

Meulaboh Re-visited

Robert Patton

As my small Cessna plane descended towards Meulaboh airport the scene below looked vastly different to the soggy brown landscape I saw when I flew over it more than four months earlier in a Singapore Forces Chinook helicopter. Three months of rain had helped to wash away the salt that burnt the vegetation following the devastating tsunami of 26 December. Now all was predominantly a lush green colour. As the wheels of the plane touched the airstrip I remembered my first landing at this airport in a similar aircraft, touching down just beyond the last earthquake wrenched crack - brakes applied hard - running out of runway and bouncing over the rough ground at the end. Then, we were picked up in an army truck and driven to army barracks; now, we taxied to the airport terminal building and enjoyed a comfortable four-wheel drive vehicle drive to our hotel.

The last time I had walked past this hotel it had looked derelict with debris and rubbish blocking the entrance to the hotel and half-a-dozen military men standing outside with black body bags. What greeted me now were well-dressed people, laughing and talking as they moved in and out of the hotel. Bright flags on the fence at the front fluttered in the breeze. Inside a painting exhibition livened the halls with oil colours and the chatter of people as they moved slowly from painting to painting. I was shown to my room. What luxury! I had privacy, a bed of my own, a bathroom with running water, a western toilet and air conditioning. What a contrast to the basic accommodation of a few months before, days after the gigantic wave of saltwater had ripped through this town. This place was surely recovering fast.

As I leisurely walked down the wide, curving staircase to the hotel lobby, I took in my surroundings. I saw part of the handrails of the staircase missing, broken off at the level the water had swept through the hotel. A beautiful grandfather clock stood in the foyer, the arms and pendulum motionless. The glass in the front of the clock was cracked and broken, the golden coloured pendulum stained with spreading rust spots. Some tiles were missing from the floor in the lobby, ruthlessly ripped up by passing water and debris.

My driver over the next few days was bright-eyed, smiling, immaculately groomed and keen to practice his English. As we talked over the days his story came out. He had a wife and a fifteen month old son and lived in a large, two storey home with wide views of the beach and the sea. He last saw them as he said goodbye and headed to his clothing shop early on Sunday morning, 26 December. He was a successful businessman. Today he has no family, his home and business are gone and, until a month ago, he lived in the mosque. At times, as he talked, he would fall silent and tears would fill his eyes.

It dawned on me that there were similarities between what I had seen at the hotel and what my driver was sharing with me. It was also a lesson in what recovery is all about. To outward, casual appearances, the hotel was functioning and had a look of normality about it. But on closer inspection inside, the scars remained and would be there for a long time. Until new workings are bought for the clock, it would never record the time again. My driver appeared "normal" from the outside; however, there are scars inside that might never heal.

The word recovery often conjures up thoughts of getting back to at least how things were before the disaster. The question hangs there; how does the driver's life return to what it was previously? Nothing can replace his family. A lack of insurance cover for homes,

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Then and now



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contents, or business is not unusual in developing countries. Even if these are replaced, life is unlikely to be the same again.



The debris has gone but the emotional scars remain



As I moved around the community I was encouraged to see activities aimed at helping to not just physically rebuild these communities, but also to assist with the healing of the emotional and psychological scars. The painting exhibition at the hotel was one such activity. People painted about the tsunami, their recollections from before and what it was like now. To walk around the paintings and, in some instances, talk with the artists, was an emotional experience. This not only allowed artists to give expression through art, but it brought community people together to view the pictures, talk about what they saw and give an opportunity to work through the trauma they had experienced.

Last year the Ministry of Civil Defence and Emergency Management published a document titled "Focus on Recovery". In this publication a holistic and integrated framework for recovery is presented. Central to this model is the community. To ensure that a comprehensive approach to recovery is taken, four key components, or environments, have been identified and integrated with community recovery. These are the social, economic, natural and built environments. Successful recovery recognises that both communities and individuals have a wide and variable range of recovery needs and that recovery is only successful where all are addressed in a coordinated way.

From talking with people, interacting with organisations, reading local newspapers and observing how recovery activities were happening, I identified the biggest challenge for everyone involved in the recovery of Aceh was the coordination of the process. It was reported to me that as yet another humanitarian agency recently presented to the Governor for Aceh, he put his head in his hands and said "I now know that you're here, but please don't tell me anything about what you're doing, I just can't absorb any more." Many of the key agencies I spoke with said that it is taken to now to get themselves setup and starting to function in a way where they can start to really focus on long term recovery. Up until this time they have been providing basic relief, such as the provision of food, water and shelter.

While there is clear evidence that reconstruction has started in Meulaboh, relief efforts still continue in remote areas. Only 20 kilometres up the coast I saw a town where every building had been destroyed by the tsunami. Six months on the rubble still lies on the ground and the survivors are in tents. In this community not one new building has been planned, let alone begun.



In some villages nothing has changed



United Nations agencies have provided key support for the coordination of activities. Critical to any recovery process is accurate, timely and reliable information. In the chaos that ensues after an event of this magnitude this is extremely difficult to provide. One of the UN agencies, Humanitarian Information Centre (UNHIC), has as its sole mandate the collection, collation and distribution of all

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 information relevant to disaster recovery. I found the service they provided invaluable for the risk assessment I was conducting. For example, they were able to provide a detailed map of Meulaboh that identified where every NGO and humanitarian agency office was and the depth of water during the tsunami. They also had detailed maps showing the incidence of diseases across the district.

In Meulaboh communication is still very difficult. There are no functioning landlines and a local cellular network often

goes down for up to 12 hours at a time. At the UN Base Camp a sophisticated communications centre has been established and internet access is provided via satellite. This can be accessed wirelessly within about a 100 metre radius of the camp. Each night I would drive up to the camp to send and receive my e-mails. In the car park there would usually be at least three or four vehicles with the eerie glow of a laptop screen lighting up the faces of the occupants. The UN has also established an excellent radio network with repeaters and had dedicated one channel for NGO use so that they can communicate in an emergency. ●

January to May



Disaster is Normal?

The January 2005 issue of the *Natural Hazards Observer* Vol. XXIX No. 3. leads with an invited opinion piece by Lee Clarke from Rutgers, The State University of New Jersey, Clarke begins: "Some people say that 9-11 changed everything. That's wrong. It changed some things. But, aside from increasing feelings of vulnerability to disaster, too much remains unchanged. Too much disaster policy continues to take a command-and-control stance. Too many officials still believe the panic myth. And there's been precious little preparation where disasters really happen—at the local level: in offices, schools, trains, and the like. Recognizing our local needs and adopting a strategy of pre-emptive resilience to foster response abilities before catastrophe strikes would mark a significant change in how we approach disaster, a much needed change. So, what might get us closer to pre-emptive resilience? An increase in the frequency and intensity of disasters could prompt a reorientation in thinking. So could efforts by academics to further establish the practical applications and general relevance of what we study, and so could an emphasis on worst cases. It's tough to make a case for the latter; I need to build up to it."

Disaster Is Normal

Start with the claim that disaster is normal, not special. Disasters, and even worst cases, are part of and not separate from the normal ebb and flow of social life. Sadly, "disaster studies" is often viewed narrowly. That's unfortunate because studying disasters is an excellent way to learn important things about how and why people think and behave as they do. Seeing disaster as special also fosters bad policy by pushing policy makers to operate on incorrect assumptions about human behaviour.

I think that we are at greater risk for worst-case disasters today than in the past, even in wealthy societies. This is because of hubris, interdependence, and population concentration. An example of hubris is the attempts by the U.S. Army Corps of Engineers to control the Mississippi River, actions that in part set the conditions for the Great Flood of 1993. The dangers of interdependence are apparent in the SARS outbreak, the significance of which is not its morality rate but how quickly it spreads. Finally, the issue of concentration is well demonstrated by Airbus Industries' new A380, a four-aisle, two-story behemoth that will carry 555 people. The first time one CFITs (controlled flight into terrain) into a mountain; we'll call it a worst case.

Worst Case: A Definition

I'll spend a few words on defining worst case. Large body counts matter, but only in events where we have a lot of experience: airplane crashes, earthquakes, shipwrecks, oil spills, and so on. Some disasters, such as the Space Shuttles Challenger and Columbia (where the worst case happened twice) and the Hindenberg, the Titanic of the sky, are called worst cases even when body counts are low because they are unfamiliar and unexpected.

Three other factors are key in the social construction of the



idea of the "worst." Worst cases make observers feel out of control. Worst cases are also overwhelming (this is connected to feeling out of control). Social similarity also matters (its darker side is ethnocentrism). The more like us the victims are, the more likely we are to judge their suffering relevant to our own experience. For example, on July 17, 1998, a tsunami killed more than 2,200 people in Papua New Guinea. In the week that followed, the disaster garnered a mere six stories in the *New York Times*, only one of which made the front page. Imagine the coverage if a tsunami killed 2,000 people in New Jersey (or New Zealand).

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Possibilistic Thinking

Now to the heart of the matter. Thinking about worst cases is fundamentally an exercise in thinking about the social organization of imagination. It concerns the categories

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and processes people use to look forward, and to the past, to envision the worst. There's theoretical and practical pay-off for focusing on worst cases. Who would argue otherwise? Well, lots of people: for worst-case thinking is *possibilistic thinking* and that is decidedly not the usual way to think about risk and disaster, or the future. From Aaron Wildavsky on the right to Barry Glassner on the left, the refrain is that probabilism is the correct way to approach possible futures. So, what's the difference? Probabilism attends to the likelihood of something happening; possibilism portends what could happen when it does.

We are constantly exhorted to be reasonable and rational in how we think about risky things. The advice is to think probabilistically. When pilots tell us at the end of a long and turbulent plane ride that we've "just completed the safest part of our trip," they mean the chances were in our favour as we flew. When officials worry about panic, they worry about people reacting unreasonably, which is to say out of proportion to the actual risk. In his book *Culture of Fear*, sociologist Barry Glassner argues that people worry about the wrong things. What he means is that people's worries don't match the probabilities of actual harm.

In an August 9, 2003, *New York Times* op ed, David Ropeik, the director of risk communication at the Harvard Center for Risk Analysis said, "When asked in the abstract about the term "risk," Americans correctly tend to talk in terms of statistical probability. Yet, when they are faced with specific threats, emotion overrides logic pretty quickly—we fear the unlikely and are relatively unconcerned about the truly dangerous. Probabilism is of course entirely modern, and it is unquestionably an advance that we know what probability is and how to use it. But probabilistic thinking isn't everything, and the equation of it with reason itself is not natural but a convention.

Consequences of Neglect

Neglecting worst-case possibilities can lead to serious mistakes. Two examples:

It used to be that pilots didn't practice flying jumbo jets nearly upside down. The reason is that it wasn't likely that such skills would ever be used. Then a handful of 737s started flying upside down; things changed.

In August 1900, a monster hurricane passed over Cuba. A few days later it was over Galveston, Texas. A Cuban forecaster sent warnings, but experts at the U.S. Weather Bu-

reau ignored them. The experts didn't trust Cubans (in spite of the latter's considerable expertise in hurricanes), and said that in all probability the storm wouldn't take a hard right turn. But it did, and it was the worst natural disaster in American history.

Similarly, attending to worst-case possibilities can be wise. If you're 30,000 feet in the sky and your plane runs into another plane, there is no probability of survival. Indeed, in commercial plane crashes, the likelihood that you'll die is higher than for automobile crashes. So, probabilistically you're more likely to experience a car crash than an airplane crash; possibilistically you're more likely to die if your plane crashes than if your car crashes. That's why it isn't irrational to fear flying.

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In July 2001, a train carrying hazardous materials derailed and caught fire inside a Baltimore, Maryland, tunnel. Some reports say the fire burned out of control for three days at 1,500 degrees Fahrenheit. Consider a similar scenario in the future where spent nuclear fuel is the cargo being transported through the city. The Nuclear Regulatory Commission's regulation for spent nuclear fuel casks is 1,475 degrees Fahrenheit for 30 minutes. If not contained within that time, 24 square miles around the accident site could be "lightly contaminated" (or worse) with radio-nuclides. Cleanup costs would approximate \$14 billion.

To be clear, I do not advocate that we jettison probabilistic thinking. But ultimately, we do need to complement it with possibilistic thinking. Worst-case thinking *is* possibilistic thinking. We need to start seeing disasters and even worst cases as normal, ordinary. When we fail to imagine the worst that could happen we do so at our intellectual peril. When our officials disregard the value of worst-case thinking they do so at the risk of much greater consequence. Just imagine the possibilities.

Note: Clarke explores this issue further in a forthcoming book *Worst Cases*, which will be published by the University of Chicago Press in the last quarter of 2005. ●

Some imponderables

- Whose cruel idea was it to put an "S" in the word Lisp
- If someone with multiple personalities threatens suicide is it considered a hostage situation??
- When cheese gets its picture taken, what does it say?
- Why are a wise man and a wise guy opposites?
- Why do overlook and oversee mean opposite things?
- Why isn't I I pronounced onety one?
- Isn't it scary that doctors call what they do "practice"?
- Where do forest rangers go to get away from it all?
- What should you do if you see an endangered animal eating an endangered plant!?
- Do they use sterilised needles for lethal injections?
- What WAS the best thing BEFORE sliced bread?
- Why is it that if someone tells you that there are 1 billion stars in the universe you will believe them, but if they tell you a wall has wet paint you will have to touch it to be sure?
- If people from Poland are called "Poles," why aren't people from Holland called "Holes"?



Canadian strain of *Clostridium difficile* may have skipped to England

Last June we reported on a *Clostridium difficile* (C-diff) outbreak in Montreal that had caused more deaths than SARS and was proving difficult to control. On June 7th the Guardian in England reported that Stoke Mandeville Hospital, in Aylesbury, Bucks, a national centre for spinal injury, has had 300 cases of C-diff in 18 months. There have been 12 deaths in which the infection has been described as an "actual or probable" cause.

Scientists at the Health Protection Agency are now working to see if the virulent strain of the bacterial infection is *C. difficile* 027, which has already been identified as the cause of infections in America and Canada. A spokesman for the Buckinghamshire Hospitals NHS Trust said that in the 18-month period when the 300 cases were identified the hospital had been visited by 225,000 members of the public. "The trust's infection control team is working with the Health Protection Agency and the Strategic Health Authority on measures to combat the spread of C-diff," he said.

C-diff is the most common cause of hospital infection and most people recover from it. But elderly people and those who have been on long courses of antibiotics are particularly at risk. It should be treatable with two antibiotics, metronidazole and vancomycin. Cases have risen substantially in recent years, although it is accepted that some of the increase is due to better reporting and more accurate identification. Because of the increase, last year it was made mandatory for hospitals in the U.K. to report all cases of potential C-diff.

Numbers have jumped from fewer than 1,000 cases in the UK in the 1990s to 43,682 last year. In 2003, the last date for which detailed figures are available, there were 934 deaths - similar to the number who died from the superbug, MRSA, in the same year.

Dr Mark Enwright, senior research fellow in medical microbiology at the University of Bath said that C-diff was easily spread between people and hard to eradicate. The particular problem with C-diff is that the spores are very hard to get rid of from the ward. The alcohol wipes now used by doctors and nurses to prevent the spread of most bacteria do not work. Surfaces have to be cleaned with bleach and hands should be washed with soap and water.

Dr Enwright said the over-use of antibiotics in hospitals was a major factor in the increase of C-diff cases, which went up by 32 percent between 2002 and 2003 and 23 percent between 2003 and 2004. Overcrowding in hospitals and lack of ventilation were also issues.

"The thing to do would be to treat everyone in a ward, to close the ward and disinfect it thoroughly," he said. "This, of course, can be difficult with the pressure on beds in the NHS. "About half of people carry C-diff in their gut but it is kept in check by other bacteria. Problems can arise when someone is on common antibiotics, such as penicillin, which destroy these other bacteria."

A spokesman for the Health Protection Agency (HPA) said:

"Symptoms are generally caused by the production of toxins in the large bowel. They can range from mild diarrhoea, which may be resolved once antibiotic treatment is stopped, through to severe colitis [inflammation of the intestine] and life-threatening pseudo-membranous colitis [when the lining of the bowel breaks away]."

According to the results of a study presented at the 15th annual scientific meeting of the Society for Healthcare Epidemiology of America (SHEA) in Los Angeles, the emergence of a highly toxigenic strain of C-diff may have been responsible for an outbreak of disease at the Centre Hospitalier Universitaire de Sherbrooke (CHUS) in Quebec.

A SHEA news release reports that the toxic strain is identical to that which caused outbreaks in 7 hospitals across 6 USA states from 2001 to 2004. Data presented in 2004 at the Infectious Diseases Society of America meeting suggest that the bacterium is resistant to fluoroquinolone therapy.

The study was initiated to identify the emergent strain related to the quadrupled incidence of C-diff associated diarrhoea and almost doubled case-fatality ratio observed at CHUS during the period from 1991 to 2003.

Michel Warny, MD, PhD, lead investigator and director of bacterial process development for Acambis Inc said, "The perception of a number of physicians is that the strain they are dealing with is more virulent than usual." "This is illustrated by the substantial increase in mortality per case of C-diff infection since the year 2000." In the study, a single identical strain (toxintype III) was identified in 82 percent of isolates collected from patients involved in the CHUS outbreak. "There's always a dominant strain involved in outbreaks," Dr. Warny noted. "This finding was significant because in general the toxintype III strain is found in only 2 percent of isolates."

Further, the toxintype III strain was found to produce 16 times more toxin A and 20 times more toxin B in vitro compared with 13 variations of the toxintype 0 strain commonly found in 80 percent of isolates (P less than .0001 for both comparisons). "The main pathogenic factor of C-diff is the production of these 2 toxins," said Dr. Warny, suggesting that the ability of the emerging strain to produce up to 20 times more toxin than more common strains may explain reports of its virulence in patients.

Genetic analysis of the type III strain revealed deletion of *tcdC*, a gene believed to be a negative regulator of toxin production that is normally expressed during the log phase of replication. Toxin production during the log phase rather than the stationary phase was consistent with this finding.

"These are in vitro data and further studies are needed to confirm whether these toxintype III isolates are indeed more pathogenic than the rest," Dr. Warny said. "If this strain is responsible for increased mortality rates, it could become important to identify it for aggressive treatment in patients diagnosed with C-diff within a geographic area where the strain was found before." ●

Understanding Noroviruses - a growing curse

Norovirus outbreaks in health care facilities at all levels of care are increasingly common both in New Zealand and overseas. Where have they come from and why is it so difficult for us to get on top of the problem? *Are noroviruses emerging?* A paper by Marc-Alain Widdowson, Stephan Monroe and Roger Glass, published in Emerging Infectious Diseases May edition provides a good overview of the problem but offers no easy solutions.

In 1972, noroviruses (previously called "Norwalk-like viruses") were discovered as the first viruses definitively associated with acute gastroenteritis. During the next 2 decades, researchers were unable to develop simple methods to detect these common viruses or to find the etiologic agents of nonbacterial gastroenteritis outbreaks and hospitalizations. Indeed, of > 2,500 food borne outbreaks reported to the Centers for Disease Control and Prevention from 1993 to 1997, < 1% were attributed to noroviruses, and 68% were of "unknown etiology". As a result, noroviruses were out of sight and mind and thus relegated to a minor role as agents of gastroenteritis at a time when high-profile outbreaks of *Salmonella Enteritidis* and *Escherichia coli* had focused attention and budgets on preventing food borne bacterial illnesses.

The development of reverse transcription-polymerase chain reaction in the early 1990s provided the breakthrough needed to facilitate diagnosis of norovirus infection. Today, noroviruses are recognized as the most common cause of infectious gastroenteritis among persons of all ages. They are responsible for $\leq 50\%$ of all food-borne gastroenteritis outbreaks in the United States and are a major contributor to illness in nursing homes, and hospitals. Noroviruses have been detected in 35% of persons with sporadic gastroenteritis of known cause and in 14% of all children < 3 years old hospitalized for gastroenteritis. Norovirus infection has put apparently healthy people in intensive care and has been associated with chronic diarrhoea among transplant patients.

In addition, we now know of a myriad of strains of norovirus, which have been classified into 5 genogroups, distinguishable from sapoviruses, a separate genus of human caliciviruses, but also in the *Caliciviridae* family. This diversity represents a dramatic increase from the single calicivirus strain discovered > 30 years ago. Moreover, the known host range of noroviruses has expanded: the virus is found in mice, cows, and pigs, and antibodies to bovine strains have been found in humans, which has stimulated speculation about zoonotic transmission. However, a fundamental question remains - is the increased detection of norovirus the result of better application of improved diagnostics or does evidence exist that norovirus disease is an emergent problem?

Recent reports have established that norovirus strains can periodically emerge either globally or nationally, displace other strains, and increase disease incidence. In 2002, a new virus variant was attributed to a well-publicized surge of norovirus outbreaks on cruise ships and in nursing

homes in the United States and in healthcare facilities in Europe. Why these strains emerge into prominence is unclear, but they often belong to genogroup II, cluster 4 (Bristol virus). Whether these strains cause different or more severe symptoms than other noroviruses, are more transmissible, or can better evade the host immune response is not known. The periodic emergence of strains is likely to have always been a feature of noroviruses, but we do not know whether norovirus infections are more frequent now than in 1929, when Zahorsky first described "winter vomiting disease". Despite a lack of consistent retrospective data to definitively answer this question, several factors suggest that norovirus disease may actually be more common today.

First, the rates of bacterial food borne illnesses are declining, in large part because of measures such as improved refrigeration and use of Hazard Analysis and Critical Control Point systems to reduce contamination of food of animal origin. Most of these measures, however, will be ineffective against noroviruses, which are resistant to chlorination and freezing, persist in the environment, and require only very low inoculums to infect. Thus, the relative contribution of noroviruses to food borne disease is likely to be increasing. Second, modern lifestyles make us more vulnerable to norovirus infection than when these viruses were discovered.

Since 1972 in the United States, more elderly people live in communal settings, with the number of beds in nursing homes increasing > 75%. In addition, we now eat more foods that have been handled by a variety of potentially infected people; 46% of household food expenditures is now spent on eating out, compared with 32% in 1972. We also eat more of the foods that are likely to be contaminated with norovirus; consumption of fresh vegetables and fruit has risen > 20% in the last 30 years, and this produce is often grown in countries where crops are still irrigated with sewage-contaminated water. Finally, more people than ever are travelling and have an increased risk for norovirus infection through exposure to hotels, airplanes, and cruise ships. From 1993 to 1998, for example, the number of cruise ship passengers in the United States increased by 50%. Faced with these trends, how should the public health community respond?

First, research on the disease prevalence of noroviruses is only beginning. If noroviruses are an increasingly common cause of infectious gastroenteritis, with some cases resulting in diarrhoea-related deaths and hospitalizations, then substantially greater investments are required in their diag-

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Articles and comment on emergency management issues are welcomed

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4 - 5 July 2005 Auckland
7 - 8 July 2005 Wellington

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7th ITACCS International Chief Emergency Physician Training Course on Mass Casualty Incidents

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17 - 22 July 2005
RedR Humanitarian Logistics in Emergencies
St. Francis Retreat Centre, Mt. Roskill, Auckland
Cost: \$700 with discounts for IPENZ and RedR members
More information from; www.redrnz.org.nz or robertpatton@xtra.co.nz

26 28 October July 2005
Health Materials Managers Conference 2005
Wellington Conference Centre
Cost: \$190
More information from; www.mianz.co.nz/conference.html

Editor's soapbox

It was no surprise that the "Asian Tsunami" was a feature of papers and discussion at the World Congress on Disaster and Emergency Medicine held in Edinburgh last month.



Less expected was the level of discord and division between the clinical and public health practitioners attending the Congress. For even a simple colonial like me it was easy to identify the causes.

The efforts of clinicians responding (often at home government request) to the needs of those injured in the tsunami has been met with wide spread animadversion. Who wouldn't feel aggrieved when, after making a considerable personal sacrifice, being told that their services were inappropriate and not needed.

On the other hand, Public health practitioners saw once again an avalanche of unwanted and inappropriate services and supplies dumped into their already stretched systems. The comment by the Aceh Governor reported by Robert Patton (page 2) says it all; *"please don't tell me anything about what you're doing, I just can't absorb any more."*

WADDEM President, Marvin Birnbaum, in his Congress address, made a plea for more evidence based research and development in disaster emergency medicine. Getting the evidence to resolve this public - clinical need dichotomy would seem to be a high priority.

On another related note, shining though the Congress was the overwhelming desire of all, despite any personal or philosophical differences, to be of service to humankind. And isn't that what healthcare is all about? The goodwill and sharing by all those who attended is what will drive us to meet and overcome future challenges.

I have invited Jo Horrocks to share her impressions of the Congress. Look out for her article in our July issue.

Finally, this month we will publish a special edition of the Bulletin, commissioned by the Ministry of Health, to celebrate and share recent innovations in healthcare emergency management in New Zealand. Look for it in you in-box before the 30th.

Bruce Parkes

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nosis. Increased use of diagnostics along with improved surveillance, such as in sentinel sites, will permit identification of new strains and shifts in the epidemiology of norovirus disease. The development of easy-to-use, sensitive assays for use by clinical and public health laboratories should also have a high priority.

Second, we do not know how to stop norovirus transmission. Foods can be contaminated with norovirus either at the source or at the point of service by infected food handlers. Noroviruses can spread by water, direct person-to-person contact, or airborne droplets of vomitus, and they can persist in the environment as a source of continuing infection despite efforts at disinfection. Recent advances in finding a cell culture system for noroviruses may allow for assessing the efficacy of various disinfectants, but only by full epidemiologic investigation of viral gastroenteritis outbreaks and by application of molecular tests will transmission routes be determined, differences in epidemiology between strains be detected, and targeted control measures implemented.

Norovirus infections are common and likely to become more so. We need to design and implement effective prevention strategies now. ●