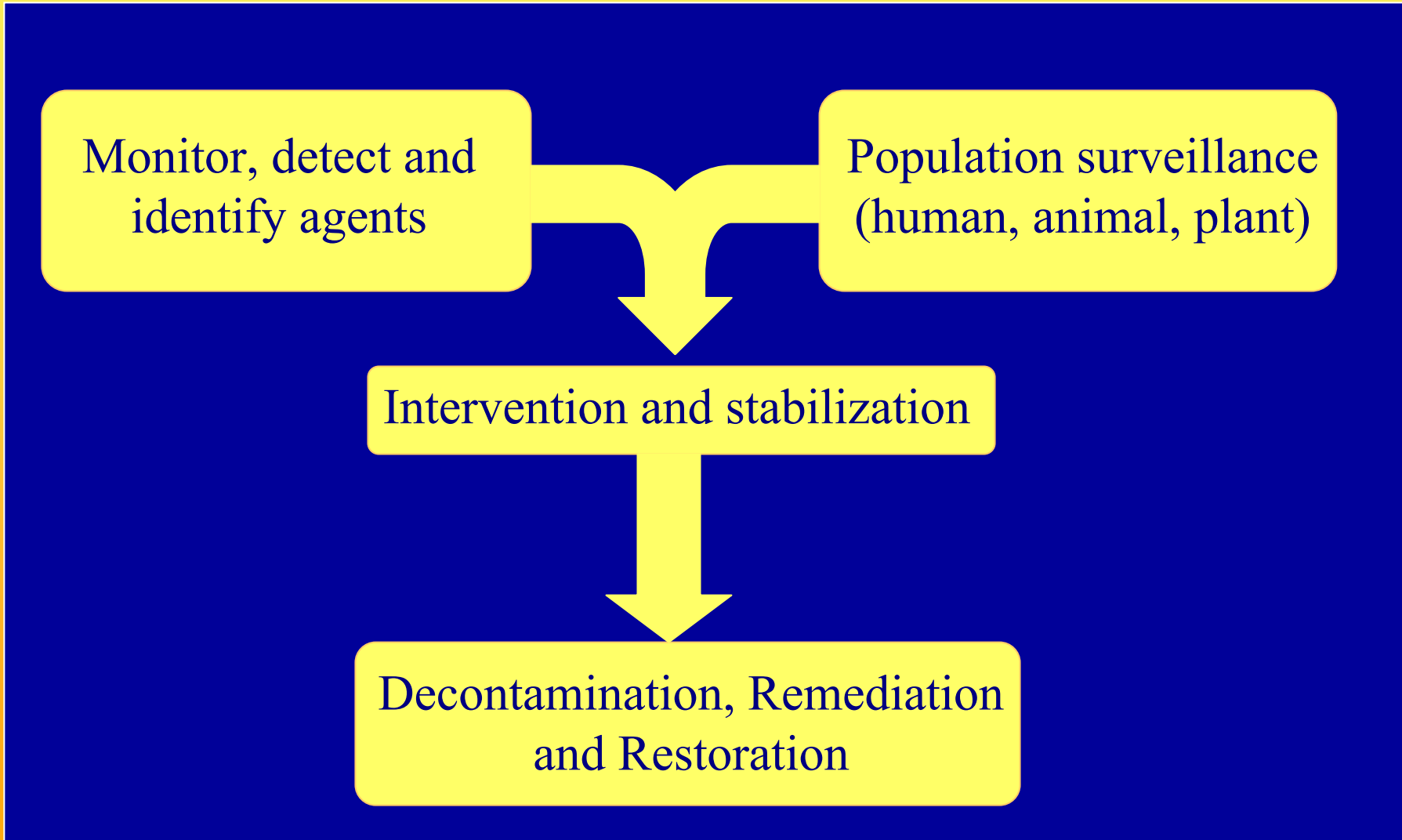
Major Components of Detection and Intervention

Monitor, detect and
identify agents

Population surveillance
(human, animal, plant)

Intervention and stabilization

Decontamination, Remediation
and Restoration



Detection and Identification

1. Sensitive
2. Specific
3. Timely

Forensics

- a. Molecular
- b. Microscopic
- c. Macroscopic

Population Surveillance

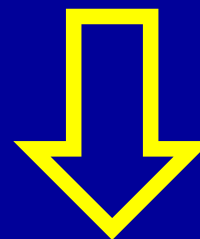
1. Syndromic surveillance
2. Sentinel diagnosis and/or laboratory tests

Timeline

Bacterial and
viral agents

Urgent

Biological toxins



Chemical Agents

Even more urgent

Intervention and Stabilization

First
Responders

Medical
Countermeasures

Meaningful
Policies

Reactive

Anticipatory
and
Reactive

Anticipatory
and
Reactive

Medical Countermeasures

Extracorporeal

Restrict movement

Quarantine

Intracorporeal

Vaccination

Therapeutic anti-
bodies

Small molecular
weight inhibitors

Meaningful Policy

1. Timely and flexible
2. Authentically implementable
3. Responsive to target population
4. Sensitive to risk-to-benefit ratio
5. Designed with adequate capacity
6. Incorporates data acquisition and means testing

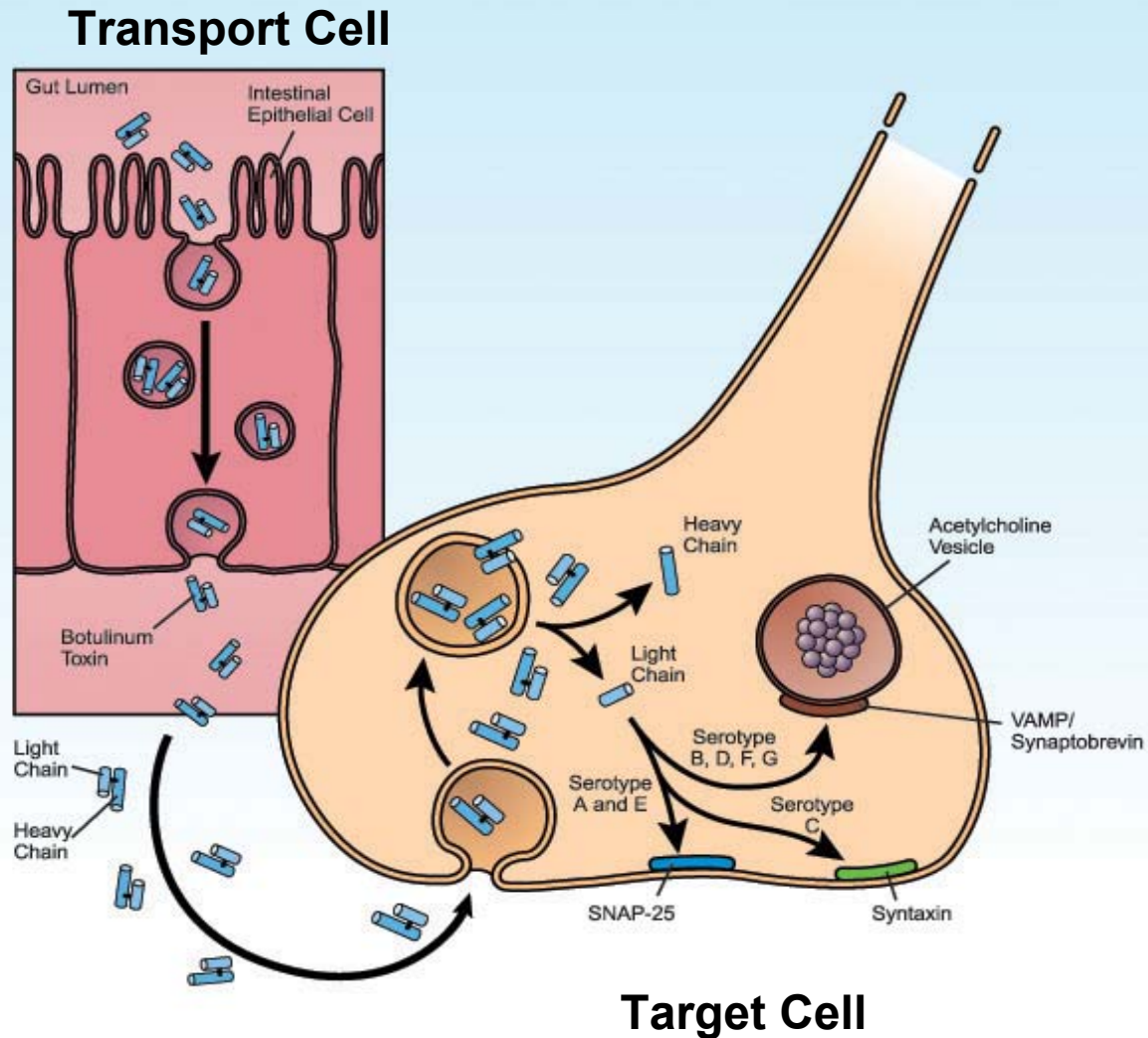
Encompassing Policy

1. Disciplines and specialties
2. Cultures and ethnic groups
3. Regions and nations

Select Agents, Category A

1. *Bacillus anthracis* (Anthrax)
2. *Clostridium botulinum* neurotoxins (Botulism)
3. *Yersinia pestis* (Plague)
4. *Variola major* (Smallpox) and related viruses
5. *Francisella tularensis* (Tularemia)
6. Viral hemorrhagic fevers (Lassa Fever, Rift Valley Fever, Dengue, Ebola)

Major Steps in Botulinum Toxin Action



Unique Properties of Botulinum Toxin

- Most poisonous of all poisons
- Not infectious (in traditional sense)
- Exists in multiple, serologically distinct types
- May not have to be weaponized
- Does not produce cell death, but does produce organism death
- Potentially long duration of action
- Used as therapeutic agent (e.g., drug choice for certain dystonias)

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Monitor, Detect and Identify

1. There are seven serotypes of botulinum toxin.
2. For those serotypes of greatest human concern (A, B and E), there is no cross immunity.
3. For those serotypes of greatest human concern, there may be numerous subtypes.

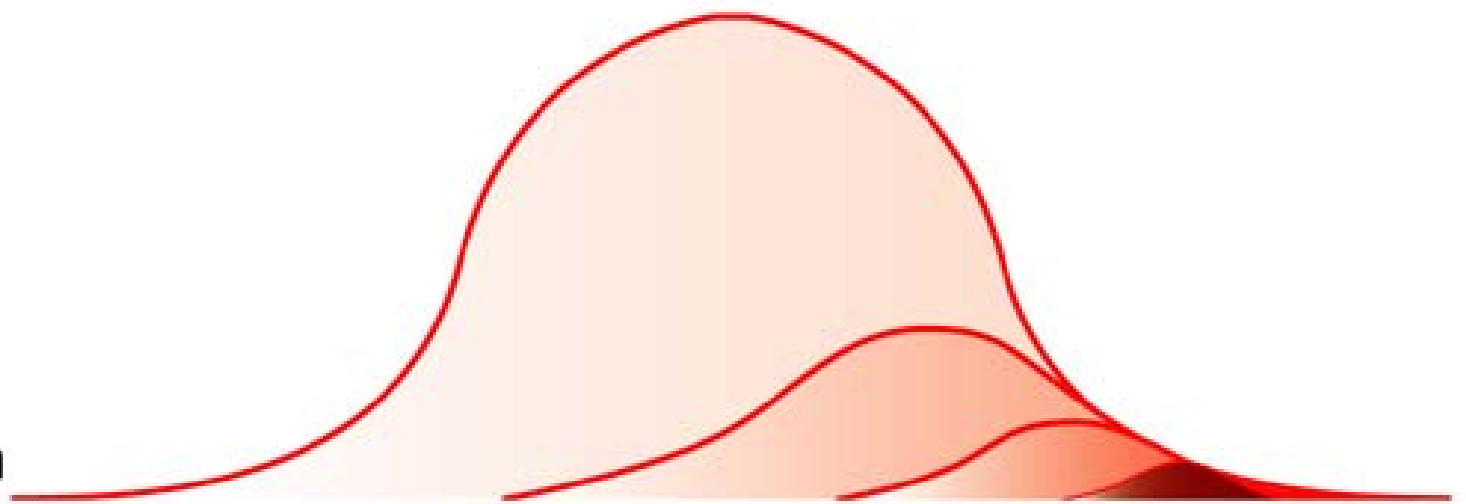
Population Surveillance

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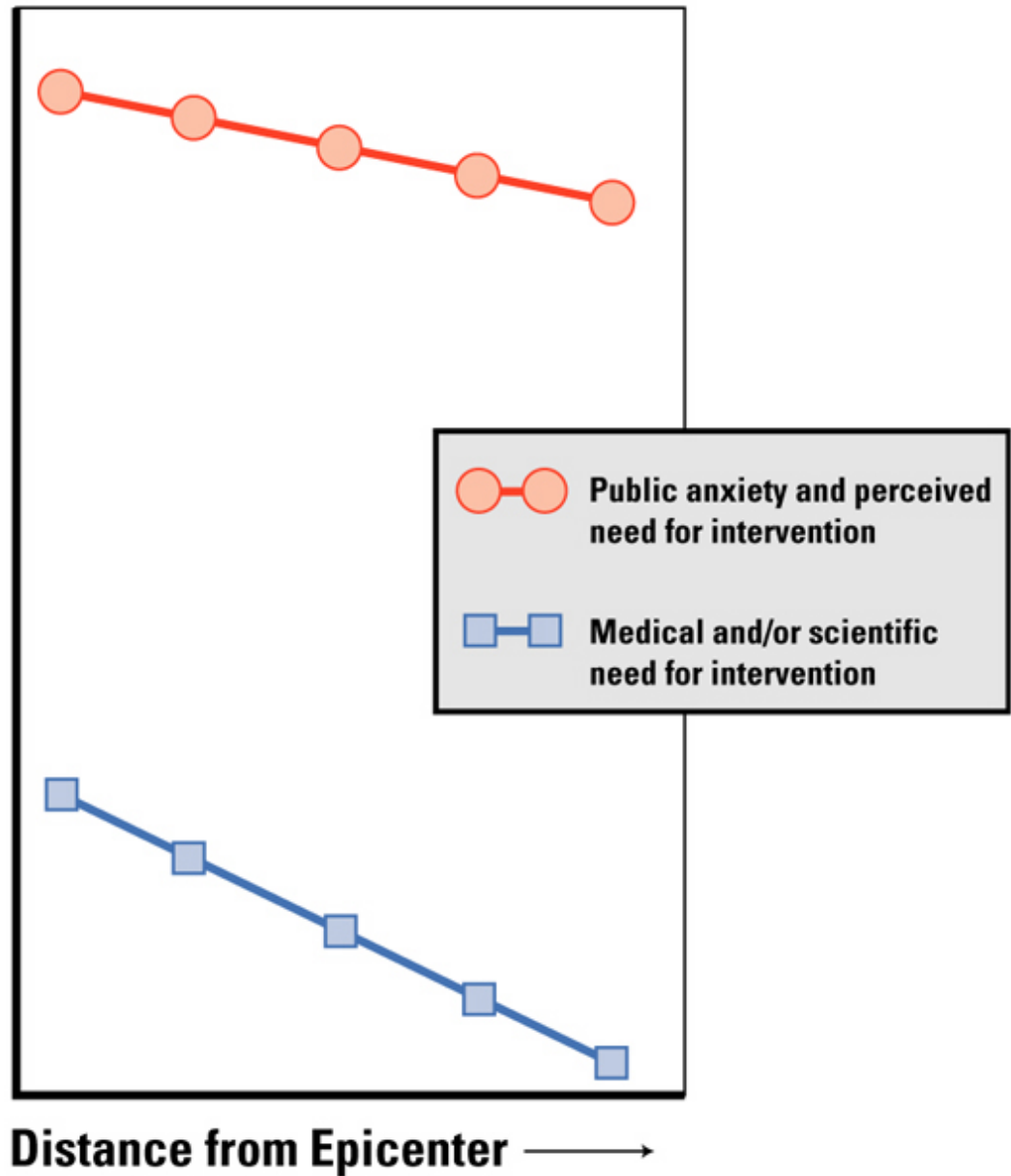
Identifying Target Populations

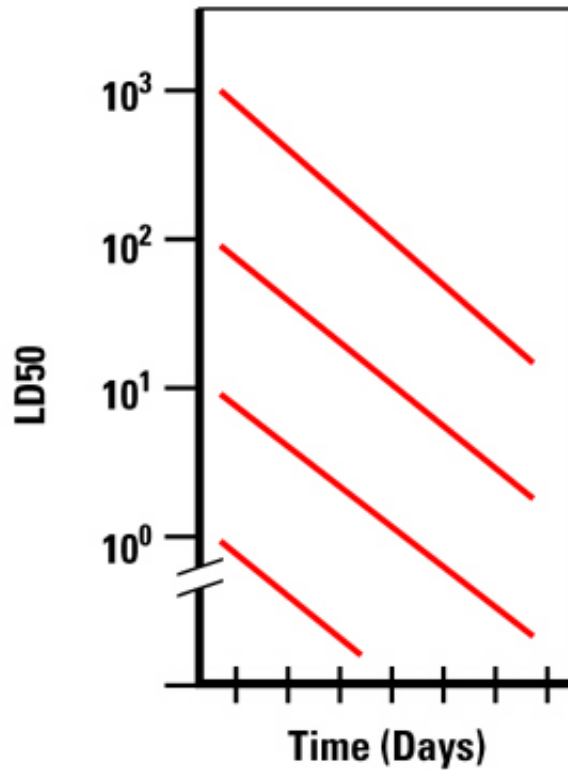
- Anticipatory population, no current incident
- “Walking Well”, periphery of incident
- Exposed population, victims of incident

↑
**Population
Size**

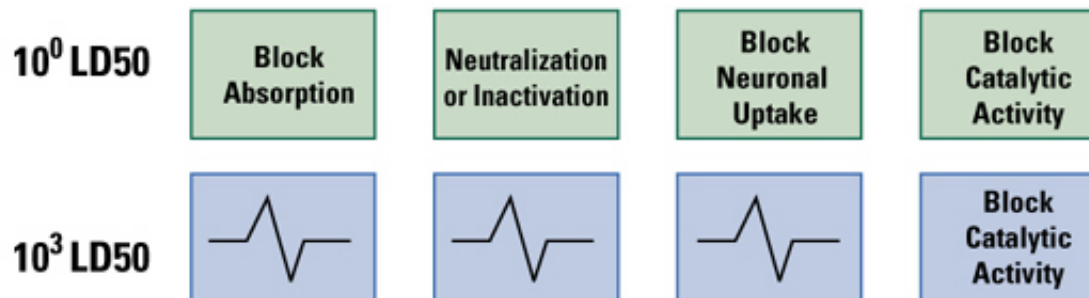


Likelihood of Exposure / Illness →





Timeline for Intervention



Fundamental Principles of Intervention

1. Requires minimum need for triage
2. Requires minimum utilization of human resources and facilities
3. Risk-to-benefit ratio should be:
 - a. Acceptable for non-exposed persons
 - b. Desirable for exposed persons

Minimum Need For Triage

1. For most patients, presentation of signs and symptoms will be first indication of exposure.
2. When signs and symptoms emerge, patient “rescue” may already be seriously compromised.

MINIMUM UTILIZATION OF RESOURCES

1. Not practical for seriously ill patients
2. Must “import” respiratory intensive care personnel and facilities.
3. Must “export” certain classes of patients.

Risk-to-Benefit Ratio

1. Data for toxoid and therapeutic antibody.
2. Risk-to-benefit ratio is not desirable.
 - a. Normal population.
 - b. Dystonia population.

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"Krantz, you are being awarded the Lance L. Simpson Prize, for diligently working on one problem for 25 years without coming up with anything."