

Advocacy, Promotion and e-Learning: Supercourse for Zoonosis

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Abstract

This paper discusses the history of emerging infectious diseases, risk communication and perception, and the Supercourse lectures as means to strengthen the concepts and definition of risk management and global governance of zoonosis. The paper begins by outlining some of the key themes and issues in infectious diseases, highlighting the way which historical analysis challenges ideas of the ‘newness’ of some of these developments. It then discusses the role of risk communication to public accountability. The bulk of the paper presents an overview of developments of the Internet-based learning system through the Supercourse lectures that may prove to be a strong arm for the promotion of the latest medical information particularly to developing countries.

Key words: e-learning, emerging infectious diseases, risk communication, risk perception, Supercourse

Introduction

We live in a dangerous world. Yet it is also a world far safer in many ways than it has ever been. Diseases that only recently were mass killers have been all but eradicated. Advances in public health, medicine, environmental regulation, food safety, and worker protection have dramatically reduced many of the major risks we faced just a few decades ago.

Governance refers to how societies structure responses to the challenges they face. Analyses of emerging and re-emerging infectious diseases (EIDs) have made it clear that national and international societies are confronting increased microbial threats (1–3). Whether the focus is bioterrorism, HIV/AIDS, severe acute respiratory syndrome (SARS), or avian influenza, germs increasingly pose dangers to human societies. *Germ governance* concerns how societies, both within and beyond national borders, structure their responses to pathogenic challenges (4). The global nature of the microbial threat requires that governance address the borderless challenges presented by infectious diseases.

The emergence of SARS is a major global public health threat that requires a coordinated global response in terms of

continued and improved surveillance and of research into a number of important public health issues. While much has been learnt about SARS since it was brought to international attention in March 2003, there remain many unanswered questions about where it came from, how it spreads, and the effectiveness of public health and other measures employed to control the disease.

The overall goal of the “Supercourse for Zoonosis” is to show the most recent development in the knowledge of SARS and other zoonotic diseases such as avian influenza and bovine spongiform encephalopathy (BSE), *inter alia*, which have significant global impact not only on health but also on the economy. The specific objectives of “Supercourse for Zoonosis” are to develop a set of educational materials for the control of zoonotic diseases, to disseminate them effectively via the Internet, to facilitate their use in the prevention and control of the diseases, and to promote human health while minimizing their economic impact. In the light of all these advances, it is most appropriate that all countries remain vigilant, not only with SARS, but also to all zoonotic diseases that may toll the productivity of human, animal, ecological, and economical sectors of our daily lives.

Emerging infectious diseases

Definitions

Emerging infections (EIs) can be defined as infections that have newly appeared in a population or have existed previously but are rapidly increasing in incidence or geographic range (5). *Re-emerging and resurging infections* are those that existed in

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the past but are now rapidly increasing either in incidence or in geographical or human host range (2). The term *deliberately emerging* refers to both naturally occurring microbial agents such as anthrax (3), and to bioengineered microorganisms such as those created by the insertion of genetic virulence factors that produce or exacerbate disease.

Global burden of infectious diseases

About 15 million (more than 25%) of 57 million annual deaths worldwide are estimated to be related directly to infectious diseases; this figure does not include the additional millions of deaths that occur as a consequence of past infections (for example, streptococcal rheumatic heart disease), or because of complications associated with chronic infections, such as liver failure and hepatocellular carcinoma in people infected with hepatitis B or C viruses (6).

The burden of morbidity (ill health) and mortality associated with infectious diseases falls most heavily on people in developing countries (7), and particularly on infants and children (about three million children die each year from malaria and diarrheal diseases alone (6)). In developed nations, infectious disease mortality disproportionately affects indigenous and disadvantaged minorities (8).

History

Bacteria and viruses existed long before humans evolved, and bacterial diseases probably co-evolved with each species. Many bacterial diseases that we see today have been around for as long as we have, others may have developed later.

Many examples can be cited in addition to the Black Death and the 1918 influenza pandemic, such as certain biblical pharaonic plagues and the unidentified Plague of Athens, which heralded the end of Greece’s Golden Age (9). Importation of smallpox into Mexico caused 10–15 million deaths in 1520–1521, effectively ending Aztec civilization (10, 11).

With the beginning of microbiology, pathogens became apparent. The establishment of the germ theory and the identification of specific microbes as the causative agents of a wide variety of infectious diseases (12–14) led to enormous progress, notably in the development of vaccines and ultimately of

antimicrobials (14). By the 1950s, which had witnessed the widespread use of penicillin, the development of polio vaccines and the discovery of drugs for tuberculosis, complacency had set in (15), and in 1967, the US Surgeon General stated that the war against infectious diseases has been won (16).

Some experts remained skeptical, aware of the current lessons from history. They were less persuaded by successes than alarmed by failures, such as the lack of progress against infections in the developing world and the global spread of antimicrobial resistance.

The emergence of AIDS led to renewed appreciation of the inevitability and consequences of the emergence of infectious diseases (17–23). In the past 25 years, some of the factors that resulted in AIDS have also led to the re-emergence of historically important diseases such as cholera, diphtheria, trench fever and plague. Many re-emergences have been catalyzed by wars, loss of cohesion, and natural disasters such as earthquakes and floods, indicating the importance not only of microbial and viral factors, but also of social and environmental determinants (17–23).

Classification of emerging infections

1. Newly emerging infections

These infections are those that have not previously been recognized in man. Many diverse factors contribute to their emergences (Table 1). Numerous microbial, host and environmental factors interact to create opportunities for infectious agents to evolve into new ecological niches, reach and adapt to new hosts, and spread more easily between them.

At the end of 2004, an estimated 39.4 million (range 35.9–44.3 million) people around the world were living with HIV, including the 4.9 million (range 4.3–6.4 million) people who acquired HIV in 2004. The epidemic claimed an estimated 3.1 million (range 2.8–3.5 million) lives in 2004. Sub-Saharan Africa remains the most affected region and is home to about 65% of the total number of people living with HIV worldwide (18). Before jumping to humans an estimated 60–70 years ago (24), perhaps through consumption of ‘bush meat’ from non-human primates, HIV-1 and HIV-2 had ample opportunity to

Table 1 Factors involved in the emergence of infectious diseases or microbes*

Factors	Examples
1. Microbial adaptation and change	Influenza; Drug-resistant microbes
2. Human susceptibility to infection	Tuberculosis
3. Climate and weather	Malaria; West Nile Virus
4. Changing ecosystems	Arenavirus Hemorrhagic Fever; Hantavirus Pulmonary Syndrome
5. Human demographics and behavior	HIV/AIDS; Nipah virus
6. Economic development and land use	Nipah virus
7. International travel and commerce	SARS; HIV/AIDS; West Nile Virus
8. Technology and industry	BSE; variant Creutzfeldt-Jakob Disease; Legionella
9. Breakdown of public health measures	Malaria; Dengue Hemorrhagic Fever
10. Poverty and social inequality	HIV/AIDS
11. War and famine	Malaria
12. Lack of political will	HIV/AIDS
13. Intent to harm	Anthrax; Smallpox

* Modified from: Committee on Emerging Microbial Threats to Health. *Emerg Infect.* 1992. (Reference No. 17), Committee on Emerging Microbial Threats to Health in the 21st Century. 2003. (Reference No. 18)

evolve in hosts that were genetically similar to man (the chimpanzee, *Pan troglodytes*, and the sooty mangabey, *Cercocebus atys*). But HIV/AIDS may never have emerged had it not been for disruptions in the economic and social infrastructure in post-colonial sub-Saharan Africa. Increased travel, the movement of rural populations to large cities, urban poverty and a weakening of family structure, all these promoted sexual practices such as promiscuity and prostitution that facilitate HIV transmission (24–27).

Infections in animals that are transmitted to humans (zoonoses), and those transmitted from one vertebrate to another by an arthropod vector (vector-borne diseases), have repeatedly been identified as ranking among the most important EIs (17, 18). Viruses in these groups have co-evolved with specific rodent species whose contact with humans has increased as a result of modern environmental and human behavioral factors. Farming, the keeping of domestic pets, hunting and camping, deforestation and other types of habitat destruction all create new opportunities for such infectious agents to invade human hosts (17–23). Examples include the arenavirus hemorrhagic fevers (Argentine, Bolivian, Venezuelan and Lassa hemorrhagic fevers) and hantavirus pulmonary syndrome (HPS).

Variant Creutzfeldt-Jakob disease (vCJD) is another example of a zoonotic disease emerging in humans. It is caused by the human-adapted form of the prion associated with the emerging epizootic (large-scale animal outbreak) of bovine spongiform encephalopathy (BSE), commonly known as mad cow disease. The new BSE prion has become uncharacteristically promiscuous: unlike most known prions, it readily infects multiple species in addition to humans. This suggests the possibility of further emerging diseases associated with prions with currently unknown transmissibility to humans (28).

Infectious agents indirectly transmitted to or between humans by way of human-modified environments account for other emerging zoonoses. Legionnaire's disease, first identified in 1976, is caused by *Legionella pneumophila*, whose emergence as a human pathogen might not have occurred were it not for the environmental niche provided by air-conditioning systems (18). *Campylobacter jejuni* and *Escherichia coli* infect agricultural animals, gaining access to humans through food, milk, water or direct animal contact. Other enteric pathogens, such as the vibrios which cause classic cholera and the zoonotic protozoa *Cryptosporidium parvum* and *Cyclospora cayatanensis* (18), seem to have come from environmental or animal organisms that have adapted to human-to-human 'fecal-oral' transmission through water.

Some EIs come from microorganisms that once caused familiar diseases, but which now cause new or previously uncommon diseases. *Streptococcus pyogenes* caused a fatal pandemic of scarlet and puerperal fevers between 1830 and 1900 (29). Scarlet fever, then the leading cause of death in children, is now rare, but has largely been supplemented by other streptococcal complications such as streptococcal toxic shock syndrome, necrotizing fasciitis and re-emergent rheumatic fever (31). *Streptococcus pyogenes* has been studied more extensively, but the basis of severe disease emergence seems to be more complex. Many factors associated with streptococcal virulence have been identified in strains bearing the M1 surface

protein as well as in other M protein strains, among them bacteriophage-encoded superantigen toxins and a protein known as sic (streptococcal inhibitor of complement), which seems to be strongly selected by human host mucosal factors. Several lines of evidence suggest that changes in streptococcal virulence reflect genetic changes associated with phage integration, large-scale chromosomal rearrangements and possibly the shuffling of virulence cassettes (clusters of genes responsible for pathogenicity), followed by rapid human spread and immune selection (31, 32).

Infectious agents that are associated with chronic diseases are one of the most challenging categories of newly emerging (or at least newly appreciated) infections. Examples include the associations of hepatitis B and C with chronic liver damage and hepatocellular carcinoma, of certain genotypes of human papillomaviruses with cancer of the uterine cervix, of Epstein-Barr virus with Burkitt's lymphoma (largely in Africa) and nasopharyngeal carcinoma (in China), of human herpesvirus 8 with Kaposi sarcoma, and *Helicobacter pylori* with gastric ulcers and gastric cancer (33–35). Some data even suggest infectious etiologies for cardiovascular disease and diabetes mellitus (36), major causes of death and disability worldwide. Other associations between infectious agents and idiopathic chronic diseases will inevitably be found.

2. Re-emerging or resurging infections

Re-emergence is caused by some of the factors that allow for newly emerging infectious diseases, factors such as microbial evolutionary vigor, zoonotic encounters and environmental encroachment. Re-emergences or at least cyclical resurgences of some diseases may also be climate-related—for example, the El Niño/Southern Oscillation (ENSO) phenomenon is associated with resurgences of cholera and malaria (37).

Travel has an important role in bringing people into contact with infectious agents (38). An increase in travel-associated importations of diseases was anticipated as early as 1933, when commercial air travel was still in its infancy (39). This has since been demonstrated dramatically by an international airline hub-to-hub pandemic spread of acute hemorrhagic conjunctivitis in 1981 (40), by epidemics of meningococcal meningitis associated with the Hajj, and more recently by the exportation of epidemic SARS (a newly emerging disease) from Guangdong Province, China, to Hong Kong, and from there to Beijing, Hanoi, Singapore, Toronto and elsewhere (41).

Plasmodium falciparum malaria was neglected for several decades, but is now among the most important re-emerging diseases worldwide. Years of effective use of dichlorodiphenyl-trichloroethane (DDT) had led to the abandonment of other mosquito-control programs, but the insecticide fell into disuse because of mosquito resistance and concerns about the insecticide's potentially harmful effects on humans and wildlife. Consequently, malaria has re-emerged, and the situation has been worsened by the development of drug resistance to chloroquine and mefloquine (42). Research efforts focus on the development of vaccines and new drugs, and on re-establishing public health measures such as the use of bed nets (43).

The remarkable re-emergence of tuberculosis was fuelled by the immune deficiencies of people with HIV infection,

which greatly increases the risk of latent *Mycobacterium tuberculosis* infections progressing to active disease, and being transmitted to others. Inadequate courses of anti-tuberculosis therapy compound the problem, leading to the emergence and spread of drug resistant and multidrug-resistant strains, and a need for more extensive treatment strategies such as directly observed therapy (44). It has been known for over a century that tuberculosis is a disease of poverty, associated with crowding and inadequate hygiene. The continuing expansion of global populations living in poverty makes tuberculosis more difficult to control.

Drug resistance, another factor causing microbial and viral re-emergence, may result from mutation or from bacterial acquisition of extraneous genes through transformation or infection with plasmids. Sequential emergences of *Staphylococcus aureus* that are resistant to sulpha drugs (1940s), penicillin (1950s), methicillin (1980s) and to vancomycin in 2002 (45)—a last line of antibiotic defense for some multiply drug-resistant bacteria—are troubling. Nosocomial *Enterococcus faecalis* became fully resistant to vancomycin by 1988, and then apparently transferred *vanA* resistance genes to co-infecting staphylococci (46). Methicillin-resistant staphylococci are now being isolated from livestock that have been fed with growth-promoting antibiotics (45), possibly contributing to resistance problems in humans.

Immune deficiency associated with HIV infection, and with chemotherapy for cancer, immune-mediated diseases and transplantation, has contributed to an enormous global increase in the numbers of immunosuppressed people over the past few decades (probably more than 1% of the world's population), setting the stage for the re-emergence of many opportunistic infections. HIV, which has infected more than 60 million people globally (47), is the largest single cause of human immune deficiency and markedly increases vulnerability to a wide range of opportunistic pathogens, including *Pneumocystis carinii*, various fungi, tuberculosis, protozoa and herpesvirus (48).

The simultaneous 1999 emergences of encephalitis due to West Nile virus (WNV) in the United States and Russia (49, 50) reflect abundances of eclectic vector mosquitoes and avian hosts in these locations. Both were probably connected to endemic sites by virus carriage in migratory birds and travelers. The remarkable geographical spread of WNV in the five years since its introduction into the Western Hemisphere reflects an unfortunate confluence of viral promiscuity and ecological diversity (51). Although humans are dead-end hosts for WNV, the risk of infection is greatly increased by marked zoonotic viral amplification and persistence in the environment.

Although WNV is now a major epidemiological concern in the developed world, dengue remains the most significant and widespread flavivirus disease to have emerged globally (52). Usually transmitted by *Aedes aegypti* mosquitoes, dengue has recently been transmitted by *Aedes albopictus*—a vector switch of potential significance with respect to dengue re-emergence (52). Dengue re-emergence is further complicated by disturbing increases in a serious and formerly rare form of the disease, dengue hemorrhagic fever (dengue shock syndrome being its highly fatal form). These severe complications are thought to result from the evolution of dengue viruses to escape

high population immunity, seen in increased viral virulence and human immunopathogenesis due to antibody-dependent enhancement of viral infection (53).

Cholera is also of interest, not only as an important cause of mortality, but also because of the complexity of factors that determine its re-emergence. Both virulent and avirulent strains of these zoonotic bacteria are maintained in the environment and are rapidly evolving in association with phyto- and zooplankton, algae and crustaceans. Such environmental strains seem to act as reservoirs for human virulence genes and to undergo gene transfer events that lead to new strains containing further virulence gene combinations (54). Thus, although cholera has appeared to be clinically and epidemiologically stable at least since the third pandemic (in the 1840s), modern evidence suggests that such apparent stability masks aggressive bacterial evolution in complex natural environments.

Influenza A viruses, which are endemic gastrointestinal viruses of wild waterfowl, have evolved elaborate mechanisms to jump species into domestic fowl, farm animals and humans. Periodic gene segment reassortments between human and animal viruses produce important antigenic changes, referred to as 'shifts'. These can lead to deadly pandemics, as occurred in 1888, 1918, 1957 and 1968 (55, 56). In intervening years, shifted viruses undergo continual but less dramatic antigenic changes called 'drifts,' which allow them partially to escape human immunity raised by previously circulating influenza viruses. Influenza drift is an evolutionary success story for the virus. Influenza A has a seemingly inexhaustible repertoire of mutational possibilities at several critical epitopes surrounding the viral hemagglutinin site that attaches to human cells.

3. Deliberately emerging infections

Deliberately emerging microbes are those that have been developed by humans, usually for nefarious use. They include microorganisms or toxins produced in a form that would cause maximal harm because of ease of dissemination, enhanced infectivity or heightened pathogenicity (57).

Two modern attacks have been well documented. In 1984, an Oregon religious cult spiked restaurant salad bars with *Salmonellae* in an attempt to sway a local election (58). A 2001 anthrax attack (59), in which a terrorist mailed anthrax-spore-filled letters to prominent figures, including two US senators, resulted in illness in at least 18 people and the death of five of these individuals. The United States, the United Kingdom, the Russian Federation and other nations once had sophisticated offensive bioweapons programs that included the production of weaponized anthrax spores (57). In Japan, the doomsday sect, Aum Supreme Truth, carried out a nerve-gas attack on the Tokyo subway in 1995, and made a trial run on an anthrax weapon, using harmless vaccine bacteria as a test (60). Bio-terror agents have been grouped into three categories (A, B and C) according to risk (61). The six category A agents (anthrax, smallpox, plague, tularaemia, viral hemorrhagic fevers and clostridial botulinum toxin) are given top priority because they are highly lethal and readily deployed as weapons. Category B and C agents include food-borne and water-borne organisms that incapacitate but usually do not kill.

Risk Perception and Communication

Definitions

Risk is the probability that exposure to a hazard will lead to a negative consequence (62). Risk communication is an interactive exchange of information and opinion on risk among risk assessors, risk managers, and other interested parties (63).

Risk perception

Humans tend to fear similar things, for similar reasons. Scientists studying human behavior have discovered psychological patterns in the subconscious ways we “decide” what to be afraid of and how afraid we should be. Any given risk has a set of identifiable characteristics that help predict what emotional responses that risk will trigger. People’s perceptions of the magnitude of risk are influenced by factors other than

numerical data (64). The factors influencing risk perception are summarized in Table 2.

Risk communication

Merely disseminating information without regard for communicating the complexities and uncertainties of risk does not necessarily ensure effective risk communication. Well-managed efforts will help ensure that messages are constructively formulated, transmitted, and received and that they result in meaningful actions. The seven cardinal rules of risk communication are demonstrated in Table 3.

The fundamental goal of risk communication is to provide meaningful, relevant and accurate information, in clear and understandable terms, targeted to a specific audience (63). The goals of risk communication are summarized in Table 4. It may not resolve all differences between interested parties, but may

Table 2 Factors influencing risk perception*

Factors	Examples	
	High Risk	Low Risk
1. Risks perceived to be voluntary are more accepted than risks perceived to be imposed.	Indoor air pollution in the workplace	Smoking in the workplace
2. Risks perceived to be under an individual’s control are more accepted than risks perceived to be controlled by others.	Flying in an airplane	Driving a car
3. Risks perceived to have clear benefits are more accepted than risks perceived to have little or no benefit.	Working in earthquake-prone areas	Hormone replacement therapy
4. Risks perceived to be fairly distributed are more accepted than risks to be unfairly distributed.	Gun shots (in Japan)	Traffic accidents
5. Risks perceived to be natural are more accepted than risks perceived to be manmade.	Radiation from mobile phones	Radiation from the sun
6. Risks perceived to be statistical are more accepted than risks perceived to be catastrophic.	Eaten by a shark (catastrophe)	Heart disease (statistics)
7. Risks perceived to be generated by a well-known source are more accepted than risks perceived to be generated by a less known source.	Private industry	Government
8. Risks perceived to be familiar are more accepted than risks perceived to be exotic.	SARS	Cancer
9. Risks perceived to affect adults are more accepted than risks perceived to affect children.	Asbestos exposure for children	Asbestos exposure in workplace
10. Risks perceived with less uncertainty are more accepted than risks with high uncertainty.	New technology	Conventional technology
11. Risks perceived that could directly affect others are more accepted than risks that could affect oneself.	Terrorism threat after the September 11 attack	Terrorism threat before the September 11 attack

* Modified from: Ropeik D and Gray G. 2002. (Reference No. 62), Fischhoff B, Lichtenstein S, Slovic P, Keeney D. 1981. (Reference No. 64)

Table 3 Seven cardinal rules of risk communication*

1. Accept and involve the public as a partner. The goal is to produce an informed public, not to defuse public concerns or replace actions.
2. Plan carefully and evaluate efforts. Different goals, audiences, and media require different actions.
3. Listen to the public’s specific concerns. People often care more about trust, credibility, competence, fairness, and empathy than about statistics and details.
4. Be honest, frank, and open. Trust and credibility are difficult to obtain; once lost, they are almost impossible to regain.
5. Work with other credible sources. Conflicts and disagreements among organizations make communication with the public much more difficult.
6. Meet the needs of the media. The media are usually more interested in politics than risk, simplicity than complexity, danger than safety.
7. Speak clearly and with compassion. Never let efforts prevent acknowledging the tragedy of an illness, injury, or death. People can understand risk information, but they may still not agree; some people will not be satisfied.

* From: Covello V and Allen F. 1988. (Reference No. 67)

lead to a better understanding of those differences. It may also lead to more widely understood and accepted risk management decisions. Effective risk communication should have goals that build and maintain trust and confidence. It should facilitate a higher degree of consensus and support by all interested parties for the risk management options being proposed.

Many considerations for effective risk communication, especially those involving the public, can be grouped in a sequence following the systematic approach of the risk communication process. This starts with gathering background and needed information, followed by the preparation and assembly of the message and its dissemination and distribution, with a follow-up review and evaluation of its impact (63). The general considerations for effective risk communication are demonstrated in Table 5.

Risk communication efforts and programs need to be evaluated both regularly and systematically to determine their

effectiveness and to provide for change when needed. Communication aims and objectives need to be clearly stated if an evaluation is to be effective. This could include the proportion of at-risk population to be reached, adoption of appropriate risk reduction practices, and the extent of resolution of the crisis. It is important to learn from both positive and negative risk communication experiences, in order to adjust and improve ongoing communication activities. Only through systematic evaluations, which are performed throughout the communication process, can that process be strengthened (63).

The Supercourse

Globalization of disease prevention lectures, through the Supercourse Prevention project, is funded by the US National Institutes of Health (NIH). The supercourse is an Internet library of lectures on prevention, shared for free by 10,000

Table 4 Goals of risk communication*

1. Promote awareness and understanding of these specific issues under consideration during the risk analysis process, by all participants;
2. Promote consistency and transparency in arriving at and implementing risk management decisions;
3. Provide a sound basis for understanding the risk management decisions proposed or implemented;
4. Improve the overall effectiveness and efficiency of the risk analysis process;
5. Contribute to the development and delivery of effective information and education programs, when they are selected as risk management options;
6. Foster public trust and confidence in the safety of the food supply;
7. Strengthen the working relationships and mutual respect among all participants;
8. Promote the appropriate involvement of all interested parties in the risk communication process; and,
9. Exchange information on the knowledge, attitudes, values, practices and perceptions of interested parties concerning risks associated with food and related topics.

* From: World Health Organization. 1998. (Reference No. 63)

Table 5 General considerations for effective risk communication*

Background/information

1. Understand the scientific basis of the risks and attendant uncertainties.
2. Understand the public perception of the risk through such means as risk surveys, interviews and focus groups.
3. Find out what risk information people want.
4. Be sensitive to related issues that may be more important to people than the risk itself. Expect different people to see the risk differently.

Preparation/assembly

1. Avoid comparisons between familiar risks and new risks, as they may seem flippant and insincere unless presented properly.
2. Recognize and respond to the emotional aspects of risk perceptions. Speak with sympathy and never use logic alone to convince an audience characterized by emotion.
3. Express risk in several different ways, making sure not to evade the risk question.
4. Explain the uncertainty factors which are used in risk assessment and standard setting.
5. Maintain an openness, flexibility, and recognition of public responsibilities in all communication activities.
6. Build an awareness of benefits associated with a risk.

Dissemination/distribution

1. Accept and involve the public as a legitimate partner by describing risk/benefit information and control measures in an understandable way.
2. Share the public's concern rather than deny it as not legitimate or as unimportant. Be prepared to give people's concerns as much emphasis as the risk statistics.
3. Be honest, frank, and open in discussing all issues.
4. If explaining statistics derived from risk assessment, explain the risk assessment process before presenting the numbers.
5. Coordinate and collaborate with other credible sources.
6. Meet the needs of the media.

Review/evaluation

1. Evaluate the effectiveness of risk messages and communication channels.
2. Emphasize action to monitor, manage, and reduce risk.
3. Plan carefully and evaluate efforts.

* From: World Health Organization. 1998. (Reference No. 63)

Table 6 Features of the Supercourse

1. It is based on the open source model, which allows free redistribution, shows the source code, and allows modifications and derived works.
2. It provides for free the full content of the Supercourse lectures.
3. This is especially useful for developing countries and minority populations with limited access to resources.
4. It aims to overcome the digital divide by improving access in places with low bandwidth Internet connection.
5. It is a teaching support system – differing from a traditional distance education system, in that it aims to teach the teachers.
6. It provides timely information for action – one of the greatest advantages of having a regional faculty base with varied areas of expertise.
7. It can provide “just in time lectures,” which are very important in the field of public health (e.g., lectures on SARS from the members in China and Singapore, where it is most rampant).
8. It is a “hyper-text comic book format”.
9. Hypertext links from text, images, tables, and pictures take the reader to other relevant Supercourse lectures, images, or other websites on the Internet.

members from 151 countries in the Global Health Network. Through the Internet-based Supercourse lectures, information can reach a large segment of the population to enrich the curricula in medical schools, especially among developing countries, with the addition of a free power point lecture library of over 2,000 lectures from across the world (65). The features of the Supercourse lectures are summarized in Table 6.

Japan has associated with the Global Health Network through Supercourse Japan (66) where a series of lectures in Health, Environment and Sustainable Development, Epidemiology for Decision-Making, and Zoonosis have so far been developed.

The Supercourse on Health, Environment and Sustainable Development was designed to provide an overview on health and environment in the context of sustainable development for public health students around the world, as well as decision makers, community leaders, scientists and professionals in government and non-governmental organizations, who are interested in health and environmental linkages in sustainable development (66).

The Supercourse on Epidemiology for Decision-Making provides a learning resource for students of environmental and occupational epidemiology, and its main purpose is to promote the understanding and application of epidemiology in the prevention of environmental and occupational disease and the promotion of health (66).

The Supercourse on Zoonosis aims to disseminate rapidly the latest information on animal diseases transmittable to humans. Severe Acute Respiratory Syndrome (SARS) and bovine spongiform encephalopathy (BSE) are some of the lectures discussed which will help in information sharing to developing countries (66).

The Okinawa Initiative

A joint action plan through the ‘The Pacific Islands Forum’ was created in 2003. Its five priority policy targets are: 1) enhancement of security in the Pacific region, 2) creation of a safer and more sustainable environment, 3) improvement in education and human resources development, 4) improvement in health, and 5) promotion of more vigorous and continued trade and economic growth.

The countries in the Pacific region face a contradictory dilemma: some of the poorest countries have the most expensive telecommunications, yet information and telecommunication technology (ICT) need to be extensively utilized. In these

circumstances telemedicine, such as for remote clinical and pathological diagnosis, is too expensive and technically demanding to be widely used.

Since information in the future will be technology- and network-based, it is imperative for “Supercourse Asia” to fully exploit the potential of ICT for health education and health service development in the region. The advantages of this approach are to use the most appropriate, inexpensive, open-source, and low-band ICT, and to operate it through active national networking.

The Supercourse Asia Network (SCAN) is an offshoot of this initiative and aims that all children and adults will have equal access to health and education of sufficient quality to empower them to break the poverty cycle, to improve their quality of life (QOL), and to participate effectively in national development. The mission is to alleviate poverty and improve health and QOL of developing countries in the Pacific region through advances in a cost-effective ICT-based health educational system. The Internet is the most inexpensive and speed efficient means to penetrate the remote places such as the Pacific islands. Japan, a leader of modern technology in the region, is in the best position to provide these technological and educational tools to contribute to the well-being of people in the region.

The SCAN is a group of primarily academics, united by a common belief: the Internet is the best way to disseminate knowledge, especially knowledge about health promotion and prevention. They are working towards facilitating the dissemination of health-related information over the Internet and improving teaching in the field of education, social/preventive medicine, public health and epidemiology.

The members are voluntary professionals in academia, healthcare, telecommunications, the government, NGOs, and other public and private sector organizations who will work together towards developing “Supercourse Asia.” They are not only active members of the SCAN but also the main contributors of “Supercourse Asia” lectures, reviewers, translators, and its major user group.

The challenges for the SCAN are 1) how to effectively utilize the national networks among the participating countries and within each participating country that may be geographically remote, 2) how to evaluate the effects of the SCAN on the advancement of health and QOL, and the alleviation of poverty through “Supercourse Asia” in the region, and 3) how to sustain the network activities for many years to come.

Conclusion

Currently, the public has become concerned with information and safety, however, gaps between the understanding of safety and assurance are widening. Health advocacy and

promotion through e-learning are becoming more important in the framework of risk communication for the community. The Supercourse lectures will serve as an international platform for sharing information, lectures, and ideas.

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