Kobe's Lesson: Dial 711 for "Open" Emergency Communications

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In January 1995, an earthquake shattered the predawn quiet in the Japanese port city of Kobe, killing more than 6000 people; 310,000 people were left homeless. The dazed survivors, together with their families and public safety agencies, immediately faced an information problem. What was going on? How could help be organized?

With a year's distance we are able to draw some lessons from the Kobe calamity. The basic conclusion is that the usual approach of disaster communications, which traditionally depends on military-style public safety agencies that operate in a top-down manner and share information with "civilians" largely on a "need to know" basis, should be replaced. In its stead should be an open-access emergency system—open to inputs from a wide variety of public and private participants, and open to access by them.

The earthquakes of Kobe, Mexico City (1985), San Francisco (1989), and Los Angeles (1994) lead to several conclusions about communications:

1) Telephone networks are not so much destroyed as congested into uselessness. In Kobe, traffic volume during the first and second days was 50 and 20 times, respectively, the usual peak for incoming calls (but less than three times the norm for outgoing calls; it seems that the survivors were not calling as much as their loved ones were). Landlines, exchanges, wireless systems, and emergency services were blocked; pay phones were clogged with coins. Experience shows that even after a crisis, the volume of calls remains heavy for a long time. Therefore, an extensive call-prioritization system needs to be instituted.

2) Television provides an overdramatized perspective rather than details that people on the scene really need. It also requires electric power. On the other hand, radio proved extraordinarily useful in emergencies. (The humble battery becomes critical; it seems impossible to have too many.) In California, too, the much-maligned talk radio shows provided a tension-reducing two-way link to counter false rumors. In Mexico City, where the progovernment Televisa channels seemed most concerned with calming the populace rather than informing it, people turned to radio.

3) The major lesson from Kobe is that computer networks and bulletin boards are more effective than voice phone networks and broadcasting once the immediate calamity is over. In Kobe the "Nifty" computer network quickly became a major information meeting point, accessed by friends and families outside of the city and then by survivors through an access point in an adjacent prefecture. One of the most interesting things to happen was the migration into Kobe of "information volunteers" with their portable computers. They visited shelters, collected messages about survivors (some taken from handwritten notes attached to ruins), provided personal accounts and testimonials, and sent out the specifics about what survivors wanted most. They obtained data about food, water, and supplies and put this information on a regional map. Later, they offered information in standardized formats about shelters, jobs, schooling, and housing. It is often feared that "unofficial" information is inaccurate. However, as the bulletin board information grew in volume, it tended to be self-verifying, responsible, interesting, and unvarnished, and it offered a better aggregate picture than did official information.

4) Government authorities are almost as much in the dark in a catastrophe as individuals are. President Clinton's early information sources on the Los Angeles quake were his brother and the TV news. In Japan, at its noontime meeting the cabinet still believed the number of dead to be only about 200. Most information traveled up the hierarchical chains of command of rival ministries whose local sources in Kobe were crippled, and this information was only slowly coordinated to assemble a full official picture.

The usual response to inadequate official information is the call for a technological fix, such as the design of a better emergency communications system. Kobe illustrates the ultimate futility of this approach. Its prefecture had installed, at considerable expense ($80 million), a satellite communication system to connect its offices and public safety agencies to local and national government. But in the crunch, the costly system quickly failed; first the backup batteries ran out, and then the emergency generators overheated when water cooling failed. On the morning of the calamity, only two calls were logged in on the entire system.

None of this should be surprising. Emergency systems can never be built to be foolproof and disaster-proof. There are always two ways to protect vital information. One is to design and build elaborate and hardened technical systems. This is expensive and will always miss unforeseen mishaps. The other approach is to decentralize the information system so that even if many of its parts are damaged, the whole will continue to function. This has long been a recognized approach for network architecture and routing protocols. However, it would be difficult to reform the institutional way in which disaster information is assembled and shared.

Instead of high-tech constructions, another approach is needed—a decentralized and open-access emergency system of interconnected computer servers. Such a system would enable individuals and emergency workers to deposit and collect information about the state of their neighborhood, family, business, and whereabouts. It would be used by public safety agencies and insurance companies as a planning tool and as a way to send messages and instructions to targeted individuals or areas. (Of course, most people today do not have access to computers, especially in an emergency. But once the immediate calamity is over, they could visit or call the emergency network and talk to its volunteers.)

Such an emergency information system could be reached by calling 711—an available access code for emergency dial tone—and accessing the interlinked emergency computer bulletin boards, such as an automatic cutoff for nonpriority callers. Individuals, rescuers, nonprofit organizations, and information volunteers would log in information, possibly into a schematic block-by-block display of a city, which would also be available to distant parties. The system would give distant officials and news organizations detailed information, provide decision-makers with communication capability, link worldwide donors with actual needs, provide "how-to" information, and connect to specialized databases and other Web sites. Communications of a confidential nature would require special levels of access authorization.

Who could set up such systems? Commercial, governmental, and nonprofit software developers would provide the platform; telecommunications carriers would offer access points and lines, some of them mobile satellite links; and municipalities, community groups, and volunteer rescue or-

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ganizations would provide the basic municipal grid information, the core of the effort. Information volunteers and public safety agencies would update the system once a disaster strikes.

Unlike the 911 system, the 711 system would not be a one-way, top-down communications system, but rather a genuine interactive and horizontal communications medium connecting affected citizens, their loved ones, and rescue efforts. The technology is available and affordable; the user base is strong and growing; and the time is here and now.

Evidence-Based Health Policy—Lessons from the Global Burden of Disease Study

Christopher J. L. Murray and Alan D. Lopez

It is both extraordinary and unfortunate that at the end of the 20th century, the international public health community does not routinely quantify or project the health problems of populations. There are no standardized compilations of comparable information on the extent of morbidity, disability, or death in different populations of the world. Information at a global or regional level on behaviors and exposures that are important risk factors for death and disability is also extremely limited. Although the demographic community routinely publishes projections of fertility and population, future trends have been projected for only a very limited number of causes of death [such as the human immunodeficiency virus (HIV)] in selected populations.

All too often, health statistics are provided to decision-makers, the scientific community, and the public by advocates. These advocates, although well intentioned, have specific agendas, and the information they provide is often filtered or biased. Health problems without vocal advocates are frequently ignored until someone or some group "discovers" or "rediscovers" a problem or when policy neglect leads to crises in which the public demands action. The rediscovery of the global tuberculosis problem is a classic example (*1*). Poor information on a health problem is often interpreted in policy debates to mean that a problem is unimportant, which generates a self-perpetuating phenomenon. In this environment, it is hardly surprising that a number of health programs at international organizations employ their own media consultants or full-time "advocacy officers." Public health policy formulation desperately needs independent, objective information on the magnitude of health problems and their likely trends, based on standard units of measurement and comparable methods. (In this case, we are defining health problems broadly to include diseases, injuries, and exposures to important risk factors.)

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The Global Burden of Disease Study

A major effort to foster an independent, evidence-based approach to public health policy formulation is the Global Burden of Disease Study (GBD). This study was initiated in 1992 at the request of the World Bank; over the past 4.5 years, the work has been undertaken with the full collaboration and participation of the World Health Organization (WHO) (*2*). Final results are now available. The study had four specific objectives: (i) to develop internally consistent estimates of mortality from 107 major causes of death, disaggregated by age and sex, for the world and eight geographic regions; (ii) to develop internally consistent estimates of the incidence, prevalence, duration, and case-fatality for 483 disabling sequelae resulting from the above causes, disaggregated by age, sex, and region; (iii) to estimate the fraction of mortality and disability attributable to 10 major risk factors, disaggregated by age, sex, and region; and (iv) to develop projection scenarios of mortality and disability, disaggregated by cause, age, sex, and region. The study is based on the collaboration of over 100 scientists from more than 20 countries (*3*).

Just under 50.5 million individuals died in 1990 worldwide, and the results of medical certification of the cause of death were obtained for 13.8 million of these individuals (*4*). Even in cases where medically certified causes of death are available, a series of analyses has been undertaken to adjust for miscoding of cardiovascular, injury, and other deaths. In some cases, these corrections for miscoding substantially alter the estimated death rates (for example, after correcting for coding of cardiovascular deaths in Japan that had been assigned to various ill-defined categories, the death rate from ischemic heart disease increased by a factor of 2.8). To ascertain the causes of death for the remaining 70 percent of deaths in the world, a variety of methods and sources has been used, including sample registration systems in China and rural India; small population laboratory studies in sub-Saharan Africa and Asia; estimates based on epidemiologic studies of the incidence, prevalence, and case-fatality rates of particular diseases; and, as a last resort, models relating cause-specific mortality for an age-sex group to mortality from all causes in that age group.

For each disease and its sequelae, epidemiological estimates based on a metasynthesis of published and unpublished studies have been developed. For example, estimates of incidence, prevalence, and duration for five sequelae of diabetes were developed: diabetes itself, retinopathy, neuropathy, amputation, and diabetic foot. Internally consistent estimates of incidence, prevalence, case-fatality, remission, and mortality rates and of duration were developed with the aid of computer models (*5*).

To foster comparisons across conditions and risk factors, a composite measure of the burden of each health problem has been developed: the Disability-Adjusted Life Year (DALY) (*6*). DALYs from a condition are the sum of years of life lost because of premature mortality and years of life lived with disability, adjusted for the severity of disability. Time lived with various short-, medium-, and long-term disabilities is weighted by a severity weight that is based on the measurement of social preferences for time lived in various health states (*7*).

Selected Findings of the GBD

Diseases and injuries in the GBD were divided into three clusters: Group I, consisting of communicable diseases, maternal causes, conditions arising in the perinatal period, and nutritional deficiencies; Group II, encompassing the noncommunicable diseases; and Group III, comprising all injuries, whether intentional or unintentional (Table 1). Group I causes of death consist of the cluster of conditions whose prevalence declines at a faster rate than mean mortality rates [most developed and a number of developing countries have undergone demographic and "epidemiological transitions" to