Proceedings of the Rhise Group Symposium, Friday 22 November 2013

After the catastrophic earthquake in Christchurch, New Zealand, on 22 February 2011, the Rhise Group (researching the health implications of seismic events) was formed by Professor Michael Ardagh.

The main objective of the group was to facilitate understanding of the health impacts of the Christchurch earthquakes and, specifically, to enable collaboration and sharing of resources where appropriate. This has been achieved through the occasional forum and a shared website, able to be accessed by the 219 members of the group. In addition, the group encouraged a dedicated funding round for earthquake research from the Health Research Council of New Zealand and the Canterbury Medical Research Foundation.

This symposium is the most significant event hosted by the Rhise Group to date and allows the recipients of that funding round, and other researchers from within the Rhise Group, to present the current state of their research. Thanks go to the Emergency Care Foundation, Lane Neave Lawyers, University of Otago, Christchurch, Canterbury District Health Board, Canterbury Medical Research Foundation, and Emergency Care Co-ordinations Teams for sponsoring the symposium.

Within the wider, loose collaborative of researchers making up the Rhise Group is a small ‘working group’ based in the Emergency Department of Christchurch Hospital, and the University of Otago, Christchurch. The working group coordinates the activities of the Rhise Group and includes Professor Ardagh, Dr Joanne Deely, Ms Alieke Dierckx, Dr Sandra Richardson and Dr Martin Than.

Particular thanks go to Dr Deely and Ms Dierckx for putting this symposium together and Dr Deely and Professor Ardagh for editing the proceedings.
How did the earthquakes change health service utilisation in Canterbury?

David Meates  
Chief Executive Officer, Canterbury and West Coast District Health Boards

The earthquakes of 2010 and 2011 have changed the way the Canterbury health system is organised and services are provided. While many changes and much of the infrastructure and relationships had been developed prior to the earthquakes, the February quake resulted in further innovation resulting in new initiatives (e.g. eSCRV, CREST, medication management). These have further emphasised the role of keeping people well in their own homes and communities.

The combination of earthquakes, system changes and new approaches has significantly changed health service utilisation in Canterbury. The initial reduction in people accessing all services has been replaced by decreasing growth in the rate of acute admission as more people are looked after in the community. Decreases in acute care growth are strongest among the over 65-age group, where the population has increased. While these changes are not attributable to the earthquakes, these seismic events have acted as a catalyst to drive the system changes.

David Meates is Chief Executive of the Canterbury and West Coast District Health Boards (DHBs)—responsible for the health services for over 550,000 New Zealanders, and the leadership of over 9,500 direct employees and thousands more non-governmental organisation health sector workers contracted by the DHB. He is a big picture thinker and has particular skills in leading change, and motivating and mobilising others to be part of the transformation. David is passionate about health and what’s possible when people grasp the vision and work collectively for the greater good. The achievements of the Canterbury Health System are testimony to his leadership. Originally from Canterbury, David has worked in both the private and public sectors, in NZ and the UK. He has also led and been involved on a number of national groups ranging from workforce negotiations to CEO alliances. Recent experiences in Canterbury have shown David is adept at managing large teams through a crisis and developing and implementing robust recovery plans.

The initial health system response to the Christchurch earthquake

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A total of 182 people died and 6659 were treated for injuries during the first day following a violent earthquake that struck Christchurch city at 12.51 on 22 February 2011. A combination of huge peak ground accelerations, time of the day, and collapse of major buildings contributed to the numbers of people injured. We report on the injury burden of the Christchurch earthquake and the initial health system response.

175 of those killed died before arriving at hospital. Of the 6659 people injured, 2032 (31%) were male and 4627 (69%) female, and 2752 (41%) were between the ages of 40 and 59 years. Eighty-seven (1%) were children under the age of 10 and 950 (14%) adults over the age of 70 years. 142 people were admitted to hospital including 18 to the Intensive Care Unit. Fourteen people were treated for crush injury syndrome, six of whom required renal replacement therapy and a small number of people required amputations.

Experiences suggest that hospitals should prepare for: patients arriving on mass by extraordinary means, patients arriving with no pre-hospital care, loss of electronic registration and tracking of patients, patient unwillingness to come into hospital buildings, loss of all electricity, many unexpected willing helpers, loss of communication, media intrusion, and maintaining teamwork with explicit leadership.

Follow up research is concentrating on understanding the demographic distributions and causes of the injuries. (See abstracts by Johnston et. al. and Standing et al. in these proceedings.)


Michael Ardagh is a fellow of the Australasian College for Emergency Medicine and has a PhD in Bioethics. He is Professor of Emergency Medicine at the University of Otago, Christchurch, and Specialist in Emergency Medicine at Christchurch Hospital. He is National Clinical Director of Emergency Department Services (a position also known as ‘Target Champion’), to assist with implementation of the ‘Shorter Stays in the Emergency Department’ health target. He is Chair of the Rhise Group (Researching the health implications of seismic events) which was formed to encourage collaborative research regarding the Christchurch earthquakes of 2010 and 2011. Michael was made an Officer of New Zealand Order of Merit (ONZM) for services to medicine in 2012.

The 2010/2011 Canterbury earthquakes: context and cause of injury

David Johnston¹, Sarah Standring², Kevin Ronan³, Michael Lindell⁴, Thomas Wilson⁵, Jim Cousins⁶, Emma Aldridge⁷, Michael Ardagh⁷, Joanne Deely⁸, Steven Jensen⁹, Thomas Kirsch¹⁰, Richard Bissell¹¹

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Little is known about the relationship between human behaviour and risk of injury during earthquakes. We aimed to fill this gap by analysing the New Zealand Accident Compensation Corporation database for causes and context of injury during the Canterbury earthquakes. The total injury burden was analysed for demography, context of injury, causes of injury, and injury type.

Three times as many people were injured in the Christchurch earthquake (22 February 2011) as in the Darfield earthquake (4 September 2010; 7171 vs 2256). Primary shaking caused approximately two-thirds of the injuries from both quakes. Actions during the main shaking and aftershocks led to many injuries.

Many people were injured after shaking stopped in both events. Most of these people were injured during clean-up. In both earthquakes: more females than males (1453 vs 803 Darfield; 4646 vs 2525 Christchurch) were injured; trip/fall was the most common cause of injury; and soft tissue injuries was the most common type of injury. The findings of this study suggest that where people were and their behaviour during and after earthquakes influenced their risk of injury.

David Johnston is a senior scientist at GNS Science and Director of the Joint Centre for Disaster Research at Massey University. His research focuses on human responses to disasters, crisis decision-making, public education, and building community resilience and recovery. David is Chair of the international Integrated Research and Disaster Risk Scientific Committee. He is also on New Zealand’s Royal Society Social Science Advisory Panel, and the editor of the Australasian Journals of Disaster and Trauma Studies, and founding editor of the Journal of Applied Volcanology.

Spatial variations in stress-related health compared to earthquake exposure: preliminary results and future directions

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Fourth September 2010 saw the start of a series of destructive earthquakes around the city of Christchurch, New Zealand (pop 350,000). These left the region with widespread damage to the city and its infrastructure including: major liquefaction (the process by which the ground turns to liquid); 70% of the central city needing to be rebuilt; 20,000 homes needing to be pulled down; and 100,000 homes needing repairing.

The aftershocks are ongoing with over 13,000. It is hypothesised that all this will have an ongoing impact on those living in and around the city. The aims of this study were to identify whether adverse stress-related health outcomes were greater among people
who have experienced greater physical damage to their communities than those who have experienced less damage, but who also live in the region. Exposure to earthquake damage through amount & extent of liquefaction and land ‘colour’ (land colour coded according to whether it can be used in the future) was estimated.

Emergency department data was collated for chest pain and anxiety for a period of 6 months before and 18 months after the start of the earthquakes. Exposure was related to health. For the period from 1 May 2010 to 30 April 2012, there were 9,807 chest pain and 524 anxiety hospital attendances. Those people living in areas of greater earthquake related damage and those living closer to more damaged areas had greater levels of stress-related ill health.

It is concluded that there is preliminary evidence that those living in and nearer to areas of greater earthquake impact have greater levels of stress-related ill-health. Further research funded by the Cooperative Research Centre for Spatial Information (CRCSI) is developing more indicators of earthquake impact such as: extent of home damage; infrastructure service closures and restriction, community disruption e.g. school & shop closure; extent of home damage; and magnitude of shaking. In addition population mobility is being included in this analysis.

Simon Kingham is Professor of Geography and Director of the GeoHealth Laboratory at the University of Canterbury, in Christchurch, New Zealand. He has carried out research in health and environment issues for over 20 years, specifically looking at environmental exposure. He is a Director of the GeoHealth Laboratory which is funded by the Ministry of Health to undertake applied research in the areas of health geography, spatial epidemiology and Geographical Information Systems. He has published his research widely and has a BA (Hons) and a PhD in Geography from Lancaster University, UK.

The role of Public Health in building resilience: from pandemics to earthquakes

Alistair Humphrey
Medical Officer of Health for Canterbury

Following the enactment of the 2002 New Zealand Civil Defence and Emergency Management Act in 2002, the Ministry for Civil Defence and Emergency Management (MCDEM) led local agencies in developing strategies for building resilience among Canterbury communities. With the looming spectre of “bird flu” (classification – H5N1), primary care led a multiagency approach to preparing for a pandemic.

Representatives from health, government agencies, non-government agencies and private business including media met monthly from August 2005 onwards to develop a strategic approach towards building resilience. One example was the development of the Pandemic Roadshow by MCDEM, Canterbury District Health Board and Science Alive museum.

The 2008 MCDEM national survey demonstrated that Cantabrians were more aware of the pandemic threat and generally better prepared for all hazards than other parts of New Zealand. Consequently, Canterbury performed well in response to the 2009 H1N1 pandemic. When struck by the earthquakes a year later, the issues promoted
during pandemic preparedness were equally pertinent: hand-washing, availability of sanitiser, water and food supplies and knowing your neighbours. Community briefings reinforced these messages, but were also promulgated using other media.

Water and sanitary health services were severely compromised after the 22 February aftershock; hand-washing, a boil water notice and provision of portaloos were key operational and communication issues for many weeks. However, community surveys showed that nearly 90% of Christchurch residents adhered to boiling water more than six weeks after the earthquake, which bought valuable time for the authorities to chlorinate the city water supply and prevent water borne disease. A heightened surveillance system revealed no increase in enteric disease after the earthquake.

Promotion of personal hygiene, emergency preparedness and social capital for an anticipated pandemic brought direct benefits to the Christchurch community following the earthquake. Broad interagency collaboration and sophisticated communication strategies facilitated this, and need to be maintained to sustain community resilience.

Alistair Humphrey is a Public Health Physician and GP in Christchurch. As Medical Officer of Health for Canterbury, he is designated by and responsible to the Director General of the Ministry of Health. Alistair is on the national pandemic preparedness group for New Zealand and the national group looking at the health effects of climate change (HAIFA). In 2011/2012, Alistair addressed the United Nations International Strategy for Disaster Reduction (UNISDR) global platform, the Towards a Safer World (TASW) group and the Global Risk Forum One Health Summit and other international meetings. He assisted the WHO Emergency Risk Management group in the development of their Safe Hospital Initiative and was an evaluator for the WHO’s Emergency Risk Framework exercise. Alistair holds a senior lectureship post at the University of Otago Medical School. He is a Fellow of the Australasian Faculty of Public Health Medicine, Royal Australian College of General Practitioners, Australian College of Rural Medicine, and a member of the UK Faculty of Public Health.

Earthquake stress and broken hearts

Cameron Lacey
Māori Health, University of Otago, Christchurch

Stress cardiomyopathy has been associated with stress and a large increase in the number of people presenting with this condition was seen following the earthquakes. The cause of this condition remains unknown, but psychiatric illnesses have been proposed as risk factors. We systematically assessed for antecedent psychiatric risk factors in two groups of cases (people who developed sporadic and earthquake-related broken heart syndrome) and compared them to a control group of healthy volunteers. We found that often psychiatric risk factors examined, only ‘neuroticism’ significantly differed between participants with broken heart syndrome and healthy volunteers. This suggests that the clinical assessment of psychiatric risk factors is unlikely to assist identification of patients at increased risk of broken heart syndrome. This presentation will also provide an overview of our efforts to identify a genetic risk for this condition.

Cameron Lacey is a consultation-liaison psychiatrist with a strong research interest in identification and treatment of psychiatric and cultural factors in medical illness. He is the principle investigator of a team of University of Otago Christchurch researchers including Prof R Mulder, Prof M Kennedy, Prof V
‘It’s a thing you’ve got to sort of learn to live with really’: the findings from the Shaken Up study of older adults aged over 75 years following the seismic events in Christchurch, New Zealand, 2011

Kathy Peri
School of Nursing, Auckland University

This project aims to explore the ongoing impact of the Christchurch earthquakes on older peoples’ health in primary health care one year post Christchurch earthquakes. The participants were part of the BRIGHT (Brief Risk Identification Geriatric Health Tool) Trial which had been underway since 2007 and in total 1095 older adults aged 79 and over (31 are Maori aged 69 years and over) were enrolled.

The Shaken Up study proposed to re-interview these 1095 older adults to investigate their health status in the recovery phase 12 months after their 36 month BRIGHT trial interview, (up to 2 years after the earthquakes), meaning a total of 4 years follow up will be available. Pre-existing status and factors related to earthquake exposure will be examined as predictors of follow up status to identify predictors of poor outcome after earthquake.

The main outcomes measured health-related quality of life, NEADL (Nottingham Extended Activities of Daily living), depression, standard of living, family and social support and life satisfaction before, between, and post-earthquakes. Relationship with trajectories of health status (improved, maintained or declined) over the same and subsequent period will be explored.

Understanding population-level health of older people with primary care utilisation through the disaster period and 12 months subsequent will enable identification of particularly vulnerable groups of older age. This is internationally relevant as detailed health data before, during and after the disaster is seldom available. It is nationally relevant to enable appropriate planning for ongoing support for older people in Christchurch and other areas, should more disasters occur.

Kathy Peri is a registered nurse, senior lecturer and research Fellow at the School of Nursing, University of Auckland, and works two days a week at the Counties Manuka District Health Board as the Clinical Nurse Director for Health of Older People, New Zealand. Her research interests are centred on improving health outcomes for vulnerable older people and she is currently involved in a number of research projects including health robotics, non-pharmacological dementia interventions. Kathy was the Director of Nursing at the Princess Margaret Hospital in Christchurch during the earthquakes and has over the past two and half years been awarded three research grants to explore the impact of the Canterbury earthquakes on the quality of life in community dwelling older people over the age of 75 years. Kathy will present the results of the Health Research Council funded research project today.
Learning from Canterbury communities: factors that help and hinder community resilience

Louise Thornley¹, Emma Rawson²

1. Quigley and Watts Ltd
2. Community and Public Health, Canterbury District Health Board

Increasing community resilience is vital – disaster experts, central and local government, non-government organisations, and communities themselves all agree on this point. We know that building stronger communities is important, but how should this be done? This presentation will discuss findings from qualitative research with Canterbury communities after the 2010 and 2011 earthquakes. It will focus on the key role of pre-existing community infrastructure (e.g. local leaders, networks, and marae) in helping communities to adapt post-disaster and to build resilience to future crises.

Almost a third of participants in our research were Māori, mostly Ngāi Tahu. Our work highlighted marae as key hubs for emergency support and hosting people in need. Māori participants emphasised that iwi and marae infrastructure helped marae to respond quickly and effectively. Building stronger communities needs to be an everyday activity not an optional extra. Connected communities with good local infrastructure are healthier, recover faster from disasters, and are better prepared for future crises.

Louise Thornley is a social researcher specialising in public health. She contracts part-time to Quigley and Watts Ltd, an independent Wellington-based research company, and has recently started as Family Planning’s Research and Policy Advisor. Louise’s previous work experience is in government, university and community sectors. Before joining Quigley and Watts Ltd in 2006, she was a Senior Policy Analyst for the National Health Committee, and Research Fellow for Otago University, Wellington. Her background is in youth work and community development. She worked in Christchurch’s community sector for five years.

Emma Rawson, Ngati Ranginui, Ngai te Rangi, Raukawa, is a Māori Health Promoter based at the Canterbury District Health Board in Christchurch. Emma’s passions are Māori workforce development and Te Reo Māori as an important leadership tool for change, enhancing identity and wellbeing. She is a recent graduate of Leadership Training for Māori in Public Health, holds a B.A. Maori, University of Canterbury, Post Graduate Certificate in Public Health, University of Otago and is working on gaining a Masters in Health Science. Emma is currently working on projects in Christchurch that support wellbeing and resilience in Māori communities and building sustainable community infrastructure in vulnerable communities.

Occupational health of front line workers in Christchurch

David McBride¹, Kirsten Lovelock¹, Daniel Shepherd², Rex Billington²

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2. Department of Psychology, Auckland University of Technology

Front-line disaster workers are exposed to potentially disturbing events and hazardous exposures, and are potentially at risk of physical and emotional harm. As members of the community they also have to contend with ‘dual jeopardy’, death or injury in their
own family and damage to their personal property. This was a cross sectional study measuring the health status of responders and ‘significant others’ using the World Health Organisation (WHO) Health Related Quality of Life (HRQOL) questionnaire with additional instruments to identify (for example) post-traumatic stress symptoms, burnout and fatigue. Eligible participants were Christchurch residents living there on the 4 September 2010.

The survey was self-administered, facilitated through the various unions representing these occupational groups or CEOs for non-unionised workplaces. Power considerations indicated that 1,100 responses would allow adequate power. Our response rate was less than the 1,100 that we had aimed for: a total of 370 participants, 200 workers, 130 controls and 40 ‘significant others’.

Workers experienced, and reported dual jeopardy; reduced physical exercise; sleep deprivation; increased alcohol consumption and imbalance between job demands and decisional latitude, the latter leading to stress. Ambulance workers and fire-fighters reported sensitisation, mediated physiologically (elevated heart rate and blood pressure) and associated with increased anxiety, when responding to ‘everyday’ emergencies following the February earthquake.

Our research also provides further evidence that social support from family, peers, colleagues and wider social networks are central to maintaining resilience and reducing vulnerability. Significantly, existing and pre-existing employment relations are central to the nature of how front line workers initially respond to a natural disaster; cope in the aftermath of the disaster and try to remain healthy.

David McBride is an occupational physician who did his initial training with the British Coal Corporation as a Medical Officer. His responsibilities were collieries in the Staffordshire and Lancashire coal fields, the Mines Rescue Station at Boothstown and an experimental coal liquefaction plant in North Wales. He did his academic training at the University of Birmingham, and then was appointed Clinical Lecturer in 1991. He was appointed Senior Lecturer in Occupational Health at the University of Otago in 1995 and Associate Professor in 2011. He has been in the army as a reservist since 1973 and has some knowledge of ‘conflict medicine’, having served with the New Zealand Defence Force (NZDF) in Timor Leste and Afghanistan. On volunteering for another engagement with the NZDF serendipity must have been a factor in his posting as a Medical Officer to Burnham Camp over the period November 2010–December 2011. He then found himself on another ‘tour’ of Afghanistan in January 2012.

Facing the unexpected – health care workers and the emergency department response to 22 February earthquake

Sandra Richardson
Centre for Post Graduate Nursing Study, University of Otago, Christchurch

This study identifies the experiences and impact of the 22 February 2011 earthquake on those staff who contributed to the Emergency Department response. While there are individual reports from various natural disaster settings identifying personal reactions and perceptions, there is very little reported about the experience of health care providers who are both responders to and part of a disaster event.
The focus on health care responders is typically centred on the provision of care and ability to maintain normal services, with little exploring what it means to be part of a disaster situation, coping with competing personal, professional and family commitments.

This study commenced in the week following the February event, and involved one on one qualitative interviews with over 90 individuals who were involved in the emergency department response at this time. Given the presence of so many staff and volunteers from a wide range of backgrounds, it was intended to include a multidisciplinary perspective. As a result, interviews were undertaken with staff from medical, nursing, social work, blood bank, orderlies, Maori health and radiology, amongst others. Interviews were reviewed and core themes identified, which allow a clearer understanding of the experience of individuals, and the implications for professional groups and health care planners. A summary of issues and recommendations is presented resulting from this process.

Sandra Richardson is a Senior Lecturer with the Centre for Post Graduate Nursing Study at the University of Otago, Christchurch and Nurse Researcher in the Emergency Department, Canterbury District Health Board. Sandra’s research interests include Emergency Department crowding, advanced nursing practice and the impact and experience of the Canterbury Earthquake events.

Shaky times – the Canterbury earthquakes and all that has followed

Caroline Bell
Department of Psychological Medicine, University of Otago, Christchurch

Since 4 September 2010 there have been three major earthquakes and over 13,000 aftershocks in Christchurch inflicting substantial damage to the city. Widespread economic and practical consequences, particularly with insurance companies and the Earthquakes Commission (EQC), have created significant secondary stressors further compounding the difficulties of many. This has resulted in people presenting with a broad spectrum of psychological responses. A specialist team was set up by the Canterbury District Health Board to treat people with significant post-traumatic stress and anxiety and this team is continuing to see new presentations.

This paper will discuss the ongoing research of people presenting with post-traumatic stress disorder (PTSD) and those identifying as resilient. Two broad lines of research will be presented that aim at understanding the treatment and neurobiology of people with PTSD and those self-identifying as resilient.

Caroline Bell is a consultant psychiatrist and senior lecturer at the University of Otago in Christchurch with an expertise in anxiety. She has had a role in managing the psychosocial responses to the Canterbury earthquakes across the community and is the clinical lead of a treatment team for people with severe Post Traumatic Stress Disorder from the earthquakes.
The impact of Christchurch Earthquake on availability of diagnostic-test results

Kevin Taylor¹, Peter George¹, Joanne Deely²

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2. Independent Contractor, Canterbury District Health Board

Between 60–70% of medical decisions are based on laboratory test results. With both community laboratories (MedLab South and Southern Community Laboratories) destroyed in the Christchurch earthquake, the performance of Canterbury Health Laboratories was integral to how the health system delivered care to Canterbury after the disaster.

This study assessed the effects of the Christchurch earthquake on turnaround times (TATs) at Canterbury Health Laboratories (CHL). We retrospectively examined 709,786 potassium and 196,795 urine-culture TATs from February 2010 to January 2013. Potassium was chosen for its low TAT (approximately 1.5 hours) and urine culture for its longer TAT (approximately 20 hours). Hospital and community data were evaluated separately and compared with the transport, registration, and analysis time phases.

From March 2011 through to June 2012, CHL undertook most of Canterbury’s community specimen testing in addition to the hospital testing. Monthly test numbers increased 30-fold for potassium and 60-fold for urine cultures. Transport times from the community increased by >20 hours (90th percentile) during the first few days when most courier fleets stopped operating in the city. Community transport time remained 2–3 hours above pre-quake levels during the main response period from March 2011 through to June 2012. Registration time increased by 10–20 minutes (hospital specimens) and 30–45 minutes (community specimens) for a short period when the system was overloaded. Community-urine-culture analysis time increased by >50 hours (90th percentile) during the first three months after the earthquake, when methodology needed revision to meet the demand. The increase in specimen numbers affected short- and long-duration test turnaround times differently.

Streamlining and automating processes reduced registration and analysis times. Increased transport time was outside the control of the laboratory.

Kevin Taylor is the Business and Innovations Manager at Canterbury Health Laboratories. He was part of Canterbury Health Laboratories earthquake response team. He is a medical laboratory scientist, specialising in laboratory quality management and solving problems with unique and novel outcomes.

Peter George is Clinical Director of the Canterbury Health Laboratories. He is a consultant to nine private and public hospitals in both the North and South islands of New Zealand. He is the recipient of over 30 major research grants. His research interests are molecular pathology of human disease and the development, translation and application of advanced methods for the diagnosis of disease, and cardiac risk.

Joanne Deely is a scientist and medical writer. She was commissioned by Canterbury Health Laboratories to document the impact of the Christchurch earthquake on the laboratories. She is a member of the Rhise working group, Emergency Medicine and Nursing Research Group, Medical Writers Association Australasia (MWAA), and Technical Communicators Association, New Zealand (tcanz), and Royal Society of New Zealand (MRSNZ).
The 22 February 2011 Christchurch Earthquake: a gender disparity amongst earthquake victims

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7. Injury Prevention Research Unit, University of Otago, Dunedin

A magnitude 6.3 earthquake struck Christchurch on 22 February 2011 at 12.51pm. In the first 24 hours, 182 people were killed and 6659 people injured.¹ A significant gender disparity was observed within the injured population with nearly twice as many females injured as males.

The aim of this study was to investigate the demography of patients injured. The study was divided into two parts. Firstly, the nature of the gender disparity amongst the hospitalised earthquake victims was stratified for injury severity. Gender distributions within these groups were then examined. Secondly, demography of injured patients was compared with baseline population demographics and possible causes of injury. A ratio of approximately 2:1 females to males was found in both parts of this study. Preliminary results suggest a relationship between the gender disparity and actions taken during the shaking.


Sarah Standring is a fourth year medical student studying at the University of Auckland, based at Auckland City Hospital in 2013. For the past three summers, she has worked under the guidance of Professor David Johnston and Professor Mike Ardagh on projects investigating injuries resulting from the major earthquakes in Christchurch. She is interested in emergency medicine and medical teaching, but would also like to become more involved in research in future.
Behavioral responses to immediate shaking in earthquakes in Christchurch, New Zealand and Hitachi, Japan

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This study compared people’s immediate responses to earthquakes in Christchurch, New Zealand, and Hitachi, Japan. 257 people in Christchurch and 332 people in Hitachi were surveyed for their emotional reactions, risk perceptions, and immediate protective actions during the shaking. In both cities, respondents’ physical, household, and social contexts were similar. In Hitachi, residents reported slightly higher levels of emotional reactions and risk perception than did Christchurch residents.

Contrary to the advice of emergency officials, the most frequent response in both cities was to freeze. Christchurch residents more often dropped and took cover than Hitachi residents. Hitachi respondents more frequently immediately evacuated from buildings than Christchurch respondents. There were small correlations between immediate behavioural responses and demographic characteristics; previous earthquake experience; and physical, social, or household context.

David Johnston is a senior scientist at GNS Science and Director of the Joint Centre for Disaster Research at Massey University. His research focuses on human responses to disasters, crisis decision-making, public education, and building community resilience and recovery. David is Chair of the international Integrated Research and Disaster Risk Scientific Committee. He is also on New Zealand’s Royal Society Social Science Advisory Panel, and the editor of the Australasian Journals of Disaster and Trauma Studies, and founding editor of the Journal of Applied Volcanology.

Human response to earthquake shaking: analysis of video footage of the 2010–2011 Christchurch earthquake sequence

Emily Lambie¹, Thomas Wilson¹, David Johnston², Steven Jensen³, Erik Brogt⁴

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3. Preparedness, Health and Safety Services, California State University
4. Academic Development Group, University of Canterbury

The influences on human behaviour during earthquake shaking include the environment the individual is located in immediately before and during the earthquake; who the individual is with at the time of the earthquake; individual characteristics, such as age, gender, previous earthquake experience, etc.; and the intensity and duration of earthquake shaking. However, little research to date has systematically analysed the immediate observable human responses to earthquake shaking, mostly due to data constraints and/or ethical considerations. Research on
human behaviour during earthquakes has relied on simulations or post-event, reflective interviews and questionnaire studies, often performed months or years following the event. Such studies are therefore subject to limitations such as the quality of the participant's memory or realism of a simulation.

The aim of this research is to develop a robust coding scheme to analyse human behaviour during earthquake shaking using video footage. This allows actual observations of individuals during real earthquakes. The coding scheme was developed in a two-part process, combining a deductive and inductive approach. Previous research studies of human behavioural response during disasters and other crisis events provided the basis for the coding scheme. This was iteratively refined by applying the coding scheme to a broad range of video footage of people exposed to strong shaking during the Canterbury earthquake sequence. The aim of this was to optimise coding scheme content and application across a broad range of scenarios, and to increase inter-rater reliability. The methodology developed will enhance objective observation of video footage to explore: reaction time, patterns of behaviour, and social, environmental and situational influences of behaviour. This will provide guidance for building configuration and design, and evidence-based recommendations for public education about injury-preventing behavioural responses during earthquake shaking.

Emily Lambie is currently studying towards her Masters degree at the University of Canterbury. Her research topic is developing a methodology to analyse immediate behavioural response to earthquake shaking, using video footage from the recent Christchurch earthquake sequence. Her interests are natural hazards, risk assessment and communication and disaster risk reduction.

Smoking, relapse and the Christchurch earthquakes

Vivien Daley
Smokefree Manager, Canterbury District Health Board

The magnitude 7.1 Canterbury earthquake in September 2010 and associated aftershocks caused untold damage, drastically changed residents' living, working, and social conditions, and took the lives of 185 people. A local study has shown that the prevalence of smoking increased following both the September 2010 and the February 2011 quakes, mainly attributable to ex-smokers relapsing.

Tobacco consumption in those currently smoking increased. The normalisation of smoking as a valid response to the stress caused by a traumatic event is discussed. This presentation outlines the need for disaster planning to include initiatives to ensure that access to Nicotine Replacement Therapy (NRT) is available for people making quit attempts following a disaster and to ensure that relevant public health messages around smoking are promoted and distributed.

Vivien Daley is the Smokefree Manager of the Canterbury District Health Board, with responsibility for developing the strategic direction for Smokefree in the Canterbury District Health Board area. Her current focus is the implementation of the ABC Strategy for Smoking Cessation across primary and secondary care, and the community. Her previous work history includes some years at Pegasus Health as Population Health Manager, time at the Christchurch School of Medicine conducting research in the adolescent sexual health area, and many years working in health promotion in the community. Vivien
is a current member of the National Smokefree Working Party. She has held the role of Vice-President of the Public Health Association of New Zealand and was a Council member of the Health Promotion Forum (NZ) for many years. Vivien is a past Chairperson of Smokefree Canterbury.

The challenges for general practitioners (GPs) following the 2010/2011 Canterbury earthquakes

Sarb Johal, Zoe Mounsey, Robyn Tuohy, David Johnston
Joint Centre for Disaster Research, Massey University

This research aimed to explore how GPs coped with the dual challenges of personal and work demands during disaster response and recovery in Canterbury. The study was qualitative using semi-structured interviews with eight GPs from the Christchurch area exploring their experiences. The interviews revealed that the GPs faced a range of challenges including dealing with a different and increased workload. Some practices experienced higher workloads due to population migration whereas other GPs found themselves without a job.

GPs engaged a wide-range of coping behaviours including accessing peer support, taking time away from work, and avoidance of news media. Many GPs experienced significant increases in workload indicating a need to coordinate locum support after disaster. GPs identified a number of effective coping behaviours though some only in hindsight. It is likely that greater awareness of self-care strategies such as part-time working would benefit GPs responding to disasters. This study has workforce planning implications.

Sarb Johal is Associate Professor of Disaster Mental Health, Joint Centre for Disaster Research, School of Psychology, Massey University. Sarb’s research interests include psychological impacts of and recovery from disasters.

The participation and quality of life outcomes following physical disability as a result of an earthquake: a systematic review

Joanne Nunnerley¹, Gary Hooper¹, Tim Woodfield¹, Kathryn McPherson², Jennifer Dunn¹

1. Department of Orthopaedic Surgery & Musculoskeletal Medicine, University of Otago, Christchurch
2. Health and Rehabilitation Research Institute, Auckland University of Technology

In 2011 approximately 14,629 people worldwide were injured in earthquakes. Earthquakes produce a unique injury picture, but little is known about the health and wellbeing outcomes of individuals injured in earthquakes. The primary aim of this review was to quantify levels of participation and Quality of Life (QOL) in individuals with earthquake related injuries.

This systematic review was based on the guidelines from the National Health Service Centre for Reviews and Dissemination. A literature search was conducted on the
following databases: Ovid on Medline, Embase, PsycINFO (American Psychological Association database), CINAHL (Cumulative Index to Nursing and Allied Health), and AMED (Allied and Complementary Medicine Database). Inclusion criteria were limited to studies involving participation or QOL outcomes in adults with physical injury sustained in an earthquake. One researcher undertook the search, screening and appraisal using the Critical Appraisal Skills Programme (CASP) to assess quality with 10% of the articles independently reviewed for reliability by two other researchers. Data from the included studies was extracted on: the intervention aims, study aims, study design, methods used, characteristics of participants, characteristics of the study setting, outcome measures used, and reported findings. Of 414 identified articles, only four articles meet the inclusion criteria. The included articles reported outcomes from the 2001 Gujarat, and 2008 Sichuan earthquake.

The results from these studies from earthquakes occurring in developing countries indicated that victims, who experienced Spinal Cord Injury or fractures, continued to have limitations in function, participation and reduced QOL between 1.5 and 2 years post injury. The research into participation outcomes following physical disability from earthquake injury is limited and has methodological limitations.

The results indicate potential benefit from participation focused rehabilitation for individuals with earthquake related trauma, which may include international assistance in developed countries. More research is required into participation and QOL outcomes for people injured in earthquakes in developed countries.

Joanne Nunnerley graduated as a physiotherapist in the UK in 1996. She has worked at the Burwood Spinal Unit in Christchurch since 2001, and part time as a clinical researcher for the Burwood Academy of Independent Living since 2007. Joanne is currently a PhD candidate at the University of Otago, Christchurch.

Lessons from the February 2011 earthquake for the training and preparation of post graduate year-one doctors

Dale Sheehan¹, John Thwaites¹, Blair York², Alex Lee²

1. Medical Education and Training Unit, Canterbury District Health Board
2. RMO Unit, Canterbury District Health Board

On that fateful day in February there was considerable distress and damage throughout the three hospitals which impacted on the junior medical workforce working on the wards and in clinics. The study was undertaken to document and describe postgraduate year 1 (PGY1) house officer’s personal and professional experience of the Christchurch earthquakes. This retrospective study used a mixed methods design and is part of the Researching the Health Implications of Seismic Event group (RHISE).

While the Canterbury District Health Board did have and does have a current disaster plan, improved training for junior doctors is required to ensure that they have a clearer understanding and awareness of disaster management at both a professional and a personal level.¹ In addition, qualitative data from the survey and thematic analysis of the narratives shows that few doctors were emotionally prepared for the events of 22
February 2011. This poster focuses on the qualitative data, which provide an insight into the experience and reminds us of the personal impact of any disaster on a workforce. After the event, house officers reported feeling shocked, vague and tired, and some were worried about making good judgements. One respondent said ‘It was just hard, everything was much more emotional and intense and at work you can’t just fall apart, so you just focus on doing your job’.

Ways in which House Officer’s found work difficult in the weeks following the earthquake included lack of sleep because of aftershocks, distressed patients, altered living conditions, travel problems and the fact that they had a run (ward) change a week after the event. We hope this study can contribute to and spark interest into further exploring the emotional impact of such events within the health research community.


Dale Sheehan is Medical Education Coordinator, Medical Education and Training Unit, CDHB and Senior lecturer in clinical teaching and supervision, School of Health Sciences University of Canterbury. Dale’s interests are in junior doctor education, clinical teaching and supervision. John Thwaites is Director of Clinical Education, Medical Education and Training Unit, CDHB. As well as being a physician John has a strong research and practice interest in medical education at all stages of the medical education continuum. Blaire York and Alex Lee where PGY1 House Officers at CDHB at the time that this work was undertaken.

Costs and effects: analysing the social costs of the Canterbury earthquakes

Ann Brower¹, Josh Flores², David Johnston³, Kelvin Berryman⁴

1. Faculty of Environment, Society and Design, Lincoln University
2. BEMP candidate, Lincoln University
3. Joint Centre for Disaster Research, GNS Science/Massey University
4. Natural Hazards Research Platform, GNS Science

On 22 February 2011, the built environment of Canterbury caused 183 deaths¹ (of 185 in total) and 3127 injuries (of 7171 in total). In the case of many seismic retrofits and make-safe actions, the owner pays the costs of an upgrade, while the public pays the cost of failing to upgrade. This privatises the cost of action, while socialising the risk of inaction. Our research aims to contribute to national dialogue around building safety by examining the social costs of failing to act to retrofit or make-safe, more specifically by:

- Quantifying the financial costs of injuries and opportunity costs of fatalities caused by the built environment on the 22 February earthquake
- Quantifying a proxy for the economic contribution of the buildings involved by using sales history and government valuations
- Analysing these data spatially via GIS

Our poster elaborates on a snapshot of one building, showing the data we are collecting around the city. Fortunately, it is not a representative sample of the city.
We use it to illustrate what analysis is possible, with the hopes of generating suggestions from colleagues about questions to ask, data to include, methods to pursue, and pitfalls to avoid.

<table>
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<th>Type of cost</th>
<th>$ value</th>
<th>Costs (benefits) borne (enjoyed) by whom?</th>
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<td>$200,000</td>
<td>Private, but not done</td>
</tr>
<tr>
<td>Out of pocket (ACC) health costs</td>
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<td>Public</td>
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<td>Opportunity costs, as value of preventable fatalities</td>
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<td>Public</td>
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<tr>
<td>Capital value of building</td>
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<td>Private</td>
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Ann Brower is a Senior Lecturer in Environmental Policy in the Department of Environmental Management at Lincoln University. She holds a PhD in Environmental Science, Policy, and Management from the University of California Berkeley. She also holds a Masters degree in Forest Science from Yale University, and Political Science from the University of California Berkeley. Her specialty is environmental policy, especially as it relates to state-owned lands and natural resources in the US, Australia, and New Zealand. She is the author of ‘Who owns the high country?’ (Craig Potton Publishing, 2008), which stimulated a national debate about the ongoing South Island land reform that is transforming the landscapes of the Southern Alps. Borrowing from Wildavsky (1973), her book aims to uncover how great expectations in Wellington were dashed in Wanaka. She has published in numerous journals, including the Georgetown International Environmental Law Review, Conservation Letters, NZ Journal of Ecology, and Land Economics.

**Crisis leadership in an acute clinical setting: Christchurch Hospital Intensive Care Unit, February 2011**

Lev Zhuravsky
**Charge Nurse Manager, Day Stay Unit, Christchurch Hospital**

An Intensive Care Unit (ICU) is a geographically distinct area of a hospital where critically ill and injured patients undergo continuous monitoring and support of failing organ systems. Leadership in the ICU, both in the routine environment and crisis situations is critical. The health response to the Christchurch earthquake was unique because this city with an urban population of about 400,000 people has only one hospital with an emergency department and intensive care unit.

The main purpose of this study was to investigate if shared leadership is possible and warranted during a crisis engendered by a natural disaster, through an exploration of the nature of both specialist and nursing leadership in the Intensive Care Unit of Christchurch Hospital within the first seventy two hours of the earthquake. This qualitative study explores the Intensive Care’s staff experiences and adopted leadership approaches to manage the large scale crisis resulting from the city-wide disaster. Indepth interviews were conducted with ten members of the ICU team. Thematic analysis of the verbatim transcriptions revealed three main global themes: core formal leadership competencies, a role of informal leadership in crisis, and a contribution of shared leadership approach to an overall management of a crisis.

This research highlighted the importance of main formal leadership competencies such as decision making abilities, ability to remain calm and effective.
communication. A contribution of an informal leadership focussed on motivation to lead, autonomy and emotional support. Shared leadership played an important role in managing a complex critical situation triggered by a natural disaster. The results of this research could potentially add value to the research field of crisis leadership and contribute to the development of professional and personal capacity building programmes and interventions aiming to assist existing and future leaders in managing complex crises.

Lev Zhuravsky is a nurse manager with particular expertise in crisis leadership, trauma, critical care nursing, and project management. He has worked in trauma ICU at one of the largest trauma centres in Israel. From 2002–2008, Lev worked in the ICU of Christchurch hospital. In a capacity of CNM of medical ward Lev was actively involved in relocation and re-establishment of acute medical services after the Christchurch earthquake. In 2013, he completed his Masters on crisis leadership in the intensive care unit of Christchurch Hospital during February’s earthquake. Lev’s main research and project development interests include: creating competency-based crisis leadership training programmes, motivation to lead, fostering and support of informal leadership in crisis, shared leadership in critical situations, crisis and disaster management. He received a Christchurch Earthquake Award for Service in 2012. Contact: Lev.zhuravsky@cdhb.health.nz

The value of integrated midwifery care in natural disasters

Rose Barker1, Samantha Burke2, Margaret Kyle3, Claire MacDonald3

Midwife, Canterbury District

1. Director of Midwifery, Women's & Children's Health, Christchurch Women's Hospital
2. Co-Chair, Canterbury & West Coast Region New Zealand College of Midwives

This poster demonstrates the effectiveness and resilience of the New Zealand maternity system throughout a time of natural disaster, the Christchurch Earthquake in February 2011 and in the weeks and months following this.

The maternity system and midwifery care continued with little change for women with midwives continuing to provide care throughout pregnancy, labour and birth and in the postnatal period. Midwives continued to provide care in the woman’s home, in clinics or in hospital. For some women, and their whanau, the midwife visiting them at home was the first ‘official’ person they saw following the earthquakes. Some women chose to leave Christchurch after the earthquakes. Midwives from around New Zealand were willing to provide care for women who arrived in their area, usually at short notice, and at any stage of pregnancy. Most women in Christchurch have midwifery notes which they carry throughout their pregnancy, birth and postnatal period. These are standardised maternity notes developed by the Midwifery and Maternity Providers Organisation (MMPO), which was established by the New Zealand College of Midwives in 1997 to provide its Lead Maternity Carer midwives with a supportive practice management and quality assurance structure and a business framework.

The effectiveness of this system was also demonstrated following the earthquakes when women leaving Christchurch were able to leave with a record of their care and
history. This meant that their midwifery care could be provided in a seamless manner by midwives, throughout New Zealand who continued to provide their care.

This poster was put together in a joint initiative by the Canterbury / West Coast Region and National Office of the New Zealand College of Midwives and by staff from Women’s and Children’s Health, Canterbury District Health Board. The New Zealand College of Midwives is the professional organisation for midwives, representing nearly 90% of practising midwives in New Zealand. It offers professional information, education and advice to women, midwives, District Health Boards, workforce unions, schools of midwifery and the Ministry of Health regarding midwifery and maternity issues. The College sets professional standards, provides continuing education for registered midwives and conducts the Midwifery Standards Review process for all practising midwives in New Zealand. To maintain its woman-centred focus, the College works in partnership with women by encouraging consumer membership and involvement in the development and maintenance of the midwifery profession. Women and Children’s’ Health, Canterbury District Health Board has a range of maternity services including pregnancy and parenting classes, pregnancy testing and post-natal care. Women can birth at Christchurch Women’s, Burwood, Ashburton, Lincoln and Rangiora hospitals. Christchurch Women’s Hospital provides a tertiary level maternity service and the other units provide primary care with the midwives employed within the CDHB providing 24 hour care for the woman’s postnatal stay. They also provide back up and support for the woman’s Lead Maternity Carer whilst the woman is in labour and birthing her baby.

**Resilience of the Canterbury hospital system to the 2011 Christchurch Earthquake**

Jason McIntosh¹, Caitlin C Jacques², Sonia Giovinazzi³, Thomas D Kirsch², Thomas Wilson¹, and Judith Mitrani-Reiser²

1. Department of Geological Sciences, University of Canterbury
2. Department of Civil Engineering, Johns Hopkins University
3. Department of Civil and Natural Resources Engineering, University of Canterbury

This research analysed the performance of the Canterbury hospital system during to the 2010–2011 Canterbury earthquakes in New Zealand using a holistic and multidisciplinary approach. The aim was to identify the resilience factors that allowed the compromised system to adapt and continue to provide health services in the emergency and recovery phases, and to translate them into metrics and models that might be used worldwide to assess and compare alternative resilience enhancement strategies for hospitals. Data on the performance of the physical, human and organizational infrastructures of the Canterbury hospital system were collated in an integrated and geocoded database. A fault-tree analysis method that forecasts loss of hospital services as a function of loss of critical utilities was developed based on physical relationships within a hospital, and tested using the aforementioned data. Two new resilience metric equations, for quantifying hospital residual capacity and quality of care, were proposed and calibrated on the collected data.

Sonia Giovinazzi’s expertise and research activities focus on seismic risk analysis and damage scenarios, toward seismic risk mitigation and management and post-disaster resilient recovery at regional scale. Sonia is currently a Research Fellow in Risk Management at the Civil and Natural Resources Engineering Department, at University of Canterbury, NZ. In the aftermath of the
Canterbury earthquakes, Sonia led different projects funded by the Natural Hazard Research Platform of NZ, to provide on-the-ground support to the initial recovery phase for multiple end-users and agencies, including the Canterbury Health District Board. Sonia acted as a consultant for the Canterbury Earthquake Recovery Authority (CERA) on decision support tools for post-disaster reconstruction planning at the urban scale.

Software in hard times: creating a disaster response application for health systems

Jacob DuVal¹, Dominic Johnpillai¹²

1. Iron Wing medical software company, Christchurch
2. Faculty of Medicine, University of Cambridge

The frequency and magnitude of major emergencies are on the rise. Larger buildings, populations, lifeline, and transportation systems increase the risk posed by natural disasters or human errors/intent. Response systems must compete with this growth in risk, and technological innovation is undeniably essential to success.

This project aims to accelerate existing disaster response systems by creating a website and mobile application. Activation of the Response Plan will push notifications to personnel via the app and allow the user to indicate safety and availability. Individual profiles will allow the system to automatically assign available professionals to specific controller or team roles based upon specialty and seniority. Relevant sub-plans will then be instantly delivered to a professional’s phone. It will also display patient numbers per triage category and emergency department/intensive care unit bed availabilities, and information entered by controllers using the web system.

This design will facilitate a rapid, effective response despite chaos and a ticking clock. Future expansion will leverage internal messaging to enhance dynamic control, GPS location of team members within the hospital and even provide ‘off-line’ use.

Dominic Johnpillai is a final year medical student at University College London and is conducting emergency response research in his hometown, Christchurch, during his elective there. He graduated from pre-clinical medicine at the University of Cambridge in 2011, the same year he received the Pathology Dissertation Prize for research in public health. He is co-founder of Iron Wing, a medical software development company.

Jacob DuVal is an intermediate software engineer currently working at Canterbury Business Solutions. Since graduating from Canterbury University, he has played pivotal roles in developing large social media platforms as well as in medical software. Jacob is a regular speaker at the .Net User Group and is also a co-founder of Iron Wing.
UC CEISMIC: a federated database for post-disaster research and information management

Paul Millar, James Smithies, Christopher Thomson  
School of Humanities and Creative Arts, University of Canterbury

Following the earthquake that struck Christchurch on 22 February 2011, staff in the School of Humanities at the University of Canterbury initiated a digital archive project to create an open-access repository of information about the earthquakes and their impacts upon the Canterbury region.

Building upon overseas models, such as the 9/11 Digital Archive and the Hurricane Memory Bank, the project quickly grew into a Consortium of regional and national cultural heritage institutions, using a federated database architecture to create and aggregate multiple collections of digital objects and websites. By engaging with New Zealand’s existing national digital infrastructure and services – notably DigitalNZ, a unit of the National Library of New Zealand – UC CEISMIC has created a broad-ranging collection of primary and secondary materials relevant to the Canterbury earthquakes, and is working to enable discovery and re-use of this digital content. To address the need for a dedicated research node within UC CEISMIC’s federated database, the University of Canterbury built a digital object repository, QuakeStudies that provides a dedicated space for research files and data as well as large collections of documents, images and video.

About 200 organisations and individuals have contributed to the approximately 40,000 records UC CEISMIC makes available to the public, and more than 50% of these are stored in QuakeStudies. A programme office has been established at the University of Canterbury to work with individuals, community groups, local and government agencies, and businesses to build the archive still further. Health research has been identified as a significant gap at present, but there is strong potential to remedy this by connecting the work of the Rhise group with UC CEISMIC.

Paul Millar coordinates the University of Canterbury's English, Cinema and Digital Humanities programmes. He researches and teaches in the areas of New Zealand Literature and Literary Biography, and has published extensively on the poetry of James K. Baxter. His most recent book is the co-authored study The Snake-Haired Muse: James K. Baxter and Classical Mythology (VUP, 2011), and his acclaimed literary biography No Fretful Sleeper: A Life of Bill Pearson (AUP, 2010) was a finalist in the New Zealand Post Book Awards. Millar has twice judged the New Zealand Book Awards, and in 2000 he was awarded a Fulbright Fellowship to teach and research at the University of Hawaii at Manoa. Millar's long association with digital humanities projects dates back to 2001 when he co-founded the New Zealand Electronic Text Centre (www.nzetc.org).

James Smithies was the project manager for UC CEISMIC from inception through to go-live. Now the programme is operational, he’s developing the UC Digital Humanities Programme. He completed a Ph.D. in the history of New Zealand literary-cultural criticism in 2002, and has worked as a technical writer, senior business analyst and IT project manager. His research focuses on the history of literature, technology and ideas. His current research project explores the literature, culture and technology of nineteenth century New Zealand. He is involved in several digital humanities initiatives, including the UC CEISMIC Digital Archive, http://humanitiesmachine.org.nz and academicami.org.

Christopher Thomson is the UC CEISMIC Programme Office Manager. He completed a Ph.D. at the University of Canterbury and has taught there regularly as a fixed-term lecturer and teaching assistant. He has also worked in the fields of audio transcription and e-learning. He is currently working on editing and publishing WWI letters as part of the WW100 ‘Life 100 Years Ago’ project, and he is a
collaborator on a digital edition of a bibliography of Māori writing in English. His interests include the use of digital tools for publishing and analysing literary and historical texts, digital bibliographies, e-learning, and twentieth and twenty-first century fiction (particularly the English and Irish novel). For more, see www.christopherthomson.co.nz

‘Ripple effects’ on older people of the Canterbury earthquakes: results from a national longitudinal study

Sally Keeling¹, Fiona Alpass², Christine Stephens², Brendan Stevenson³

1. Department of Medicine, University of Otago, Christchurch
2. School of Psychology, Massey University
3. Centre for Maori Health Research and Development, Massey University

The timing of the 2010 and 2012 surveys conducted by the New Zealand Longitudinal Study of Ageing provides a clear “before and after” dimension to the exploration of the impacts of the Canterbury earthquakes, on the study population of older people. Our data shows some effects (after controlling for baseline differences) on measures of living standards, as well as on physical and mental health, according to location, and degrees of recorded direct and indirect exposure to the Canterbury earthquakes. In particular, the aspects of control and self-realisation within the quality of life measure show different trends based on location and exposure to earthquake effects. Other psychosocial measures of loneliness and depression also show regional differences. These differences are not unidirectional or consistently negative, to the extent that some exposure suggests positive outcomes on some measures. The relevance and value of these findings in terms of policy will be further enhanced by our future ability to continue to track such effects over the longer term, in light of the scale and duration of the Canterbury recovery process, and of other emerging phases of this country’s exposure to a potentially hazardous seismic environment.

This paper comes from the Health and Ageing Research Team (HART), which was established in 2004 in the School of Psychology, Massey University and includes Professor Fiona Alpass, Professor Chris Stephens, Dr Joanne Taylor, Dr Rachael Pond, Mr Brendan Stevenson, & Ms Vicki Beagley from Psychology; Professor Steve La Grow, Dr Mary Breheny, Dr Andy Towers, & Dr Polly Yeung from Health and Social Services; Dr Juliana Mansvelt from People, Environment and Planning; and Dr Sally Keeling from the University of Otago, Christchurch. Among the projects HART has led, is a longitudinal study of older New Zealanders begun in 2006 which has encompassed numerous research partners (Research Centre for Māori Health and Development; New Zealand Institute for Research on Ageing; Family Centre Social Policy Research Unit), four discrete data collection waves, and over 8000 participants. HART data from the 2012 data collection included a number of Christchurch earthquake specific questions allowing changes in participants status due to the Christchurch earthquakes to be assessed.

Sally Keeling is a social scientist who works as a Senior Lecturer in the Dept of Medicine, University of Otago, Christchurch. Her research interests for the last 20 years have explored the social context of ageing in New Zealand, through involvement with several longitudinal interdisciplinary studies of ageing, health and wellbeing, with a particular focus on social support and family caregiving, and implications for policy and practice.
The influences on return to employment/productivity for people injured as a result of the Christchurch 22 February 2011 earthquake: a grounded theory study

Joanne Nunnerley¹, Jennifer Dunn¹, Kathryn McPherson², Tim Woodfield¹, Gary Hooper¹

1. Department of Orthopaedic Surgery & Musculoskeletal Medicine, University of Otago, Christchurch
2. Health and Rehabilitation Research Institute, Auckland University of Technology

Return to work (RTW) following injury improves quality of life, restores important pre-injury roles and is a means of social interaction. Despite the importance of employment, the RTW rate in spinal cord injury (SCI) and other trauma populations is comparatively low. A systematic review of the literature showed low RTW following injury in an earthquake in a developing country, but no studies investigated these outcomes in a developed country.

The aim of this study was to explore factors that influenced return to employment/productivity (such as home making, school or education programs, community organisation and leisure time activities) for individuals with moderate or severe injuries requiring hospitalisation as a result of the 22 February Christchurch earthquake. Semi-structured Interviews of 14 people with moderate or severe injuries were performed at two time points. In addition professionals involved in the RTW process were interviewed (n=12). The study used a constructivist grounded theory methodology in keeping with Charmaz’s approach.

Data Analysis focussed on the differences in the RTW processes and outcomes as a result of the earthquake. Preliminary results show good RTW rates in the injured individuals from the Christchurch earthquake. There are unique factors influencing RTW in individuals injured in the Christchurch earthquake compared to other trauma populations. The themes identified include the shared experience of being involved in the earthquake, the secondary effects of the earthquakes, and the uniqueness of the injury.

The return to employment/productivity following traumatic injury as a result of an earthquake is complicated by ongoing environmental factors. However the positive influences on RTW could be utilised in the non-earthquake related trauma population to improve employment/productivity outcomes.

Joanne Nunnerley graduated as a physiotherapist in the UK in 1996. She has worked at the Burwood Spinal Unit in Christchurch since 2001, and part time as a clinical researcher for the Burwood Academy of Independent Living since 2007. Joanne is currently a PhD candidate at the University of Otago, Christchurch.
Employee resilience and organisational factors: the workplace as a venue for building community resilience

Katharina Näswall¹, Sanna Malinen², Joana Kuntz¹

1. Department of Psychology, University of Canterbury
2. Department of Management, University of Canterbury

To date, the resilience literature mainly focuses on the clinical notion of coping with challenging life circumstances, and views the construct as primarily dispositional. However, recent research has proposed a departure from the trait-like approach, suggesting that resilience can be cultivated, and that successful adaptation to adversity or change is symptomatic of its developable nature. Despite the likely connections to positive responses in changing environments, the investigation of resilience in the workplace is largely limited to an organisation-level assessment, or to the trait-based approach, without looking at the aspects of resilience among employees which can be facilitated by the organization. Also, research to date has yet to investigate the association between employee resilience and important work-related outcomes.

The present study aims to introduce a measure of employee resilience, developed to assess the interplay between employee and the organization in facilitating proactive and adaptive behaviours during organisational change. The study also aims to investigate the relationship between employee resilience and organizational factors, such as organizational support and participation as predictors of employee resilience, and work-related attitudes as outcomes of resilience. The data was collected in a New Zealand professional organization. The context includes both internal (changes to workload and performance management) and external challenges (economic turbulence and the parts of the country recovering from natural disaster). The preliminary results indicate that the newly developed measure of employee resilience indeed captures something that is not a trait or a coping strategy.

Results of regression analyses indicate that employee resilience is related to important work-related attitudes such as higher job satisfaction and engagement, and lower turnover intention. Even though the results of the present study are preliminary in that the research questions are only tested in a cross-sectional sample and thus cannot allow for causal inferences, they are promising by their indicating that employee resilience can be affected by organizational factors such as support and participation, and that it relates to positive outcomes which benefit both the employee and the organization. In turn, employee resilience and facilitating organisational factors will contribute to the resilience of the community.

Katharina Näswall, Senior Lecturer, Department of Psychology, University of Canterbury. She is interested in employee and organisational resilience, job insecurity, employee wellbeing and health, boundaryless working life, and research methods.
Voices of resilient five-year olds

Annabel Carter
Department of Health Sciences, University of Canterbury

Christchurch has experienced a series of over 13,500 earthquakes between September 2010 and January 2012. Some children who have been exposed to earthquakes may experience post-traumatic stress disorder (PTSD) symptoms including difficulty concentrating, feeling anxious, restlessness and confusion. Other children may be resilient to the effects of disaster.

Western models of resilience relate to a child’s social support and their capacity to cope. The Māori model of wellbeing relates to whanau (family), wairua (spiritual connections), tinana (the physical body) and hinengaro (the mind and emotions). Children’s concepts of helping, caring and learning may provide insight into resilience without introducing the topic of earthquakes into the conversation, which in itself may provoke an episode of stress. Many researchers have studied the effects of earthquakes on children. However, few studies have examined positive outcomes and resilience or listened to the children’s voices.

The objective of this study was to listen to the voices of children who experienced the Canterbury earthquake period in order to gain a deeper understanding of the ideas associated with resilience. Individual interviews were conducted with 17 five-year-old participants during their first term of primary school. After the interviews, the teacher shared demographic information and reports on the children’s stress and coping. Six children were identified as New Zealand European and eleven children identified as New Zealand Māori. Children had different views of helping, caring and learning. Themes of resilience from Western and Kaupapa Māori models were identified in transcripts of the children's voices and drawings. Māori children voiced more themes of resilience associated with the Western model, and in the Tapa Whā model, Māori children's transcripts were more likely to be inclusive of all four components of wellbeing.

How five-year-old children, having experienced an earthquake disaster during their preschool years, talk or draw pictures about helping, caring and learning can provide insight into resilience, especially in situations where it is not advisable to re-traumatise children by discussing the disaster event.

Annabel Carter is completing a Masters in Child and Family Psychology. Her interests are psychology and helping and teaching children and young people. In 2012, she worked in Melbourne on a project for diverse populations, funded by the Royal Commission following the 2009 bushfires disaster. She has worked in both education and social services in New Zealand. Currently she is working for the Ministry of Education in a Primary school in Christchurch. Annabel’s current research studies young children’s concepts of helping, caring and learning, in children who experienced the earthquakes during their preschool years. Her Masters’ thesis is on resilience and wellbeing of new entrant children attending a primary school in an Eastern suburb of Christchurch. She completed a literature review of the effects of earthquakes and natural disasters on children’s mental health. She is keen to pursue further study in Child and Family Psychology and to continue research on longitudinal changes in children’s mental health, post-earthquake.
Participatory research with children on their earthquake experiences

Carol Mutch
University of Auckland

The findings presented here are part of a study funded by UNESCO (United Nations Educational Scientific and Cultural Organization) and the University of Auckland which focused on the role of schools in supporting their communities through the Canterbury earthquakes. The larger project was a series of in-depth school case studies in which principals, teachers, school support staff, students, parents, and other family members shared their experiences through audio and video interviews and arts-based activities. This was supported by document, visual and electronic media analysis.

The case studies used a participatory approach whereby each school could negotiate the focus, participants, data collection, analysis strategies, and the format in which they wanted the findings to be presented. One of the key principles underpinning the research was to make children’s stories a central focus. Each school chose to do this differently. The differences led to the lead researcher theorising around the way in which the different approaches engaged children in research that was for, about, with, or by them. For this poster presentation three primary school projects (Hillview, Riverside and Beachlands – not their real names) are described in depth to illustrate three places along a continuum of engagement of children in research that relates to them. Hillview School created a book about children’s experiences.

Riverside School created an earthquake memorial with children and at Beachlands School a documentary was made by children. Two key themes drawn from the findings relating to children’s engagement in earthquake-related research are (a) the framing of children as participatory actors and (b) the provision of safe emotional processing opportunities for children.

Carol Mutch is an associate professor in the School of Critical Studies in Education, in the Faculty of Education, at the University of Auckland. She is the director of the Te Whakatere au Papori (Navigating Social Currents) Research Unit. Her teaching, research and writing is in educational policy, research and evaluation methodologies, and social and citizenship education. She is a Christchurch resident who commutes to Auckland weekly. Following the earthquakes she undertook research into the role of schools following the earthquakes. This research is ongoing as she follows schools through the post-earthquake school closures and amalgamations. She has recently co-edited a special issue of the journal Disaster Prevention and Management on different disciplinary lenses on the Canterbury earthquakes.
The psychology of earthquake stress cardiomyopathy, non-cardiac chest pain and myocardial infarction

Julie Zarifeh¹, Roger Mulder², Andrew Kerr³, Christina Chan⁴, Paul Bridgeman⁴

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2. Department of Psychological Medicine, University of Otago, Christchurch
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Stress cardiomyopathy is the classic psychologically precipitated physical illness. The September 2010 Christchurch earthquake provided a unique opportunity to compare the psychological factors underlying this condition, plus myocardial infarction and non-cardiac chest pain.

We hypothesized that patients with non-cardiac chest pain or stress cardiomyopathy may be more psychologically vulnerable than those with myocardial infarction (heart attack). In the week following the earthquake, cardiology admitting staff prospectively identified female patients with earthquake precipitated chest pain, all meeting strict diagnostic criteria for one of the three conditions. Seventeen consenting patients were interviewed by a senior clinical psychologist. Premorbid psychological factors, experience of the earthquake and psychological response to the earthquake were assessed using validated tools. Earthquake experiences were notably similar across the groups. Patients with non-cardiac chest pain scored high on the HADS (Hospital Anxiety and Depression Scale), the Eysenck neuroticism scale and the Impact of Event scale. Women with stress cardiomyopathy scored as the most psychologically robust; depression and extroversion scores were the same across groups.

Stress cardiomyopathy following an earthquake does not appear to be specific to psychologically vulnerable women. Women presenting with non-cardiac chest pain have both higher health anxiety, and generalized anxiety, and score more highly on neuroticism scales, when compared with women diagnosed with either myocardial infarction or stress cardiomyopathy.

Julie Zarifeh is a Senior Clinical Psychologist working across Psychiatric Consultation-Liaison Service/Cardiology Departments. Her role is to undertake assessments and psychological interventions for Canterbury District Health Board (CDHB) patients suffering significant comorbid physical health and emotional health symptoms. This work is across the disciplines of Oncology, Cardiology, Nephrology, Dermatology, Medical/surgical specialties and other fields. Julie also undertakes teaching and liaison with medical/ allied health CDHB staff, as well as the Cardiac-Rehabilitation service and other community non-governmental organisations. Following the Sept 2010 Christchurch earthquake Julie was part of a small multidisciplinary research team who investigated the potential role of psychological factors as having played a role in the presentation of a noticeable increase in the number of (mostly) women who were admitted to Christchurch Hospital with ‘Broken Heart Syndrome,’ (Takotsubo Cardiomyopathy).
Slipping between the cracks: metacognitive therapy for earthquake-related post-traumatic stress disorder: a case study

Jennifer Jordan
Department of Psychological Medicine, University of Otago, Christchurch

The active earthquake sequence since 4 September 2010 has had profound effects on those who live in Christchurch. Many experienced acute stress symptoms immediately after the February quake, however most in the community appeared to be recovering. After major aftershocks though, waves of referrals were made for psychotherapy for earthquake-related distress, particularly after two large aftershocks in June 2011, highlighting the development of chronic PTSD (post-traumatic stress disorder).

This case study illustrates the application of Wells and Sembi’s metacognitive therapy for PTSD. A brief history will be followed by presentation of the metacognitive formulation, a description of treatment techniques used and response to treatment. Pre and post self-report measures will be reported. The client responded well to metacognitive therapy (MCT) for PTSD, achieving significant reduction in symptoms with very brief therapy. Metacognitive therapy appears to be an effective treatment for earthquake-related PTSD as illustrated by this case. MCT may have a particular salience for PTSD symptoms.

Jennifer Jordan is a senior research fellow and clinical psychologist working in the Clinical Research Unit at the Department of Psychological Medicine at the University of Otago, Christchurch, New Zealand. She also works for the Canterbury District Health Board at a specialist Anxiety Disorders Service and in the CDHB Adult Speciality Service Earthquake Treatment Team (ASSETT). She has been an investigator and therapist in a series of randomised clinical trials, evaluating different psychotherapies for serious mental disorders including eating disorders, depression and latterly post-traumatic stress disorder (PTSD) related to the Christchurch earthquakes. She is the principal investigator of a pilot study (still recruiting participants) of metacognitive therapy vs. cognitive behaviour therapy for earthquake-related PTSD.

PTSD symptoms and coping in children beginning school: preliminary findings

Kathleen Liberty¹, Sonja Macfarlane¹, Arindam Basu¹, Jeff Gage¹, Maureen Allan²

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We are beginning a mixed method study to follow a community sample of five-year-old children who experienced the September 2010 earthquake aged between 12 and 42 months. Natural disasters are thought to disrupt neural development with potential long-term impacts. The ages of 12–60 months are sensitive periods for cognitive, language and emotional development and thus likely to be particularly vulnerable to the effects of disasters.
Although it is commonly believed that younger children would be more resilient, and/or ‘forget’ disasters, research has shown this to be false, or a product of developmentally inappropriate assessment, and new PTSD diagnostic criteria for young children have consequently been introduced in May 2013.

The aim of our proposed study is to conduct a mixed-method longitudinal study of stress and coping in children who experienced the Canterbury earthquakes (EQ) during their preschool years. This would be the first longitudinal study of young children post-EQ.

The quantitative methodology of our study will address the question: will children who experienced the EQ ages 12–48 months show PTSD symptoms, coping and/or post-traumatic growth during the beginning years of primary school? The qualitative methodology will explore the views of whānau/family on the child’s wellbeing during and since the EQs, and how the family/whānau have supported their child over this time, as these factors have been identified as crucial for resilience and post-traumatic growth. We began our study this year, and are working with four primary schools, with decile ratings of 2, 4, 5 and 10 on the east side of Christchurch. Initial study data will be compared with similar data from our preEQ study of Christchurch five-year-olds (N=298), completed in 2009. In the present study, we have reviewed school reports on an initial group of 110 children who have started school this year, and preliminary results from these children will be presented on our poster.

Kathleen Liberty is Associate Professor of Early Intervention in Health Sciences, University of Canterbury. Kathleen’s research interests include early intervention in public health, children's learning, health and wellbeing, disability and disorders of childhood and adolescence.

Psychological effects of the 2010 and 2011 Canterbury earthquakes and aftershocks in clients with anxiety disorders

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Due to the unpredictability of natural disasters, relatively few studies have been able to report data on pre-disaster psychological functioning. However, limited research suggests that individuals who have a pre-existing anxiety disorder diagnosis may be more likely to experience heightened posttraumatic stress reactions following a natural disaster.

This cross-sectional study aimed to assess the impact of the 2010 and 2011 Canterbury earthquakes and aftershocks in an adult clinical population with a pre-existing anxiety disorder. Participants were assessed at a community service two years after the Canterbury earthquakes. The experiences of a cohort of individuals with a pre-existing anxiety disorder will be compared and results will be discussed in the
context of reactions to a natural disaster among individuals with a psychological disorder. Clinical and research implications will also be considered.

Caroline Bell is a Psychiatrist and Clinical Head of the Anxiety Disorders Service in Christchurch. This is the only publicly funded specialist service for treating patients with severe anxiety disorders in New Zealand. She is also a senior lecturer at the Department of Psychological Medicine at the Christchurch School of Medicine and Health Sciences, University of Otago. Her research interests include investigating the neurobiological mechanisms involved in anxiety disorders and the clinical effectiveness of different treatment modalities for these conditions. This recent work has focused on the use of a computerised cognitive behaviour therapy treatment for patients with social phobia, panic disorder and GAD (Generalised Anxiety Disorder).

The Anxiety Disorders Service is a community-based team of clinicians who specialise in the treatment of adults experiencing severe anxiety disorders. After being referred from within mental health services or from their general practitioner, clients are given a full psychiatric assessment and provided with a number of evidence-based treatment options. These may include individual or group therapy, medication reviews and trials, as well as support from both physiotherapist and dietician services. To assist with continued development of best practice treatment for anxiety disorders and to evaluate treatment efficacy, the Anxiety Disorders Service conducts research on their group therapy programmes, within both a clinical and academic framework.

Administration in the disaster zone – moving stories from Pathology

Linda Kerr
Department of Pathology, University of Otago, Christchurch

The Department of Pathology is one of the largest departments in the University of Otago, Christchurch. It was the department most disrupted by the main building closure – we are a laboratory department so have specialist staff, space, and instruments. The poster was prepared for the University of Otago General Staff Conference 2012 to support ‘Fragmented Campus: UOC General Staff Navigate the Roadmap to Earthquake Recovery’. The information was easy to collect because we were living and breathing it – the team had to pack up offices and set them up in new locations several times, including furniture, equipment, information technology, and so on. For the team to function, it was important to have administration support integrated with academic staff and that the administration team had to be flexible problem solvers.

‘How we survived the earthquakes’

Elizabeth Hughes
Canterbury Medical Library, University of Otago, Christchurch

The Canterbury Medical Library, University of Otago, Christchurch is the key provider of library and information services for University of Otago, Christchurch School of Medicine and Health Sciences and Canterbury District Health Board. Prior to the February 2011 earthquakes, the library resided on the 6th floor of the University of Otago Christchurch Building. After the earthquakes for almost 2½ years, we provided services from various temporary locations in Christchurch public hospital and eventually in a portacom on Cambridge Terrace.
We returned to our 6th floor location in June 2013. This poster chronicles our journey through some of this time documented by staff who have kept a record of the journey through disaster and repair via photos and staff experiences.

The poster was prepared in 2012 for the University of Otago General Staff Conference in Dunedin in support of the presentation ‘Fragmented Campus: How University of Otago Christchurch General Staff Navigated the Road map to earthquake recovery’ presented by Jane Mariner of Mihi, Robyn Maguigan and Dean Pester of the Deans Department, University of Otago Christchurch School of Medicine and Health Sciences.

Libraries and wellbeing in post-earthquake Christchurch

Sarah Gallagher¹, Andrew Adams², Anna Howard², Donna Robertson², Ryan Reynolds³, Coralie Winn³

1. University of Otago Health Sciences Library, Dunedin
2. Christchurch City Libraries, Christchurch City Council
3. Gap Filler Trust, Christchurch

The effects of the Christchurch earthquake sequence are wide-ranging and have been devastating to communities. The temporary loss of public facilities, such as libraries, has been felt strongly. Libraries fulfil an important place in society for a wide range of people. They provide a place for the community to meet, for ‘literacy, learning and leisure’¹.

Temporary libraries, mobile libraries, roving librarians and community book exchanges evolved to meet the needs of Christchurch’s communities. Evidence from reports, studies, comments in social media, and customer feedback demonstrate clearly that in post-earthquake Christchurch, access to libraries was, and continues to be, extremely important for the wellbeing of individuals. This is evident from increased usage of library websites when physical libraries were unavailable, delight, relief, and increased use when libraries re-opened, or when alternative options were made available.


Sarah Gallagher is an Academic Liaison Librarian at the University of Otago Health Sciences Library in Dunedin. She holds an MA in Classics from the University of Otago and an MLIS from Victoria University of Wellington. At the time of the earthquakes Sarah was working for Boffa Miskell in Christchurch. On hearing about the Gap Filler initiative she contacted Coralie Winn and with Ryan Reynolds with an idea for a book exchange. Together they developed the Think Differently Book Exchange on the corner of Kilmore and Barbadoes Streets. Sarah is interested in the role of libraries as places and in their role in supporting the wellbeing and mental health of communities. The poster and references available from http://hdl.handle.net/10523/4387. Contact: sarah.gallagher@otago.ac.nz
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