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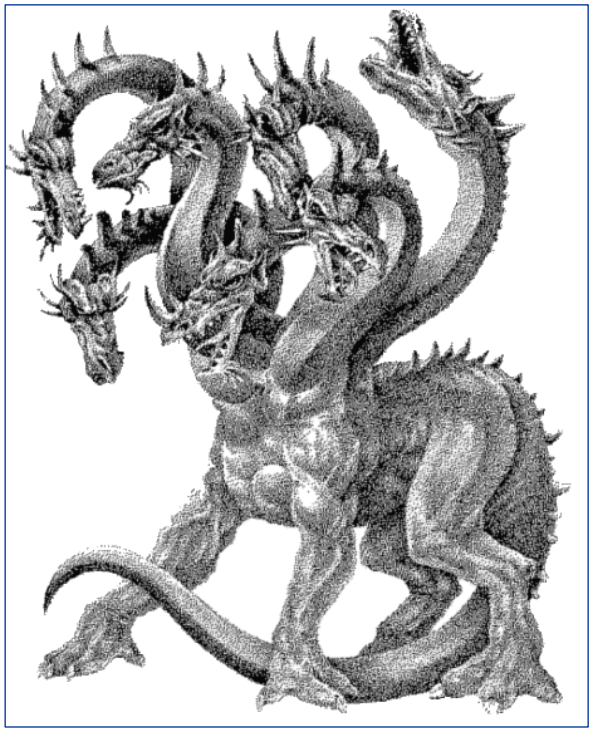
Bird Flu: A modern day Hydra

Bird flu is on the march again with outbreaks in wild birds confirmed in Italy, Greece, Bulgaria and in poultry in Nigeria. Human deaths in Iraq, Indonesia and now perhaps Nigeria help to fuel media interest. The outbreak in Nigeria has attracted the least interest but may well be the biggest concern and more of that later.

As H5N1 trundles around the Mediterranean and up into Europe new research from China suggests it may be a modern day Hydra, one of the more fearsome monsters in Greek mythology. Even without Peter Jackson and Weta Workshops the Greeks put together some rather impressive monsters. The Hydra had the body of a serpent and many heads (most versions of the story favour nine, our artist seven), one of which could never be harmed by any weapon, and if any of the other heads were severed another would grow in its place. As secondary armament, the stench from the Hydra's breath alone was enough to kill man or beast. It emerged regularly from its swampy home to attack cattle and local villagers, devouring them with its numerous heads.

As always in Greek mythology, Hydra eventually got its comeuppance. Heracles (not to be confused with Hercules of local TV fame) drew the 'short straw' and set out to rub Hydra out. Heracles courageously attacked the beast, flaying at each head with his sword, but soon realized that as one head was severed another grew in its place. Calling on his sidekick Iolaus for help, Heracles cut off the heads from the Hydra, one by one and Iolaus cauterized the open wounds with a torch to prevent them from growing again. Without PPE, Heracles was almost stifled by the writhing monster's obnoxious breath, but eventually, with the help of Iolaus he removed all but one of the Hydra's heads - the one that could not be harmed by any weapon. Picking up his hefty club Heracles crushed it with one mighty blow, then tore off the head with his bare hands, buried it deep in the ground and plonked a huge boulder on the top.



New research published by New Scientist indicates that the H5N1 flu virus has been circulating continuously in poultry in south-eastern China for a decade. A massive genetic analysis shows the virus has mainly been spread by poultry, but also that wild birds had carried it from southeast China to Turkey. Yi Guan and colleagues at Shantou University, and scientists in Xiamen and Hong Kong, say the only way to stop the virus is to control it in southeast China. They may be too late in that assessment.

The researchers analysed samples taken from 13,000 migratory birds and 50,000 market poultry in southeast China between January 2004 and June 2005, when the Chinese government

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banned independent sampling. In all but 2 months of the sampling they found H5N1 in about 2 percent of apparently healthy ducks, geese, and chickens in the markets.

The genetic make-up of the virus differed slightly between Guangdong, Hunan and Yunnan provinces, forming distinct geographic clusters (or heads). But they all descend from a 1996 Guangdong virus, and show the greatest genetic variation in Guangdong and neighbouring Guangxi and Hunan, showing they have been there longest.

Robert Webster of St. Jude's Children's Research Hospital in Memphis, Tennessee, US, a co-author of the paper, says this shows the virus originated in those provinces, and has been circulating in the region ever since, long enough to evolve divergent strains.

These strains then "colonised" neighbouring areas. Viruses from Vietnam and Thailand match Guangdong viruses, while Indonesia has its own related cluster. Genes from Vietnamese viruses reveal repeated introductions from Guangxi, most recently in 2005. This contrasts with past insistence by Chinese officials that H5N1 exists only in isolated cases in China, and did not necessarily originate there.

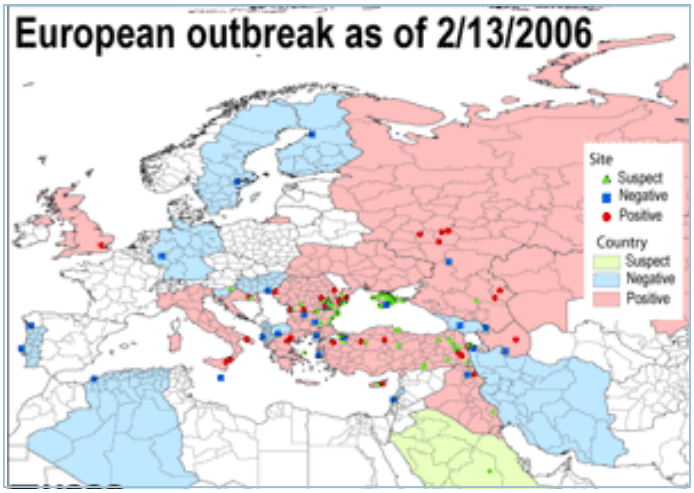
The existence of distinct clusters also means the main carriers cannot be wide-ranging birds - instead, most transmission is via local poultry movements. Co-author Malik Peiris, of the University of Hong Kong, told New Scientist: "If there had been repeated waves of virus introduced into, for example, Yunnan, one would expect multiple sub-lineages of the virus. But in each place there is only one."

But wild birds are involved. In January and March 2005, before the northward migration, the team found H5N1 in 6 apparently healthy migratory ducks at Poyang Lake in Jiangxi province, which borders Guangdong and Hunan. The isolates had all the genes, and certain specific mutations, later found in geese at Qinghai Lake, 1700 kilometres northwest. And this virus, notes Peiris, is very like H5N1 in Turkey.

The team also tested whether the Poyang viruses would make ducks too sick to fly by infecting young mallards. "Most got a bit sick then recovered," says Webster, and all shed virus for up to a week. "The evidence is now overwhelming that migrating birds can move H5N1 over long distances," says Peiris. "But they are not the scapegoats for maintaining H5N1 within poultry. There the cause and solution lies within the poultry industry."

Another important finding of the research is that antibodies to each sub-lineage of H5N1 did not bind readily to other sub-lineages. That means vaccinating people or birds against one strain may not protect against others. The team warns that H5N1 pandemic vaccines should be developed using several strains, and constantly updated. We seem to have a multi-headed monster on our hands.

But to head off the threat of a human pandemic, the authors insist "the source of the virus in southern China must be contained." Webster adds: "Let's be optimistic that [the Chinese authorities] will accept that this thing is out there. It is terribly important to realise that perfectly healthy looking birds have this damn virus."



And that sound advice may be just a bit too late. Now that the virus has found its way into West Africa, we may have a whole new ball game. This is a region with six of the poorest countries in the world; a region wracked by internal conflicts and scanty government control. Expecting the governments of those countries to organise and follow through with an effective domestic bird cull would be an attempt at modern mythology.

Initial reports say the Nigerian government is making the right noises but there is little evidence of government intervention on the ground – they may have the will – the means may be another story.

Reports tell of similar stories in other countries in the region where millions live in close contact with chickens and other domestic birds and where health and education systems are weak and poorly equipped. Local and international experts say Africa runs a serious risk of human infection from the disease – latest reports from Nigeria suggest human infection has arrived. To stop it spreading, they have recommended emergency prevention measures, such as quarantine, mass culling of infected birds and bans on poultry trading. But for many Africans who face a scramble for food and confront disease, poverty and violence every day of their lives, veterinary health is not a pressing concern.

In the Democratic Republic of the Congo Hortense Muadi has heard about bird flu on the radio and knows it can kill. But the Congolese mother of two didn't know it had arrived in Africa and, like many others on the world's poorest and most disease-stricken continent, she has more to worry about than watching out for sick chickens. "We already have other priorities," Muadi said, as she prepared manioc for an evening meal and a handful of chickens pecked dirt near her children outside her simple Kinshasa home. "If it comes to Congo, people may tell us to kill chickens but people will not listen, if they even hear the message," she said. "If the chicken looks good, it is fine. We will eat it and worry about the rest later."

Congo is struggling to recover from a five-year war that killed four million people and officially ended in 2003. Experts say continuing violence, especially in the lawless east where government forces and U.N. peacekeepers battle marauding bands of rebels and militias, kills a further 1,000 people every day, mostly from hunger and

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disease.

On top of trying to disarm rebels and organise elections this year in the vast chaotic nation the size of Western Europe, the government is now preparing to tackle the bird flu threat. Like many other African governments, it has banned poultry imports from countries infected with the disease. However, chicken is such an important staple food on the continent, many believe it is unlikely government restrictions could prevent the sale and consumption of diseased birds. Corruption is widespread and government authority is weak, leading many to question how effective such bans can be.

"Here, this government wouldn't be able to do anything," said Dianne, a waitress in a Kinshasa street bar. "I keep chickens at home and sell a few from time to time. There is no way I will let them kill any. I won't be reimbursed and that is not fair," she added. "We live off chickens. If they killed them we won't be able to get by or send my children to school. This is the reality," said Dianne, who only gave her first name.

European Union countries are gearing up to fight the virus. But in Congo, which has already experienced deadly epidemics like the Ebola virus, and other West African countries, the sense of threat is more muted. Without a modern day Heracles we may be in deep trouble. #

The hidden killer - The effect of 9/11 lingers on

TWO days after the World Trade Centre's towers collapsed in September 2001, Christine Todd Whitman, then the boss of America's Environmental Protection Agency, announced that "EPA is greatly relieved to have learned that there appears to be no significant level of asbestos dust in the air in New York City." The city heaved a collective sigh of relief—but it has been coughing ever since. Sadly, Ms Whitman was being "economical with the truth." The collapsing towers released a cloud of hazardous substances, including fibreglass, Freon, mercury, lead, 130,000 gallons of transformer oil and some 2,000 tons of asbestos.

By the next day the EPA already knew that tested air samples contained asbestos levels four times higher than its own danger threshold. Separate studies conducted by other government agencies and independent researchers all found frightening levels of asbestos in homes and workplaces. Yet Ms Whitman (a former New Jersey governor), and her agency repeatedly and knowingly mislead the public into believing the air was safe in the days after the attacks and encouraged thousands of New Yorkers to return to their schools, homes and offices.

The EPA, federally mandated to clean up the insides of buildings, passed that responsibility to the still reeling and ill-equipped city of New York. The methods used by the city, though inadequate, were endorsed by the EPA. The agency meanwhile used the latest technology to clean, very thoroughly, its own downtown building. Four and a half years later, Lower Manhattan has yet to be cleaned properly. Even the EPA's internal watchdog criticised the response in 2003.

These points are made in an 83-page pre-trial judicial opinion for a class-action lawsuit filed by students, workers and residents of Lower Manhattan and Brooklyn who say they were exposed to hazardous materials and polluted air. The judge, who described Ms Whitman's assurances as "conscience-shocking", ruled that she was not entitled to immunity just because she was a public official.

Ms Whitman and the EPA are appealing that decision. That would allow the plaintiffs to continue their suit and to seek monetary damages. Their lead lawyer, Sherrie Savett, says the class-action suit hopes to achieve a proper cleaning for Lower Manhattan, the setting up of a medical monitoring fund and damages for those suffering.

Whatever the merits of the suit, there is plenty of evidence of continuing pain. Babies born after the attacks had significantly shorter gestations and smaller head circumferences, and were underweight. Thousands of New Yorkers are battling respiratory problems, and such diseases may take years to reveal themselves.

Interestingly, on the same day that this opinion was released, a ruling on a similar case filed by fire fighters and soldiers went in Ms Whitman's favour. Another judge ruled that rescue and clean-up workers were not entitled to sue, in part because the EPA and Ms Whitman made a distinction between risks to workers at Ground Zero and the risks to everyone else. Scores of rescue workers have developed respiratory illnesses and cancer, and the deaths of two emergency response workers and a police detective have been blamed on breathing problems related to the many hours they spent searching for victims. #

They were not really in the clear

It's time for Grass Roots Pandemic Planning

From Robert Patton

What if the pandemic begins tonight? Asked Michael T. Osterholm, in his article *Preparing for the Next Pandemic,* published in *Foreign Affairs*. July / August 2005. After the usual introductory and background information about influenza viruses and the pandemics they have caused, Osterholm launches into a speculative outline of what might happen.

I consider myself reasonably well informed about what the impact of a pandemic might be and yet, when I read the paragraphs in this article "Starting Tonight", it caused me to stop and think anew. Osterholm claims that on the first confirmation of human to human transmission most international borders will likely close. This certainly fits with New Zealand's plan. He then adds "…without any predetermined criteria for how and when those borders might be opened." A number of months ago I received an indeterminate answer when I asked our Ministry of Health how long they might close the borders in a pandemic. As someone who travels overseas frequently this rang some alarm bells for me. It sounds like this guy might be painting a reasonably accurate picture.

The article then moves on to border security, outlining the need for the protection of pandemic-specific medicines that are likely to be in short supply and having strategies to protect against domestic insurgency. Osterholm notes that most business continuity plans account for localized disruption, not extensive, long-term outages with a loss of key personnel due to the pandemic. A grim economic picture is described as the global economy effectively shuts down for 12 to 36 months with major shortages in all countries of a wide range of commodities, including food, soap, paper, light bulbs, petrol, parts for repairing municipal water pumps and, of course, many medicines.

Osterholm then asks another question: What if an influenza pandemic is a year away? He believes "pandemic planning must be on the agenda of every school board, manufacturing plant, investment firm, mortuary, state legislature and food distributor."

I am currently in Bangkok at the Asia Regional office of an international humanitarian agency and asked the Director what the agency was currently doing regarding planning for an influenza pandemic. He provided a brief outline of specific projects different country offices in Asia were implementing, such as economic development projects for small-scale rural farmers who have lost their livelihoods through culling of poultry, education of farmers for early identification of avian flu in poultry and on how to reduce the likelihood of contracting avian flu and other similar development-type projects.

Nodding approval at these good projects I asked my question again, elaborating this time by asking what specific plans the agency has in place if an influenza pandemic was to happen today? After further discussion it became clear that there had been no specific planning or preparation for a pandemic and we started to explore the implications for the agency if the borders were closed. The agency has offices in 15 Asian countries. Most with expatriates on the staff, some on multiple year contracts, others volunteers in-country for periods ranging from a month to years. While the majority of the staff in country offices are nationals it is not unusual for them to undertake international travel within and outside of Asia.

This raises many questions. What is the responsibility of the agency for an employee who might be stranded overseas when a pandemic breaks out? What does health insurance cover and for how long? What are the implications if an employee's visa expires while stranded overseas? What are the responsibilities of the agency to family members? Are there any policies about repatriation of corpses or mortal remains? Is the agency actively monitoring the situation and providing employee travel guidelines? Has the agency provided employees with information on personal protection and infection control measures? How much responsibility should individuals take for their own planning?

In addition to personnel aspects, there is also the "business" side of the organization. The agency is contracted by donors to implement development projects. What if the projects cannot be continued or completed as per the contract and funding is removed?

In New Zealand, as in many other countries, pandemic planning has proceeded at full blast at government department level but the filter down has been rather uneven. District Health Boards have planned extensively; peer reviews are currently underway to identify and close any gaps and plans are being submitted to the Ministry of Health.

But at the lower levels of the health sector and in many other organisations, planning has yet to start. In the education sector, have schools placed pandemic planning on the school board agenda? Has it progressed from a discussion item at the board meeting to hard planning? Has planning got down to the grass roots level with each family being prepared and having a plan in place? "What if a pandemic started today?" should be asked of each family. Planning is important and needs to be done at all levels, however, I believe more emphasis should be placed at the community and family level.

Let me bring it to a personal perspective. When I am working in Asia for my agency, do I rely on them to look after me and make all my arrangements? Can I depend on them? If I am in New Zealand and I am sick with the flu, can I expect that the health service will look after me? Can I depend on being able to buy all my food at the local supermarket? Or should I have my own plans and preparations in place?

If Osterholm is right, there might not be a lot left functioning for me to get help from when a pandemic strikes. #

Aceh Post Earthquake/Tsunami health needs assessment

Just as our Ministry of Civil Defence and Emergency Management announced a project to look at impact and needs assessment in this country, Morbidity and Mortality Weekly Review published a report on a health needs assessment conducted in Aceh Province, Indonesia in July – August 2005; just seven months after the 2004 Boxing Day earthquake/tsunami and four months after the Nias earthquake. The assessment gives a snapshot of how the region is coping now media attention (and with it, public sympathy and support) has drifted elsewhere. Perhaps the most interesting finding is the similarity in need between internally displaced and non-displaced people.

The Boxing Day earthquake/tsunami hit hardest in Aceh Province in northern Sumatra, Indonesia, where an estimated 130,000 persons died. In addition, 500,000 persons were displaced from their homes, and 37,000 remain unaccounted for in the province. In the Aceh Province districts of Banda Aceh and Aceh Besar, an estimated 90,000 persons died; approximately 75% of health workers in Banda Aceh either died or were displaced from their homes. On March 28, 2005, a second major earthquake, measuring 8.7 on the Richter scale, caused large-scale damage to the islands of Simeulue and Nias off the western Sumatra coast; approximately 300 persons died, and thousands were displaced.

The international community responded to these events with the largest relief measures ever undertaken for a natural disaster. To determine the health and nutrition status of the affected populations and to evaluate the effectiveness of relief interventions, Cooperative for Assistance and Relief Everywhere, Inc. (CARE) International Indonesia and CDC conducted surveys in three districts of Aceh Province (Aceh Besar, Banda Aceh, and Simeulue).

Before the December 2004 tsunami, Aceh Province was isolated by ongoing civil conflict. After the tsunami, unprecedented measures by local and international agencies were taken to provide temporary shelter, food, and drinking water. An early warning disease surveillance system was implemented, and a mass measles vaccination campaign, together with administration of vitamin A, was initiated as a collaborative program of the Indonesian government, World Health Organization (WHO), UNICEF, and other nongovernmental organizations. No large disease outbreaks were reported during the relief period, and mortality from disease was low.

To conduct the survey three separate, two-stage, random-cluster surveys were conducted during July-August 2005 among households in the three districts. Both Aceh Besar (estimated 2005 population: 295,000) and Banda Aceh (178,000) were severely affected by the first earthquake and tsunami; Simeulue (78,000) was affected primarily by the second earthquake. Interviewers used hand-held computers to administer questionnaires, and informed consent was obtained from all participants. The height and weight of children aged 6-59 months were measured; finger-stick blood samples for evaluation of anaemia and malaria and stool samples were obtained for detection of soil-transmitted helminths (worms) from every second child aged 6-59 months. Among children in this age group, 17% did not complete anthropometric and laboratory assessment. Differences in proportions between IDPs and non-displaced persons were tested using chi-square tests with a statistical significance level of $p<0.05$; confidence intervals were calculated using statistical software to accommodate the complex sampling design.

A total of 2,751 households were in the initial sampling; residents of 101 (3.7%) households either refused to participate or did not complete the questionnaire, leaving 2,650 households in the three surveys. Average household size was 5.2 persons. Of 13,712 persons in the households surveyed, 51.4% were male and 11.3% were children aged <5 years.

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FIGURE. Three surveyed districts affected by tsunami and/or earthquake — Aceh Province, Indonesia, July–August 2005

* Approximate epicenter of December 26, 2004, earthquake (magnitude 9.2) that produced a tsunami.
† Approximate epicenter of March 28, 2005, earthquake (magnitude 8.7).

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At the time of the survey, the highest proportion of displaced households was in Simeulue (32.3%), followed by Aceh Besar (22.4%) and Banda Aceh (15.8%). Interviewed IDPs either were housed in camps or had found shelter with other families. Persons in an additional 46% of households in the three districts had been temporarily displaced but had returned to their residences. The survey results are summarised in the Table below.

The surveys and measurements found levels of malnutrition similar to those identified by earlier surveys conducted in the same districts during February--March 2005 by UNICEF, suggesting food conditions were stable. Malnutrition levels were below the WHO emergency threshold for GAM of 15% in Banda Aceh and Aceh Besar but were elevated in Simeulue. However, this finding might reflect high rates of malnutrition in Simeulue before the earthquake. The results also indicate that food and drinking water were provided to the majority of the population, although improvements to prevent contamination of drinking water were needed.

Despite these successes, substantial gaps in the relief program remained. Both measles vaccination coverage and micronutrient supplement coverage were low. Access to basic sanitation was deficient in rural areas such as Simeulue. In Aceh Besar and Simeulue one half of children aged <5 years were anaemic. Nearly one half of preschool children and three fourths of school-aged children were infected with soil-transmitted helminths. In general, health indicators were similar among IDPs and non-displaced populations, warranting relief strategies that provide assistance to both populations in Aceh Province.

Data from these and other surveys in Aceh Province are being used to plan longer-term health and nutrition interventions. In Simeulue, for example, local government and nongovernmental organizations are strengthening the growth-monitoring system. This will improve vaccination coverage, micronutrient supplementation, and access to feeding programs for malnourished children. Measles and de-worming campaigns will be conducted in Aceh Province. These and other programs, such as construction of water and sanitation infrastructure, will benefit both IDPs and non-displaced populations.

The findings in this report are subject to at least two limitations. First, results from the three districts might not be representative of all areas of Aceh Province affected by the tsunami and second earthquake. Second, because only limited data were available regarding the health and nutrition status of the populations in these districts before the tsunami, determining to what extent the findings on health indicators reflect underlying conditions or the effects of the disaster and subsequent displacement was not possible.

With improved access to formerly isolated areas of Aceh Province and recovery resources made available, expectations for the humanitarian response are high. In addition to rebuilding homes, an opportunity exists to rebuild the public health infrastructure in the province. Monitoring health and nutrition indicators can continue to ensure that standards for relief measures are met by international agencies and nongovernmental organizations. **#**

Health interventions, health indicators, and environmental health factors among populations affected by tsunami* and/or earthquake,† by district — Aceh Province, Indonesia, July–August 2005

	Aceh Besar				Banda Aceh				Simeulue			
	IDPs§		Nondisplaced persons		IDPs		Nondisplaced persons		IDPs		Nondisplaced persons	
Category	%	(95% CI¶)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Health interventions												
(children aged 12–59 mos)	n = 67		n = 323		n = 39		n = 263		n = 183		n = 316	
Measles vaccination	37.3	(22.4–55.1)	49.7	(31.3–51.0)	43.6	(30.0–58.2)	58.2	(49.5–66.4)	51.9	(43.9–59.9)	53.3	(45.2–60.5)
Vitamin A capsules**	62.7	(47.0–76.2)	54.4	(45.2–63.3)	52.6	(39.8–65.2)	64.4	(54.9–73.0)	55.1	(44.1–65.6)	63.5	(55.4–70.8)
Micronutrient supplements**	56.9	(34.2–75.6)	22.7	(11.7–39.4)	25.0	(12.6–43.6)	15.1	(10.2–21.9)	60.8	(49.9–70.9)	53.2	(42.0–66.0)
Growth monitoring during preceding 3 months	50.9	(35.6–64.4)	54.4	(43.9–64.4)	42.2	(24.9–61.7)	44.9	(37.6–52.4)	60.6	(49.0–71.9)	61.1	(53.3–68.5)
Health indicators												
(children aged 6–59 mos)	n = 72		n = 326		n = 39		n = 192		n = 176		n = 345	
Global acute malnutrition††	6.3	(3.6–17.2)	9.9	(6.2–12.6)	12.8	(5.1–28.6)	7.8	(3.5–16.2)	17.6	(12.1–25.0)	16.5	(12.1–22.1)
Severe acute malnutrition††	0		1.5	(0.7–3.5)	0		0.5	(0.1–3.4)	3.4	(1.6–7.3)	1.9	(0.8–4.5)
Anemia (mild or moderate)§§	45.8	(19.6–74.3)	31.8	(21.5–44.2)	50.0	(30.8–69.2)	45.9	(34.7–57.6)	51.9	(39.2–64.3)	64.5	(53.3–74.5)
Helminths infection§§	33.3	(11.9–64.9)	51.3	(38.2–64.2)	18.2	(5.3–49.8)	22.9	(14.3–34.4)	63.0	(49.3–75.6)	52.5	(42.9–62.0)
Environmental health factors												
(households)	n = 193		n = 663		n = 140		n = 679		n = 292		n = 667	
Access to protected water source	76.7	(54.0–99.2)	30.5	(16.6–46.7)	69.0	(58.2–89.1)	79.8	(74.2–84.5)	20.9	(12.7–32.4)	16.3	(10.8–23.8)
Water source ≤500 m from home	97.3	(93.3–99.2)	93.0	(85.0–96.8)	88.9	(84.0–93.8)	94.2	(79.8–98.4)	97.2	(94.3–98.6)	98.3	(93.2–99.6)
Boil drinking water (excluding bottled water)	79.2	(66.0–88.3)	93.9	(86.7–96.5)	91.2	(74.2–96.6)	77.4	(71.6–82.2)	99.3	(95.2–99.9)	98.5	(95.7–99.3)
Toilets or latrines	85.9	(81.5–95.2)	74.4	(68.2–84.0)	98.6	(95.1–99.6)	97.3	(95.3–98.5)	45.5	(30.1–61.1)	68.1	(47.9–71.2)
Bed net usage	80.8	(66.3–99.0)	52.2	(49.6–62.7)	36.7	(27.8–49.1)	35.6	(27.4–44.6)	93.5	(87.2–96.8)	92.1	(85.8–95.6)
Indoor residual spraying after tsunami	37.3	(16.2–63.5)	57.7	(44.8–69.5)	13.2	(7.7–21.9)	47.3	(38.4–56.5)	65.3	(51.4–77.0)	43.6	(29.9–59.4)

* December 26, 2004.
† March 28, 2005.
§ Internally displaced persons.
¶ Confidence interval.
** Received after tsunami or earthquake.
†† As defined by the World Health Organization.
§§ Every second child was assessed for anemia and helminths infection.

Economics of Tamiflu Stockpiling for an Influenza Pandemic

New Zealand, like most countries has been stockpiling Oseltamivir (Tamiflu) to treat and prevent influenza in the event of an influenza pandemic. Worldwide, there have been a number of studies comparing the cost-effectiveness of vaccination versus treatment with antiviral agents, but only one study has examined the cost-effectiveness of Tamiflu as a prophylaxis. That study, ***Economics of neuraminidase inhibitor stockpiling for pandemic influenza, Singapore***, by Lee VJ, Phua KH, Chen MI, Chow A, Ma S, Goh KT, and Leo YS, is reported in the January 2006 edition of Emerging Infectious Diseases.

The study is Singapore specific but the conclusions have a wider currency. Their models can help policymakers weigh the options for pandemic planning. They compared strategies for stockpiling Tamiflu to treat and prevent influenza in Singapore. Cost-benefit and cost-effectiveness analyses, with Monte Carlo simulations, were used to determine economic outcomes. The treatment-only strategy for the wider population had optimal economic benefits. Prophylaxis was economically beneficial in high-risk subpopulations, which account for 78% of deaths, and in pandemics in which the death rate was ≥0.6%. Prophylaxis for pandemics in Singapore with a 5% case-fatality rate would save 50,000 lives and $81 billion.

Ten percent of the world's population and 20% of the population of tropical Singapore are infected with influenza virus annually. In a pandemic hastened by globalization, vaccination is not a viable initial solution because vaccine production requires an estimated 6 months. Instead, neuraminidase inhibitors are influenza-specific antiviral agents that figure strongly in preparedness plans.

Methods

The study used a decision-based model to perform cost-benefit and cost-effectiveness analyses for stockpiling antiviral agents in Singapore. Oseltamivir was the drug of choice because

of its safety profile and available data on influenza prophylaxis and treatment. The model compared three strategies: supportive management (no action), early treatment of clinical influenza with oseltamivir (treatment only), and prophylaxis in addition to early treatment (prophylaxis). Costs were assigned to each outcome, and probabilities at each node were aggregated as population rates for calculating overall costs for each outcome. Decision branches were similar for each strategy, but probabilities at individual nodes differed.

Cost-benefit analyses were used to compare treatment-only and prophylaxis strategies to taking no action. These analyses included direct and indirect economic costs, such as the cost of death. However, quantifying the societal cost of death is difficult, and cost-effectiveness analyses based on cost per life saved by treatment only and prophylaxis, compared to no action, were included.

Pandemic influenza is unpredictable: uncertainties surround its occurrence and outcomes. Excess deaths in annual epidemics occur mostly in the elderly, but the 1918–1919 Spanish flu pandemic had higher death rates among adults. To account for such uncertainties, the input variables were modelled as triangular distributions centred on base values, with ranges corresponding to minimum and maximum values. Sensitivity analyses, including 1-way analysis, were conducted to identify variables of highest impact and the outcome's sensitivity to treatment and prophylaxis stockpiles. Monte Carlo simulation analyses were performed to determine outcomes under different scenarios.

Treatment stockpiles, based on proportions of the population, are used on all influenza like illness cases, from pandemic plan activation until the pandemic ceases or the stockpile is depleted, whichever comes first. Analysis was conducted to determine the proportion of untreated influenza patients and simulation iterations with complete coverage, by stockpile levels. Further analysis was then performed for prophylaxis stockpiles where prophylaxis, by weeks, is given to the population over and above treatment requirements.

Input Variables

Conservative values favouring no action were used to justify alternative strategies. The study was conducted on Singapore's 2004 midyear population of 4,240,300, divided into three age groups, each consisting of two risk groups (low and high risk, according to underlying medical conditions predisposing the patient to influenza complications), for a total of six groups that represented differing infection outcomes and drug responses.

The clinical attack rates during the 1918 and 1957 pandemics were 29.4% and 24% respectively, and attack rates in Singapore during the 1967 pandemic were 12.8%–36.4%. This study assumed a base clinical attack rate of 30% (range 10%–50%), corresponding to rates in other studies.

Case-fatality rates were derived from Singapore's excess deaths from inter-pandemic influenza; hospitalization and death were assumed to occur only in clinical influenza. To reflect hospitalization rates in relation to case-fatality rates, both rates were correlated. For outpatient visits, clinical influenza patients were assumed to seek medical care and take medical leave. However, some patients may not be treated effectively within 48 hours of infection, and they were assumed not to benefit from treatment.

(Continued on page 8)

(Continued from page 7)

For pandemic duration, influenza activity in tropical climates commonly rises above the baseline for ≥12 weeks, compared to 6 weeks in temperate climates. This study assumed a 12-week pandemic duration base value with a range from 6 weeks (average temperate duration) to 24 weeks (assumed vaccine development).

Individual economic value was calculated from the net present value of future earnings for average-aged persons in the respective age groups, adjusted for age. Other costs included were hospitalizations and work days lost; all costs were standardized to 2004 Singapore dollars.

Oseltamivir

Oseltamivir has a good safety profile with insignificant rates of severe adverse events and drug withdrawal. Costs from side effects were thus assumed to be insignificant compared to costs for pandemic illness and deaths. The known safe administration duration of 8 weeks represents only studied durations. Extension is assumed possible, and the model included up to 24 weeks' prophylaxis. Oseltamivir trials have lacked the power to detect mortality reductions because influenza deaths in trials are rare, and wide ranges were used to account for uncertainty. Oseltamivir is also less effective in the elderly. Immunity after prophylaxis among those without clinical infection was assumed to be 35%, as shown during an influenza study in which 38% of study participants on prophylaxis had serologic infection but no clinical infection. Oseltamivir's pharmacologic action is selective and is assumed to be inactive against non-influenza illnesses.

Stockpile use depends on the probability of an influenza pandemic occurring. Antigenic shifts and reappearances of past variants were estimated to have pandemic potential every 8–10 years. Using oseltamivir's shelf-life of 4 years and patent expiration in 2016, the model assumed a conservative base value of 2.25 stockpile cycles before use (range 1–3.5 cycles) to account for significantly reduced costs after patent expiration. The model assumed that all unused stockpiles are lost.

Tamiflu by the bin load

Discussion

The analyses suggest that treatment is always beneficial compared to no action and that the optimal treatment stockpile is 40%–60%: 40% maximizes economic benefits, while 60% maximizes treatment benefits. Compared to other strategies, treatment-only was the optimal economic strategy, while no action was always the least desirable option. Although treatment-only saved fewer lives than prophylaxis, stockpiling costs for treatment were lower. Prophylaxis was only economically beneficial compared with no action in subpopulations at high risk.

Substantial outcomes with prophylaxis occurred with durations of >4 weeks because shorter durations prolonged the pandemic, were insufficient for immunity, and did not cover the pandemic's peak. Increasing duration improved outcomes because it covered the pandemic's peak, but the improved outcomes tapered off after 20 weeks, resulting in a sigmoid curve.

In low-risk groups with low death and hospitalization rates, increasing prophylaxis duration decreased economic benefit and increased cost per life saved. In contrast, groups at high risk, who had higher death and hospitalization rates, were affected substantially by prophylaxis, resulting in overall benefits compared to taking no action. Elderly groups had the smallest populations but the highest risk levels and most deaths. However, their lower average future earnings compared to those of younger age groups resulted in lower overall benefits.

This study of pandemic outcomes in a tropical climate is similar to an Israeli study that compared treatment and prophylaxis strategies. Our study used local health outcome rates but did not include a ring prophylaxis strategy. Both studies found that oseltamivir treatment is economically beneficial, but in addition, our study showed that long-duration prophylaxis is beneficial for high-risk groups and high case-fatality pandemics.

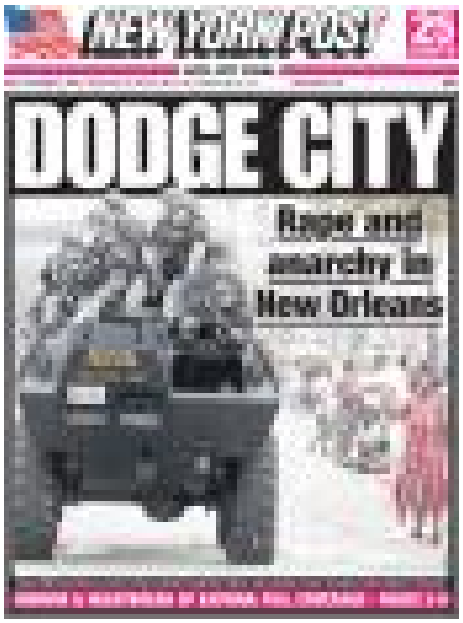
Limitations of this study include the disregard for intangible costs, such as societal value of health; cost-utility analyses could address these costs. Also, indirect effects on national economy and world trade were not considered. For comparability, neither treatment nor prophylaxis were assumed to alter the pandemic's transmission dynamics. This assumption may be true if therapy is limited to small subpopulations, but it understates the benefits if infection is delayed until the pandemic is resolved or vaccine becomes available; it overestimates the benefits if the pandemic continues. Correlation between attack rates and pandemic duration was not accounted for, and all possible combinations were included.

Policy Implications

Stockpiling is insurance in planning for pandemics with high case-fatality rates, in which more severe outcomes and higher risks demand higher premiums. Policymakers should consider lives saved even if economic costs outweigh incremental benefits. Prophylaxis of high-risk groups balances saving lives with economic benefits. Prophylaxis also reduces hospitalizations, which may otherwise overwhelm the healthcare system. Analysis of peak pandemic healthcare use is required to determine the effects of prophylaxis. Other options to reduce a pandemic's impact, including reducing influenza attack rates by quarantine or closing borders, should be considered as alternative strategies.

The decision to stockpile requires predetermined objectives; non-economic, moral, and ethical implications should be considered. Treatment-only maximizes economic benefits, while prophylaxis saves most lives. Policymakers have to act decisively, and determine the subpopulations to be given priority, to enable preparedness plans to succeed. **#**

Media Attention fuelled by self interest



How do you get a humanitarian crisis into the headlines? And how can you convince editors to keep covering it? A new study by U.S.-based media analysts CARMA International may provide a few pointers. The survey of disaster reporting in newspapers in the United States, Australia and Europe found that it is not human suffering but Western self interest that dictates how disasters are covered in the press.

"The ultimate challenge for victims of disasters and those who wish to help is to capture and sustain media attention by using national economic and political self-interest as hook," Tom Vesey, managing director of CARMA International, said in a statement.

The survey scrutinised the content of 64 daily and weekly newspapers from nine countries for coverage of Hurricane Katrina, the Asian tsunami, Bam and Kashmir earthquakes, Darfur and Hurricane Stan. Key findings were:

- Hurricane Katrina dominated with 50 percent of the coverage. The Indian Ocean tsunami came second with a quarter of the coverage, followed by Darfur with 15 percent, and Bam, Kashmir and Hurricane Stan making up the remaining 10 percent.
- There was no direct link between the number of people who died and the amount of coverage. The death tolls for Darfur and the tsunami were similar, but Darfur received much less coverage. The 2003 Bam earthquake in Iran attracted the same level of media coverage as Kashmir, even though 3.5 times more people died in Kashmir.
- The U.S. press provided the most coverage of humanitarian crises.
- Media reports on Katrina focused on the political and economic implications of the disaster – only 27 percent looked at the suffering of the survivors.
- Some of the language used had racist overtones, including widespread reports of black groups raping and pillaging in New Orleans – many of which turned out to be false.
- 40 percent of the tsunami coverage focused in Westerners affected, even though only 900 Westerners died compared with a total of 230,000 dead or missing.
- The German press gave three times more coverage to Katrina, in which no Germans died, than to the tsunami, in which they lost more lives than any other European country.
- Food shortages were mentioned far more than water shortages.
- In all the disasters except Bam, local government relief work was criticised.
- Having a celebrity take up your cause may or may not work. In some cases there was less coverage of crises involving celebrities than those without. #

Two ninety year old men, Nev and Vic, have been friends all their lives. It seems that Vic is dying, and so Nev comes to visit him every day.

"Vic," says Nev, "You know how we have both loved cricket all our lives, and how we played together for so many years. Vic, you have to do me one favour. When you get to Heaven, and I know you will, you've got to let me know if there's cricket in Heaven."

Vic looks up at Nev from his death bed, and says, "Nev, you've been my best friend many years. If it is at all possible, I'll do it for you." And shortly after that, Vic passes on.

It is midnight a couple of nights later. Nev is sound asleep when he is awakened by a blinding flash of white light and a voice calls out to him, Nev... Nev..."

"Who is it?" says Nev sitting up suddenly. "Who is it?"

"Nev, it's me, Vic." "Come on. You're not Vic. Vic just died." "I'm telling you," insists the voice. "It's me, Vic!" "Vic? Is that you? Where are you?"

"I'm in heaven," says Vic, "and I've got to tell you, I've got really good news and a little bad news."

"So, tell me the good news first," says Nev.

"The good news is that there is cricket in heaven. Better yet, all our old mates who've gone before us are here. Even better yet, we're all young again, it's always spring time and it never rains. And best of all, we can play cricket all we want and we never, ever get tired.

"Really?" says Nev, 'That's just fantastic! Wonderful! Beyond my wildest dreams! But what is the little bad news Vic?"

"Nev, you're opening the batting, next Tuesday!"

HEMNZ Bulletin

The HEMNZ Bulletin is published monthly by the Risk Management Unit of St John Northern Region for all those interested in emergency management in health care settings

Articles and comment on emergency management issues are welcomed

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Check out our Web site at www.hemnz.org.nz

Up coming Events

23 - 24 March 2006
HEMNZ2006
Novotel Hotel, Ellerslie, Auckland
Cost $650 incl GST with group discounts
Brochure available from;
www.hemnz.org.nz

19 - 20 April 2006
Enterprise Wide Risk Management
Spencer on Byron, Takapuna,
Cost: $2195 + GST
More information from;
www.conferenz.co.nz

Editor's soapbox

Despite most of us beavering away frantically over the summer on our pandemic plans the sad reality is that the window of opportunity to engage public attention has gone.

The common view is that nothing has happened since the virus winged west in November-December so there are more pressing things to worry about — like how our teams will go in the Super 14.

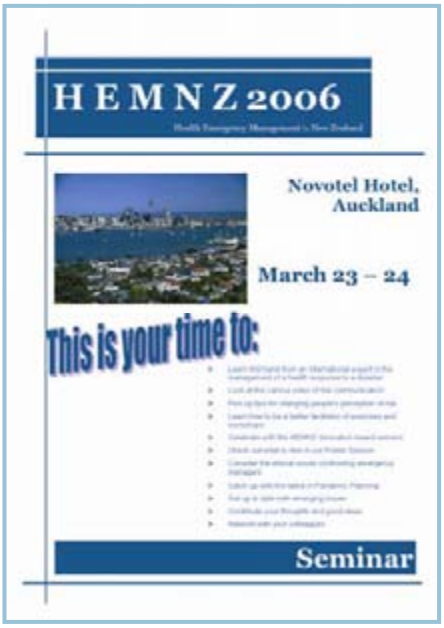
Oh, our public is so fickle. The first human to human case and a perception of personal danger will have it screaming to know why plans are not in place and practiced to perfection. With the government back from its summer recess and the opposition looking for barbs to throw across the floor of the House, we can also expect our plans, or perceived lack of plans, to become political footballs. The better our plans are, the less likely that is to happen.

Just three years ago I wrote in this column that, based on the Northern winter flu season, we might look forward to a low flu season (and what would we do with our spare time). And then there was SARS. Having been proved wrong once, in predicting trouble from western Africa I would like to be proved wrong again. Now that bird flu has reached this bubbling incubator of infectious diseases we need to be very alert. And we need to keep planning, preparing and practicing.

Enough doom and gloom. HEMNZ2006 is almost with us. As you plan for the unknown, take the time to come and listen to Skip Burkle, one of America's top "disaster" practitioners. Not just an academic and writer, Skip has worked in and on numerous humanitarian emergencies and large-scale international disasters in Asia, Africa and Eastern Europe and serves as an International Health Delegate to the Red Cross. He served as Joint Civil-Military Liaison for the Kurdish Crisis in southern Turkey, northern Iraq, and Baghdad, and again in the humanitarian crisis in Somalia.

With a whole new line up of speakers the conference offers new learning and sharing opportunities.

Bruce Parkes



There are only five weeks to wait for HEMNZ2006. Have you registered? If not, do it now. You have been working so hard these past few months on your pandemic. Now is the time to catch your breath and catch up with what is new before charging off into 2006 activity.

We have assembled an exciting line up of speakers bringing new ideas and experiences. Keynote speaker Professor Skip Burkle brings a lifetime of experience working in combat and disaster zones.

Don't forget the HEMNZ Poster Display. An opportunity to showcase the work you have been doing.

Full information and registration forms for all HEMNZ activities are available on our website or by e-mailing bruce.parkes@stjohn.org.nz