

PRESENTATIONS BY PRINCIPLE PRESENTERS - 20 MIN. (paper length)
DISCUSSIONS - 15 MINUTES.

OPEN DISCUSSION

Organisms have selected as ^{the topic of} surveillance - and for good reason. ~~of the subjects of this first session~~
Over the past 25 years, we have witnessed the ^{occurrence} ~~emergence~~ of a surprising

number of new or emergent infectious diseases. The U.S. CDC tabulated 30 such diseases during just the past 25 years; ^{First discovered only 23 years ago} HIV/AIDS ^{was} has risen to the point of being the 4th leading cause of death in the world; avian flu, were it to begin to spread actively from human to human, could conceivably result in a global catastrophe of ~~unprecedented~~ proportions unprecedented in world history.

Can we anticipate others - yes. Organisms in the microbial world are constantly growing, mutating, occasionally throwing off a ^{more virulent} ~~mutant~~ form that can cause serious illness in man and can spread. Many years ago, ^{human} populations were very much

smaller and widely scattered; ^{not as fast} transportation from place to place was slow. Thus, even if a virulent organism did emerge ~~that organisms would mutate to cause serious illness~~

most such ^{would} altered organisms ~~would~~ die out - ~~not~~ unrecognized and unreported.

The world today has changed ^{dramatically} ~~radically~~ from what it was 25 or 50 years ago.

Fifty years ago. — 2 cities ^(5 × 10⁶) Today 15 cities > 15 million — many in

tropical and subtropical areas — densely crowded lower SE areas, poorly serviced, ^{pop.} no sanitation — an area ripe for a mutated organism to gain a foothold and to spread.

^{More than} Nine hundred million people per year travel ^{each year} for international air flights; no city in

the world is more than 36 hours from any other — this is less than the incubation period of any of the diseases of concern. For this reason, there is no way in the

world to prevent the importation of any disease from anywhere in the world by any sort of air port inspection or quarantine. And this ^{was} discovered during the

SARS outbreaks. ~~The~~ Air ports in various countries screened 35×10^6 travelers

for fever — result: 0 cases. Taiwan quarantined 80,000 travelers who might have been exposed. Result — 0 cases.

~~It~~ It has never been more apparent than now that we are all ^{an outbreak} in habitants of one planet; that ~~what happens~~ ^{potential} in one country is a threat

to all countries; that, as never before in history, we, as residents of a small planet, must work ~~together~~ ^{more} closely together & identify emerging microbial threats and to devise the necessary ^{measures} ~~measures~~ of vaccines, antimicrobials, isolation procedures or whatever in order to contain potentially serious problems.

A critical factor in all of this is the ^(as best possible) detection and identification of the offending microbes; the characterization of ^{their} ~~the~~ epidemiological spread so as to be ^{in other words SURVEILLANCE} able to contain ^{their} ~~the~~ further spread. This calls for a greater degree of cooperation, communication and information sharing than we have ever experienced.

This morning we had the opportunity to discuss mechanisms for disease ^(identification and epidemiological) detection, characterization in each of our participating countries and to identify what more can be done ~~to~~ in working together to deal with a very formidable foe - the microbes.

Surveillance

Key to dealing with the range of biothreats rep: (Adel and Gerry) - have some speed to determine what is going on
What to do? Having now spent the best part of 30 years dealing with the development of surveillance programs - for smallpox, measles, polio, influenza and others, it seems clear to me that there are some productive directions that have ~~not~~ been taken and a ~~number~~ of people and resources which ~~are~~ ~~not~~ ~~being~~ ~~devoted~~ to a host of other projects that are ~~more~~ ~~significantly~~ ~~productive~~ at best

and many other that could be taken

A growing cast of new microbes

More than 30 new agents in 25 years

Highly diverse clinically


- AIDS
- SARS
- TSE - "mad cow" disease
- H5N1 influenza
- Monkeypox

At the same time, there are today substantial resources being devoted to a host of other projects that are more significantly productive at best

conclusion - go back to the beginning


Surveillance
the problem of disease detection

Preparing for Emerging Infectious Diseases
Boston University Symposium
14 December 2005

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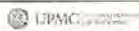
Why now?

- Growth in urban populations
 - Population of cities
 - 1975 - 5 with more than 10,000,000
 - 2004 - 20 with more than 10,000,000
 - 6 with more than 15,000,000
 - Illustration - India
 - 1991 - 23 cities > one million persons
 - 2002 - 35 cities > one million persons

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Why now?

- Growth in urban populations
- International travel
 - Volume (2003)
 - 642 million international air passengers
 - Arrival at 750 airports in 135 countries
 - Remote area destinations
 - All cities less than 36 hours from others

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Why now?

- Growth in urban populations
- Travel
- Growth of hospitals in endemic areas
 - Major sites for disease distribution
 - Problem of blood borne diseases
 - Development of antibiotic resistance
- Food supply
 - Internationalized
 - Industrialized

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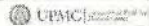
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Intentional release of bioagents

- A threat, largely ignored until 1995 and not taken seriously until 2001
- Arguments
 - Too difficult to grow organisms
 - Technologically difficult to disseminate
 - Not used because of a moral barrier

All have now proven to be fallacious

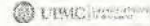
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Early detection is critical but how

- A menu of initiatives
 - Public health surveillance
 - Detection and quarantine at borders
 - Syndromic surveillance
 - Biowatch

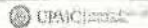
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Public health surveillance

- The on-going monitoring of the occurrence of specific diseases
 - Routine reporting of designated diseases from physicians, clinics and hospitals
 - Compilation and analysis by government authority
 - Implementation of needed action

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Surveillance in action

an illustration -- smallpox

- International Sanitary Convention required weekly reports to WHO from all countries denoting "local infected areas"
- Country reports based on communication from health units who irregularly submitted weekly or monthly reports

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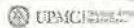


Surveillance efficacy -- 1966

- Completeness of reporting of smallpox
 - 1966 -- cases officially reported -- 65,512
 - Estimated number of cases -- 12,000,000

Approximately 1 case in 200

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Surveillance post 1967

- Reporting units -- all hospitals, health centers
- Frequency -- every week
 - Name, age, sex, village, onset, vaccination status
- Surveillance-containment teams
 - One per 2 to 5 million people
 - Vehicle, two team members
 - Investigate every report of smallpox
- The challenge when smallpox vanished

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Experience with smallpox surveillance

- System possible for 80%+ weekly reports
- Rapid response needed to reinforce interest
- 12-18 months to establish in a country
- Constant monitoring needed to insure quality
- Difficult to sustain interest with no disease
- Reports of other diseases not uncommon

Systems for the detection of clinically recognizable diseases can be developed but they are labor intensive and unlikely to survive if there is a prolonged absence of cases

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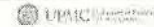


Detection/quarantine at borders

- A costly, disruptive pre-20th century approach, unjustified by experience
 - e.g. with smallpox, plague, cholera
- SARS experience with screening
 - 35+ million screened for temperature = 0
 - 80,000 Taiwan arrivals quarantined = 0

"Screening and quarantining entering travelers did not delay virus introduction in past epidemics and will likely be less effective in the modern era". WHO Writing Group --EID, Jan 06

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Syndromic surveillance (Biosense)

- Reports of patients with one of 11 syndromes (e.g. rash, diarrhea, respiratory) from:
 - ER, OPD patients; 911 calls; nurse call line data
 - Electronic transmission to hub for interpretation
- Limitations
 - Can't detect small outbreaks—signal to noise issue
 - False positives
 - Problem of sustained interest in absence of event
 - Manpower problems

Costly, experimental programs whose value not yet demonstrated

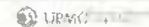
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Biowatch

- Air samplers collect material on filters; examined once daily for class A agents
 - Object: detect aerosol attack within 36 hrs
 - 31 cities with ~ 3000 collecting points
 - Cost ~ \$130,000,000/year
 - Problems
 - False positives (Houston and D.C.)
 - Labor intensive
 - Limited area covered; only detects outdoor release
 - Technology still in early development phase
- Ultimately a very costly program many years away from being practical or useful*

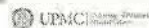
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Challenge of new/emergent infections

- If tropical or subtropical locale
 - Limited curative care and lab facilities
 - Routine reporting incomplete or absent
 - Limited communication
 - Language barriers
 - Problematic security

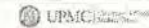
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Some scenarios

- Epidemic-- hundreds of cases and deaths
 - Hemorrhagic—Ebola, Marburg
 - Extensive rash-- Smallpox
- Epidemic—hundreds of cases; low CFR
 - Yellow fever, typhus, Legionellosis
- Scattered cases
 - HIV/AIDS, Lyme

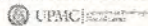
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How have emerging infections come to light?

- HIV/AIDS
- Lyme disease
- Monkeypox
- Ebola
- Hanta virus pulmonary syndrome
- SARS

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What is the answer?

- Industrialized countries
 - Physicians and nurses, especially in ER, with 24/7 contact to a public health authority prepared to respond with technical expertise and lab support
- Developing countries
 - A *network* of centers with epidemiological and laboratory competence
 - Proximate to cities
 - Good communications through a vastly strengthened WHO and to other Centers

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Little likelihood of ^{any} productive approach based on routine mining and analysis of large-scale data bases. He now quite extraordinary sums of money and thousands of staff now pushing this approach could far be far more productively employed.