

How SARS changed the world in less than six months

The global outbreak of severe acute respiratory syndrome (SARS) can be traced to one man and one night he spent in a Hong Kong hotel on 21 February 2003.

Scientists are still baffled as to how Dr Liu Jianlun, a 64-year-old medical doctor from China's Guangdong province, where the mysterious virus originated, could have transferred SARS to at least 16 other guests on the same floor during his brief stay. But there is no doubt those travellers fanned out across the world, triggering outbreaks in Singapore, Toronto in Canada, and Hanoi in Viet Nam as well as in Hong Kong itself.

In less than four months, some 4000 cases and 550 deaths of SARS outside China and Taiwan can be traced to Dr Jianlun's visit to Hong

Kong; the Metropole Hotel is considering turning the ninth floor (he stayed in room 911) into a SARS museum; and SARS has proved that the worst-case scenario long mooted by infectious disease experts can come true; but also that such an outbreak, for all its speed and force, can be contained.

SARS has travelled more widely, swiftly and lethally than any other recent new disease so far. Near the end of June 2003, the total of cases was 8456 in 30 countries and areas, 809 of which had resulted in death.

HIV/AIDS took two decades to cover the globe, owing partly to its incubation period of up to 10 years. Ebola, which has caused periodic outbreaks in Africa since 1976, and two new Asian diseases, caused by the Nipah and Hendra viruses, have not travelled extensively. In the case of Ebola, this is because the patient

quickly becomes much too ill to travel; and for Nipah and Hendra it is because neither virus established efficient human-to-human transmission.

"SARS is the first new disease to show the damage possible in a globalized world," said Mary Kay Kindhauser, who writes SARS updates for the WHO website, adding that SARS has made people take the infectious diseases threat more seriously and made them realize that in today's closely interconnected and highly mobile world, every country is vulnerable.

Rapid international travel helped SARS to spread, but rapid communications helped to contain it. WHO issued its first of two global alerts on 12 March, after 55 cases of the new disease had been identified. Heightened awareness facilitated the early detection and isolation of suspected cases, and a virtual lab



Keystone

Mourners wearing surgical masks for protection against SARS look on as the coffin of Tang Heung-May is carried to her grave in Hong Kong on 29 May 2003. Tang, a frontline health worker, was killed by SARS after being infected by a patient at the hospital where she worked.

network identified the SARS coronavirus within a month.

WHO's second alert, on 15 March, called the disease Severe Acute Respiratory Syndrome for the first time, and issued an emergency advisory notice for travellers and airlines. The warning made headlines across the world as authorities scrambled to contain the disease or prevent outbreaks from imported cases. Some were better prepared than others. After anthrax was distributed through the US postal service by suspected bioterrorists following the September 2001 attacks, the United States was ready to react and has had few cases and no deaths.

China's failure to admit the true extent of the SARS outbreak drew severe criticism from governments and from WHO's Director-General Gro Harlem Brundtland. China has been hardest hit to date (24 June), with 5327 cases and 348 deaths reported from throughout the mainland. Beijing and Guangdong were the most severely affected, with 4033 of these cases and 250 of the deaths.

But it took two months — after explosive SARS outbreaks in Hong Kong, Singapore, Hanoi and Toronto, and the spread of exported cases to every continent — for China, under mounting international pressure, to allow WHO epidemiologists to enter Guangdong province on 3 April to assess the situation there and determine that the outbreak of atypical pneumonia was indeed SARS.

On 18 April, China warned officials not to "withhold any information or delay its release". Two days later, Beijing's health minister and mayor were sacked, and the authorities eventually admitted that there were hundreds more cases in Beijing than previously reported.

Symbolized by the image of masked faces, SARS struck fear into the public across the globe, triggering drastic measures: mass quarantine in hospital wards enforced by armed guards, infectious passengers hauled off planes, and closed businesses and schools. As the epidemic grew, China threatened to execute any SARS patient who violated quarantine.

SARS has been devastating for Asia's economies and has helped to further depress the international

tourism and airline business. Taiwan blamed the outbreak for its recession, Hong Kong said it would spend US\$ 1.5 billion to ease the impact of the outbreak on business, and the Asian Development Bank is seeking approval for US\$ 30 million in loans to SARS-affected countries in the region.

In China, SARS, at least for a while, presented a powerful political challenge, and forced the country's leaders to think about accountability and openness.

WHO has been criticized by some for "exaggerating" the threat of SARS and causing economic damage, particularly in Toronto. But on the whole, the Organization, so often lambasted as bureaucratic and distant from reality, has been praised for its early warning of the dangers and the way it coordinated global efforts to contain SARS.

WHO teams assisting in affected areas have risked their lives. Dr Carlo Urbani, the WHO infectious diseases expert in Viet Nam who first drew attention to the new disease, also became one of its first victims. WHO teams were at every outbreak site in Asia, and highly active in epidemiological investigation, infection control and research coordination.

Scientists know a little about SARS, but there are still many unanswered questions. We know that SARS belongs to the coronavirus family which causes the common cold, that its maximum incubation period is probably 10 days, that it originated in Guangdong in southern China and that one person can infect a great number of people in a short space of time. But scientists are still not certain of the precise origin of the disease, which is the key to predicting its further evolution.

Preliminary studies suggest it jumped species from the civet, a member of the cat family, or the raccoon dog, both of which are delicacies in the cuisine of southern China, as several people working closely with these animals in restaurants and markets were among the first infected. However, the possibility of seasonal recurrence is not ruled out, and the prospects of a vaccine and a cure are still remote.

It is also unclear whether patients without symptoms can infect others, and scientists are still working on a point-of-care diagnostic test for the early laboratory confirmation of cases. Without such a test, the next influenza season could be a nightmare, with every cluster of febrile hospital patients with respiratory symptoms requiring extensive investigation and causing panic. ■

Fiona Fleck, *Geneva*

The Costa Rican health system: low cost, high value

In 2001 the World Health Organization ranked the small Central American nation of Costa Rica 36th out of 191 countries for health system performance. Experts hail this as the result of health care reforms which changed the structure of the Costa Rican system and dramatically improved primary health care (PHC). Costa Rica, which has a population of 3.8 million, famously abolished its army in 1947, which means that it can, at least in theory, spend on the social sector what other countries spend on arms and armed forces.

The process of reform began nearly 40 years ago when it was decided that the health ministry should assume the role of steward rather than provider — formulating policy coordinating the services, and informing the public. The Costa Rican Social Security Institute (CCSS) was put in charge of financing and providing services to the population.

The CCSS made a push towards universal health care coverage, replacing the previous system which only encompassed the working population. In 1970 47% of the total population was insured, today that figure is 89%. In 1996 the need to improve service and lower costs by strengthening the PHC system was recognized. Health spending had risen to almost 10% of gross domestic product (GDP) but without a corresponding rise in the volume and quality of services. The aim was to bring essential services closer to the population and to increase the capacity of district-level clinics. This was where the real process of reform began.

"The reforms were designed to allow the CCSS to maintain or decrease expenditure while increasing production and patient satisfaction," says Miguel Carmona, President of Costa Rica's Red Cross. "In this they have been successful."

Changes were intended to increase quality and decrease waiting lists, to decentralize the service and raise accountability at the local level.

"The problem before was that the population was not cared for in a holistic sense," says James Cercone, President of SANIGEST, a consulting and management company in Costa Rica's capital San José. "The CCSS treated and paid for patients, but there was very little interest in primary health care such as prevention, diet and education."

One of the most successful elements of reform was the introduction of EBAIS (Basic Health Attention Teams) responsible for a community's physical and social needs. The Costa Rican system was divided into 29 hospital providers and 90 health zones. Each zone was further divided into 10 EBAIS. A minimum EBAIS consisted of a doctor, a nurse and a technician for a population of around 4000.

Management contracts were introduced between the CCSS and health facilities. Purchaser and provider became separated, replacing the old system that had operated under a budget and planning model. The approval of a Law on Decentralization in 1998 consolidated efforts to devolve authority and responsibility to public providers.

This encouraged providers to implement a care model and follow CCSS standards. Through the management contract the CCSS purchasing department established indicators for over 124 provider organizations which included targets for coverage, quality, efficiency and user satisfaction.

A national health plan was approved and investments were restructured, allocating resources where they were most needed. Through parallel efforts to improve efficiency in social security collections, the quantity of these resources also grew, reflecting improved efficiency in the collection of social security contributions from the public.

The autonomy of health providers increased, with greater control

over their finances and the power to implement organizational changes. Incentives for achieving goals were raised because 10% of a hospital's budget was withheld and rewarded later for good performance.

Over the last decade investment from development finance institutions including the World Bank and the Inter American Development Bank has been US\$ 123 million. The Costa Rican Government has contributed roughly US\$ 200 million to finance the recurrent costs and strengthen PHC services.

Cercone says that total benefits are conservatively more than US\$ 409 million and the investment rate of return is nearly 70%.

"This means that for every dollar invested US\$ 1.5 has been returned to the population in terms of improved health status, greater productivity and better quality," he says. In the Central American region, the Costa Rican system is uniquely successful.

According to Cercone this has a lot to do with political stability and a clear national consensus on what the health reforms should do. In addition, where other Central American countries spend less than 3% of GDP on public health, Costa Rica spent 6.4% this year.

However, Dr Zeidy Arce who works as a general practitioner in San José says that there is still not enough money in the health system.

"The Government needs to invest more for the reforms to realize their potential," she says. "There are changes still waiting to be made and waiting lists are long."

Despite a general air of enthusiasm for reform most people agree that there are still problems and that progress is slow in some areas. Mary Clark, a researcher at Tulane University in Louisiana, criticized in particular the way in which the reforms do not in fact succeed in concentrating resources where they are most needed.

"There are budget issues because hospitals are not being held sufficiently accountable yet," she says "Particularly in regional hospitals the directors still do not have enough control over either budgets or staffing."

Dr Marcela Vives who is in charge of Strategic Development at Costa Rica's Health Ministry agrees

that reform has come more gradually than some would like.

"This is an ongoing process of improvement and modernization," she says. "We have a long way to go but already we have a system that most developed countries would be proud of. Certainly, we could teach the United States a thing or two about health care." ■

Isabel de Bertodano, *San José*