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In this Issue of the Journal

Original Articles

The impact of alcohol-related presentations on a New Zealand hospital emergency department
Rebecca Stewart, Manidipa Das, Michael Ardagh, Joanne M Deely, Stuart Dodd, Nadia Bartholomew, Scott Pearson, Ruth Spearing, Tracey Williams, Martin Than

Over 42 8-hour shifts (2 weeks) between 15 November 2013 and 9 December 2013, patients attending the ED with recent alcohol consumption were classified as screen-positive (consumed alcohol in the 4 hours prior to presentation) or not. A subset of screen-positive patients was classified as impact-positive (alcohol consumption clearly contributed to the reason for presenting). Alcohol-related presentations had a significant impact on the ED, particularly on weekends. Teenagers, young adults and middle-aged adults contributed to the alcohol-related patient impact on weekends. Male patients were a significant burden on Saturday evening and night shifts.

Patterns and sources of alcohol consumption preceding alcohol-affected attendances to a New Zealand hospital emergency department
Manidipa Das, Rebecca Stewart, Michael Ardagh, Joanne M Deely, Stuart Dodd, Nadia V Bartholomew, Scott Pearson, Ruth Spearing, Tracey Williams, Martin Than

Alcohol-affected patients presenting to Christchurch Hospital Emergency Department over 336 hours (covering two full weeks) in November and December 2013, were identified and invited to consent to answering questions about their drinking behaviours (amounts, types and sources of alcohol consumed) preceding the presentation. Consumption of large amounts, as well as allegedly ‘safe’ amounts, of a range of alcoholic beverages, most commonly from an off-licence source, contributed to alcohol-affected presentations to the ED. Beverage and source popularity varied by age and gender.

Estimated infant intake of persistent organic pollutants through breast milk in New Zealand
Andrea ’t Mannetje, Jonathan Coakley, Phil Bridgen, Allan H Smith, Deborah Read, Neil Pearce, Jeroen Douwes

Persistent organic pollutants (POPs) include dioxins, PCBs, and organochlorine pesticides such as DDT. POPs are persistent in the environment, accumulate in the food chain, and can be detected in human blood and breast milk. During the first year of life, breast milk is the primary source of postnatal exposure to POPs. Breast milk concentrations of chlorinated POPs were determined for 39 mothers, and the infants’ daily intakes of POPs through breast milk were estimated. The estimated daily intake for New Zealand infants was low (for e.g. dioxin) to average (for e.g. DDT) by
international comparison, and five times lower than 25 years ago. Future breast milk monitoring will determine whether this diminishing trend is continuing.

A new web-based Medication Error Reporting Programme (MERP) to supplement pharmacovigilance in New Zealand—findings from a pilot study in primary care
Desirée L Kunac, Michael V Tatley, Mary E Seddon

Medicines are used commonly and when used appropriately contribute to improvements in health; however, unintentional errors in the use of medicines can be associated with patient harm. To support learning more about medication errors in an effort to prevent patient harm, the New Zealand Pharmacovigilance Centre which operates the Centre for Adverse Reactions Monitoring (CARM) programme, developed a voluntary, web-based, confidential Medication Error Reporting Programme (MERP). The MERP is designed to capture and collate key information about errors so that priorities for improving medication safety can be quickly identified. The MERP was successfully trialled with a small group of general practice and community pharmacy staff where the leading types of error reported were wrong dose and wrong medicine. Use of the MERP helps us to understand more about how and why medication errors occur and has the potential to inform how we can improve the safety of medicines use to prevent patient harm.

Current trends and projections in the utilisation rates of hip and knee replacement in New Zealand from 2001 to 2026
Gary Hooper, Alex J-J Lee, Alastair Rothwell, Chris Frampton

Over the past decade, incidence of total hip and total knee replacements have increased, and by 2026, the number is projected to increase by 84% and 183% respectively. The main increase is in female patients between 70 – 75 years with a high incidence of Polynesian patients requiring knee replacements. This increase will create a significant socioeconomic burden which will necessitate prudent and focused health funding.

Translation of research into clinical practice: a case study of calcium supplement prescribing in New Zealand
Mark J Bolland, Andrew Grey, Ian R Reid

Between 2008 and 2011, our research group published 3 studies showing that calcium supplements increase the risk of heart attack and stroke by a small amount, and that their risks outweigh their benefits. We assessed the impact of this research on prescriptions of calcium supplements in New Zealand. We found that monthly prescriptions of calcium supplements decreased by 66% from 2007 to 2012, and that the annual cost of these supplements to PHARMAC decreased by $1.5 million over this time, with a cumulative reduction in cost of $3.9 million. Our research was funded by the Health Research Council of New Zealand and the University of Auckland, and we concluded that this kind of public-good funding of independent
Viewpoint

Direct-to-consumer advertising of prescription medication in New Zealand
Susanna Every-Palmer, Rishi Duggal, David B Menkes

The last decade has seen increasing measures aimed at regulating the influence of ‘Big Pharma’ following a number of scandals relating to unethical marketing practices. Despite these international trends, New Zealand continues to tolerate a controversial pharmaceutical marketing strategy that has been prohibited in all but two countries in the industrialised world. This is the Direct to Consumer Advertising (DTCA) of prescription medications. While the pharmaceutical industry asserts that DTCA is informational and empowers consumers with medical knowledge, in this article we present New Zealand and international evidence to show that DTCA is a biased source of health information and is associated with unnecessary prescribing, harms to consumers and unnecessary costs to the taxpayer. New Zealand remains an outlier in allowing this controversial and harmful practice. The available evidence suggests that consumers and health care professionals oppose DTCA. It is time for the New Zealand government to review its stance on Direct to Consumer Advertising.
Too many risky drinkers; too little alcohol law reform

Doug Sellman, Jennie Connor

Alcohol (ethyl alcohol) has been a source of delight, comfort, and therapeutics for *Homo sapiens* from our early hunter-gatherer beginnings. Alcohol’s compelling intoxication was a likely factor in maintaining optimism and hope during periods of hardship, and its analgesic and antibacterial properties further contributing to survival, especially through providing sterile fluid to drink.

The downside of alcohol intoxication would have been sporadically evident in individual heavy consumers from ancient times, but the advent of predictable availability of large quantities of alcohol through industrial production took alcohol harm to a new level of social impact, which continues to this day, now being further fuelled by marketing science.

Many effects of intoxication are less obvious than falling down drunk. For example, alcohol’s ability to induce sadistic behaviour at reasonably low consumption levels has been known for some time now.¹ More recently, we have been shown alcohol’s ability to induce a near psychotic misinterpretation of the emotion being expressed on other people’s faces as one of threat, particularly in men.² These insights help in the understanding of why violence and mayhem so often breaks out at heavy drinking ‘social’ events.

Alcohol is our favourite and most well-known recreational drug, and like every other drug, there are benefits and costs that are best to consider before consumption, which are strongly influenced by the dose consumed. Acute and chronic overdosing on alcohol can cause a myriad of harms, in both the short and long term, to both health and social life.

Many of these harms afflict the drinkers but, in contrast to tobacco where the effects are mainly on the consumers themselves, alcohol harm is more likely to be disseminated. Heavy drinking commonly affects the drinker’s partner, children, relatives, friends, neighbours, co-workers, people living in the same household, or strangers. In the New Zealand general population, harm from others’ drinking is more frequently reported than harm from one’s own, especially for women and young people.³

There is an enormous amount of alcohol harm in New Zealand directly caused by very high numbers of risky drinkers. In 2008–2010, New Zealanders 15 years and over were consuming an average of 10.9 litres of pure alcohol each year, which is 165 grams of alcohol or 16.5 standard drinks per week.⁴

However these figures include people who don’t drink at all and ignore the large gender differences in consumption. In New Zealand, more men drink than women, and they drink considerably more. In fact, the 85% of men who were drinkers consumed an average of 18.6 litres of alcohol per year (28 standard drinks per week), and the 75% of women who were drinkers consumed an average 8.5 litres of alcohol...
per year (13 standard drinks per week). This is the equivalent of 4 bottles of wine per drinking man, and 2 bottles of wine per drinking woman on average per week. It sounds like a lot and it is.

The Health Promotion Agency’s new “low-risk” drinking guidelines advise a maximum of 10 standard drinks per week for women and 15 for men. This advice was based on evidence of harm resulting from different levels of consumption, and is similar to new drinking guidelines in Canada and Australia.

So in New Zealand, the average consumption of drinkers is well over the low-risk guideline for both men and women. This is not to say that everyone drinks in a risky manner. We know that most 15 and 16 year olds are not drinking their share of this average, and there are many other drinkers who don’t drink nearly this much. However, these figures suggest that balancing these lower-risk drinkers is a large number of drinkers consuming at even higher volumes.

Wells and colleagues found that 25% of people aged 15 years and over in New Zealand were heavy drinkers—700,000 individuals. The World Health Organization (WHO) per capita consumption levels described above suggest this is likely to be an underestimate.

The presence of very high numbers of risky drinkers and tolerance of drunkenness help explain why there is so much harm from alcohol in New Zealand. This includes fights, falls, fires, accidents, road deaths, family violence, self-harm, suicide, teenage pregnancy, fetal alcohol spectrum disorder, sexual assault, absenteeism, eroded work productivity, chronic disease (especially cancer), mental illness and addiction. It also helps explain the extent of social cost from alcohol, conservatively estimated to be NZ$4.4 billion in 2005/2006.

Emergency departments are among the frontline agencies dealing with those consequences of drinking that demand immediate attention. Although the magnitude of the alcohol problem is well known to those who work in emergency departments (EDs), published information is surprisingly sparse.

This is why the two papers in this issue of the Journal—by Ardagh and colleagues documenting research at the Christchurch Hospital ED—are important. This research quantified the impact of alcohol presentations on the ED and described the drinking behaviour of people presenting as a result of alcohol use.

Their key findings were that 5% of all presentations are alcohol-related, with a bias towards these acute presentations being in people who are young, male and presenting on a Saturday night. The median amount of alcohol consumed prior to these presentations was a staggering 14 standard drinks (more than a whole week’s worth of alcohol consumed in one session) ranging up to a death-defying 71 standard drinks, albeit self-reported in an intoxicated state). Where known, the alcohol was sourced half the time from liquor stores (48%), and around a quarter of the time each from supermarkets (22%) and on-licence premises (26%), with only 4% from home (home-brew, duty-free).

The authors rightly suggest this study will assist in assessing the impact of any alcohol policy changes, by establishing a baseline. However alcohol policy changes are hard to come by.
The Sale and Supply of Alcohol Act 2012 was a pitiful response by the National Party-led government to the monumental review of alcohol in New Zealand by the Law Commission in 2009/2010. All of the most effective recommendations of the Commission’s final report *Alcohol in our Lives: Curbing the Harm* were ignored. Of particular note, there were no new substantial measures addressing the demand side of alcohol consumption—marketing and pricing.

The new Act did, however, include an untested strategy of enabling local councils to reduce the accessibility of alcohol through establishing restrictions to the hours of purchase of alcohol as well as the density of alcohol outlets in their area through local alcohol policies (LAPs). While this provides the best opportunity from the new legislation to reduce harm in local communities, any council which dares to put up reformatory restrictions on trading hours or liquor outlet density will be challenged and potentially held up in appeal courts. Of 22 provisional LAPs produced, 15 have been appealed by the alcohol industry so far.

We are not expecting any significant reductions in alcohol-related harm, including alcohol-related presentations to ED, as a result of this new Act, unless the terms of engagement between councils and the industry are substantially altered.

However, on 1 December 2014 the first substantial alcohol law reform for a generation will come into force, with a new drink-driving limit of 0.05g per 100ml for drivers over 20, and we can confidently expect a reduction in alcohol-related harm to follow.

Of course, one effective strategy is not going to be enough for the transformation of the dominating culture of risky drinking. As with tobacco policy reform, phasing out marketing and increasing the price of alcohol will be fundamental to achieving culture change.

**Competing interests:** Nil.

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**References**


What are the Health Policies of the next New Zealand Government?

Frank A Frizelle

The health policies of the government in power affect both patients and doctors alike on many levels. As we move towards another general election it is important to look at the smorgasbord health policies on offer from the various political parties.

I have asked the three largest Parties (National, Labour, and Green) to outline their health policies. Each is written by the Party itself and comes from the Health Minister or Spokesperson Office.

We publish them unabridged, unedited and without opinion below. The policy outlines are in the order that they were received.

Labour Party’s position on Health

Annette King (Opposition Spokesperson for Health; MP for Rongotai, including the Chatham Islands)

Labour believes access to good health care is the right of every New Zealander. From efforts of the first Labour government which established our public health system to the significant primary health care reforms of the Fifth Labour government, Labour has always been focused on bringing this vision about. Through a focus on equality, access, and fairness in the health domain, through an unquestionable commitment to the integrity of the public health system, and by providing tools, information, and incentives for people to make good health decisions for themselves, we can make New Zealand a healthier nation for all.

It is time to rebalance the allocation of health resources by prioritising long-term health outcomes. Re-prioritising critical health expenditure can address health inequalities, by dealing with the root causes of poor health. While long-term outcomes can be more difficult to measure than politically expedient short-term health outputs, this is the right thing to do to improve public health outcomes and secure the long-term financial sustainability of the health system.

Labour will work towards achieving a bipartisan approach on key health goals, so that health ceases to be a competition of who can reach politically determined targets at the expense of long-term public health outcomes. We need evidenced-based strategies that will survive changes in government to meet the health needs of our people.

Our eight priorities are:

- Reducing health inequalities
- Preventing and managing non-communicable diseases
- Primary health care
- Mental health
• Oral health
• Children’s health
• Older persons’ health
• Health workforce

We are committed to ensuring New Zealanders are able to live longer and healthier lives with the support of a strong and adequately funded public health system. Labour’s vision for health is about providing accessible, affordable, and effective advice and care to New Zealanders before they get seriously ill.

When Labour is in government, the direction of travel in the health system will change. Labour’s approach will emphasise public and primary healthcare. This begins in the home with our Healthy Homes Guarantee, affordable, modern, healthy KiwiBuild houses, and cheaper power through NZ Power so that families can stay warm. It extends to more funding for GPs, public health programmes that target the causes of disease, and health NGOs. It includes specific funding to make doctor visits and medicine free for the people who need it most. It is an integrated approach focused on keeping people healthy and addressing illness quickly and cost-effectively.

We will invest a billion dollars each year in vital public services, particularly health and education, to insulate vital public services against cost pressures and improve services.

Labour will make primary healthcare more affordable and accessible by increasing the number of people who get free or discounted GP and dentist visits, and reducing prescription charges. Labour's plan will see 1.7 million New Zealanders, nearly 40% of the population, getting free GP visits and prescriptions, compared to 12% now. An additional 1.2 million New Zealanders, nearly 30% of the population will have access to low-cost GP visits.¹ All 60,000 expectant mothers each year will also be able to get free dental care.

The Ministry of Health's 2013 survey found over half a million adults didn’t visit the GP when they needed to because of cost, a 5% increase compared to 2012. Nearly 60,000 children didn’t go to the doctor because of cost last year, a 30% increase over 2012.

In Budget 2014, the current government allocated funding to extend free provision of GP visits and prescriptions for children up to age 13. However, the policy does not come into effect until 2015. Labour has decided to implement this policy after the election.

Because they tend to visit the doctor more frequently and have greater medical needs, people aged 65 and older face the highest primary healthcare costs of any age group despite most older people having low, fixed incomes. It is unfair that the people with the most medical need are also saddled with the greatest health costs. It is also not cost-effective – if older people do not get care early on, they are at greater risk of their condition worsening, requiring more expensive hospital treatment.

Labour’s plan to make doctor visits and prescriptions free for people aged 65 and over will benefit nearly 700,000 people.
We will also work with Primary Health Organisations and primary healthcare professionals to set new, more flexible criteria for Care Plus with a target of giving 250,000 more New Zealanders with serious long-term health need access to its benefits. This will help people with serious conditions such as diabetes, heart disease, stroke, and mental illness. We are not setting the new criteria within this policy – that would be inappropriate; they will be determined by experts who best understand the needs of people with long-term illnesses.

This policy will mean one in ten New Zealanders gain better health outcomes from Care Plus.

The Very Low Cost Access programme was introduced by the previous Labour Government to offer extra subsidies to general practices in high needs areas that agree to keep their fees under set limits. Currently, 1.3 million New Zealanders – 30% of the population – are enrolled at VCLA practices.

Labour has a target of 2 million people benefiting from affordable medical care through the programme, a 50% increase on current enrolments.

To achieve this, $40 million per year of the primary health boost will go to the VLCA scheme. Labour will boost the VLCA subsidy by 20% and relax the funding formula so that it is easier for practices to access it.

Because primary health providers are reporting that they are under increasing financial pressure and are being forced to increase charges because the current government has failed to provide enough funding, Labour will also invest $20 million a year in other primary health services. This funding will be split among maternity services and health NGOs.

We have also announced our commitment to rolling out a national bowel-screening programme, starting with regions with the highest need.

Of course, a strong public health system needs to be supported by a strong and well-resourced health workforce. New Zealand has specific challenges to meet health needs for isolated populations, specific groups and vulnerable people.

The need to plan and develop a New Zealand workforce to meet those needs is essential.

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Endnote:
1. Labour's $60 million Primary Health Boost includes expanding the number of people in the Very Low Cost Access programme for GP visits to two million. An estimated 40% of these people, 800,000, will be getting free visits via our other policies, with the other 1.2 million receiving very low cost visits.

A healthier future, from the Green Party of Aotearoa

Kevin Hague (MP and Green Party Spokesperson on Health and Wellbeing)

Western nations are at a turning point in how they decide to run their States. Our children, or grandchildren, will face unprecedented challenges of food production, social organisation, resource allocation, and ethical decisions as populations age, the
world heats up and the sea level rises. Sometimes, the magnitude of these challenges keeps me up at night. What kind of society will we be living in, in 10, 20, 100 years? What kind of citizen do we need to grow now to survive it? The next generation will undoubtedly need all their reserves of strength, intelligence and fortitude to find sustainable ways to live in this world.

New Zealand’s population demographics are already changing. We are getting older, and suffering more from the burdens of chronic disease. The latest research suggests that one in four New Zealanders over the age of 15 has diabetes or pre-diabetes, and more than 1 million adults, and disturbingly, 85,000 children, are obese. The tidal wave of chronic disease is set to swamp our health system and economy—the treatment cost alone for diabetes is projected to hit $1.8 billion by 2021. At the same time these so-called diseases of ‘affluence’ are hitting the people who same are suffering a re-emergence of infectious diseases we associate with ‘developing’ countries. Truth be told, when 14 people are living off scraps in an unheated 2-bedroom house without basic furniture in South Auckland, we need to recalculate our assumptions about New Zealand being ‘developed’. Our graduate doctors may need to recalculate their assumptions about how best to discharge their duty of care for their patients; in the surgery, and in society.

Simultaneously, what is technically possible in the field of medicine is taking off like a rocket. For those who can afford to pay, doors open to technology that we could not dream of a generation ago. Just who has a right to this treatment, and who pays, is vexed.

As in other countries, these factors are threatening to blow out our comparatively modest spending per capita on healthcare, very very quickly. Politically, it’s a game of Russian roulette—given years of underfunding of health relative to need (this year alone the Budget was $232 million short) no one wants to be holding the purse-strings when the dam bursts and the hospital walls start leaking.

The thing about health, as you will have learnt early in your career, that it is often only with much perseverance and a long wait will you see the fruits of your labour; much longer than a three-year electoral cycle. There is almost no political incentive to spend now on prevention of conditions that cannot be easily quantified and are not likely to impact voters immediately. This is especially the case if the choice is between spending on prevention, which will return more in the long run, or on highly desirable, expensive tertiary procedures easily counted and in great demand. For long-term fiscal sustainability in health, the Government has to have genuine concern for the lasting welfare of the populace and economy, rather than just Machiavellian nous.

Luckily, the Green Party is in politics for the right reason. It is my personal mission to move the focus back to evidenced based investment of health funding that reduces inequality, focuses on prevention and gives the greatest benefit for the most.

This election, the Green Party has committed to health funding keeping up with changing population demographics and real need. This will take the squeeze off DHBs, community programmes, contracts and staff to deliver greater outputs on less real money year after year. Yes, this will cost big money, $3.085 billion by 2018, to be precise. The Government argues it can’t be done. We say that it’s a question of priorities. The National Government’s tax cut package is continuing to cost $1.1
billion dollars every year, and they have set out provisions for new election spending on top of that of $4.561 billion by 2018. We believe that this would be more responsibly invested in sustaining our health service.

Health investment is disproportionately spent in the last few years of a person’s life rather than at the start; despite the first years having the longest overall benefit on a person’s health status and quality of life. New research in epigenetics is at the forefront of understanding the profound impact that in-utero and even pre-conception environments have not just on the health of an individual, but on subsequent generations. Exploration of inflammation and DNA methylation is unteasing the aetiology of diseases with strong social gradients like depression and cardiovascular disease. Suddenly, we have potential medical explanations for social and political research on the negative population impacts of inequality and social stress.6

Child poverty and emotional deprivation are now linked to an individual’s overall resilience, levels of empathy, self-control and ability to invest in ‘long-term’ biological strategies for survival, generation after generation. It is perhaps no surprise that science is ‘discovering’ something we already intuitively understand as a species—our deep need for each other.

The Green Party has put out a $1 billion commitment7 to reduce child poverty—the lifelong driver of poor health. As long as the current Government continues to ignore health determinants like housing, nutrition, and social alienation and financial stress, ‘Band-Aid’ health interventions like the rheumatic fever project will not be optimally effective, much to the frustration of those working on the ground.

Our campaigns have prioritised the causes of preventable disease, like the ‘Warm Healthy Rentals’8 initiative, and our ‘Home for Life’9 package. There is only so much that health professionals can do when other social factors are driving outcomes, but the Government isn’t coming to the table, or even measuring basic social problems like child poverty.10

As part of our commitment, we will be investing in free doctors’ visits and prescriptions for all children up to the age of 18 years. Chronic diseases are appearing earlier, and early intervention can prevent progression. No young person should have to delay going to the doctor because of the cost. Teenagers have very specific health needs, including mental and sexual health, which if not addressed early can change their life-course. Even teenagers from relatively well-off families sometimes don’t have access to independent income for confidential medical care at this vulnerable time in their lives.

The total cost to extend visits from age 13–17 is just $21 million dollars a year—but we know that there is also likely to be an increase in workload and costs to cover unmet need. We don’t expect practices to do more on already stretched resources. We have listened to PHO feedback from the free visits for under 6s, and have allocated another $8 million dollars a year to this programme to cover increased workload. The current funding formula for all visits clearly isn’t properly compensating some practices, or targeting those who need it most, and it will be reviewed with a view to improving efficiency and fairness. More details of our Healthy Teens, Healthy Futures package can be read at https://www.greens.org.nz/policy/fairer-society/healthy-teens-healthy-futures
Chronic disease is another strategic area which requires long-term change; the National Government’s head-in-the-sand approach has not been working for New Zealand. The treatment costs of diabetes, or the projected economic costs, the effectiveness of the current approach to prevention, the per patient costs, and the projected numbers of diabetes cases are just some of the things that the retiring Health Minister does not know about and has had no apparent interest in finding out.11

The health sector deserves to have clear direction before the election on our strategy to reduce chronic disease, which is why we have written up specific action plans for diabetes12 and heart disease.13 They cut across social risk factors, food environments, education and primary and tertiary care. We will put more effective controls on alcohol14 and tobacco; we support the Smokefree 2025 goal, and we are not influenced by the legal posturing and bullying of Big Tobacco or the liquor lobby.

Likewise, we will end the tension of inadequate health workforce numbers and poor sector engagement. This has been due to both negligence and arrogance; the current Minister does not even record doctor vacancies, let alone measure shortages.15 I recently conducted a nationwide tour on health issues (https://home.greens.org.nz/health/tour) where I outlined the real reduction in specialist numbers relative to need, and the number of unemployed nursing graduates. You can watch it online (https://www.youtube.com/watch?v=5BCxxFhYHW8&list=UUHMJ7z-9wxGvWVljzfntFVQ), as well as other topics from the tour. It was instructive watching the dots connect for the audience between their hospital experiences and the workload pressure that staff are under.

Over decades in health we have seen endless workforce reports churned out ad-nauseum by a plethora of committee. The ignored recommendations have mounted up with wasted hours of clinicians’ time. We don’t need more reports. We need governance that is committed to letting health experts solve health sector problems then actually taking their advice. Unions and professional bodies should be prepared to be swiftly locked in a boardroom after September 20th and listened to.

Our last great Prime Minister was also a Minister of Health. Now, if I were to have the honour I’d do a few things differently, but Helen Clark is above all a master of planning. In her current role as United Nations Development Programme (UNDP) Administrator, she has the daunting task of preparing the world for the very threats I outlined at the start of this article. She has chosen the theme of ‘resilience’, often used in disaster risk reduction, the first principle of which is prevention.

If our world is to be one in which poverty is eradicated, and inequality reduced; and where growth is inclusive and production and consumption do not break planetary boundaries; and if we are to be effective in combating the effects of climate change; we need to look beyond our traditional interventionist logic to harness the agency of people, their communities, and institutions. It is this logic which has led UNDP to encapsulate its mission statement in the simple phrase: Empowered Lives, Resilient Nations. This speaks to both means and ends. Empowered people can build resilient nations…People and infrastructure, communities and institutions, must be equipped to withstand external shocks, whatever they may be.

When I reflect on the history of my own country, New Zealand, a dominant theme has been its quest for security... As a small nation, far distant from all its major markets except Australia, and dependent on export returns from commodities whose prices fluctuated considerably, New Zealand put in place a social protection system after the Great Depression which prevented its people ever again experiencing outright destitution.16
At the end of my health tour, I presented five fundamental points of a good health system, and asked the audience to guess the author.

They are:

- Health care should be a fundamental right for all New Zealanders
- There should be no access barriers, certainly not financial ones
- Services should be universally available
- Services should be preventive in focus
- Services should be integrated

Just two people in the whole national tour guessed it right. The author is one and the same of the social protections Clark spoke of, the architect of the 1938 welfare State, Michael Joseph Savage. Healthcare and the world might be ever-advancing and changing, but we have some enduring social formulas for resilience that stay the same.

Earlier, I alluded to a change in expectations of how physicians might have to fulfil their duties; it is my plan to abide by the same principle to ‘prevent disease whenever I can.’ With your help I intend for this to be our gift to the next generation; every chance for a healthy future.

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National Party: Making New Zealand the best place in the world to grow up and grow old

Tony Ryall (Minister of Health; MP for Bay of Plenty)

Overview

Good health is hugely important to New Zealand families. A strong public health service gives families peace of mind – knowing that the care they need will be there, when they need it.

In the last six years, as a result of the Global Financial Crisis reducing Government incomes, many advanced nations have had to freeze or even reduce their social spending. In contrast, in New Zealand the National Government has taken a more measured, long-term approach which has involved maintaining or increasing spending levels on social services funded by borrowing over the last six years, while returning New Zealand to growth and a balanced budget.

The result has been that New Zealand has emerged from the world economic downturn and a major earthquake with one of the highest growth rates in the world, one of the lowest rates of unemployment, and having protected our important social services like health through the difficult times.

In fact, the official budget figures show investment in our public health services has risen from a budget of $11.8 billion in 2008/9, to $15.6 billion in 2014/15. That’s an increase averaging around $500 million a year of new money.

Best value from every health dollar

Along with protecting and growing our public health services through extra investment, after decades of major reforms, National has deliberately focused on making the existing structure work better for patients.
To deliver better and more accessible services, the Government has

- Led the creation of integrated Primary Care services, such as Integrated Family Health Centres, and
- Pushed DHBs to work in a more integrated fashion with Primary Care, and
- Focused on improving the efficiency and viability of DHBs.

Over the last six years:

- Our DHBs have employed over 4,500 more doctors and nurses; we have more than doubled GP training places from 74 to 170, and lifted medical school training places by 170.
- DHBs deficits have been addressed, reducing from around $200 million to $25 million, which is where we have been able to fund the new under 13s policy from next July.
- Elective surgery numbers are up 44,000 patients a year, from 118,000 to 162,000.

And there’s a more effective focus on preventing illness:

- We are on track to have 95% of 8-month-olds fully immunised this year.
- ED wait times have improved from 69% to 94% of patients treated or discharged within 6 hours.
- Over 1 million at risk patients have had CVD checks over the last five years due the good work of GPs.
- We are now spending more on preventative health, and on a range of interventions. These include a major increase in diabetes and cardiovascular checks and treatment, and the new $40 million Healthy Families programme to help address obesity.
- Shorter waits for cancer treatment, with patients ready for chemotherapy or radiation treatment to 4 weeks – the world gold standard.
- Our hospital wards are becoming more productive and efficient.

The next term

Over the next three years, National will build on the positive progress made in health services, with a particular focus on

- Continuing to invest more in public health services as this can be afforded,
- Bringing more health care services closer to home,
- Place even more emphasis on primary care and prevention,
- While continuing to deliver more and better hospital services.

The key health initiatives over the next three years include exciting new approaches in all three main health areas of preventative, primary, and secondary care.
Preventative

In preventative health care, National has announced the new $40 million anti-obesity programme – Healthy Families NZ

HFNZ communities will involve approximately 900,000 New Zealanders. In each community, a local provider will lead the programme, recruiting a dedicated health promotion workforce who will work with schools, early childhood education centres, workplaces and sport clubs to encourage and support people to make healthy lifestyle choices. Complementing several existing preventative health programmes, Healthy Families NZ is based on the best evidence.

This early intervention initiative will add to the existing major investment in preventative/early interventions, including the more heart and diabetes checks, the record levels of immunisation, and the 25% reduction in smoking that has been delivered.

Primary Care

In Primary Care, the major new investment is in the provision of free Doctor visits and pharmaceuticals for under 13 year olds. This has been made affordable by the bringing DHB deficits under control, and adds to the free under 6s extension to after-hours delivered in the last few years. This will provide better access to health services for around 400,000 children.

Providing better primary care will require new investment in Health Information Technology

Improved technology makes life easier and less frustrating for GPs, patients and the wider clinical community. It can further improve coordination of care.

We want New Zealanders to have access to a core set of personal health information available electronically to them and their treatment providers regardless of where they access health services.

Patient portals allow patients to securely log in and do things like check their latest laboratory test results, order a repeat prescription, or send a message directly to their GP – all from the convenience of their home.

Between 15 to 20 percent of general practices have, or are in the process of implementing these portals. By the end of the year we want at least half of all general practices in New Zealand to be offering a patient portal. The goal is to have this at 90% of patients by the end of 2015/16.

The other main Primary Care initiative will be to continue to expand the role of Community Pharmacies. We have worked to ensure pharmacists are able to provide a broader range of services, like managing patients with long term conditions and helping this high needs group adhere to their medicines

Primary/Secondary Care – reducing pain, increasing prevention

With an aging population however, demand for elective surgery continues to increase. The over 65 population is projected to double to one million two hundred thousand people over the next twenty years.
National will therefore continue to increase elective surgeries, but to further advance how we address orthopaedic need in particular, a new investment and approach will be implemented.

We will invest $6 million to create new multi-disciplinary early intervention teams to address pain, and improve the quality of life for New Zealanders in relation to pain in bones, muscles and joints.

These teams will identify patients who are likely to suffer from bone, muscle and joint conditions in the future and support them to make changes to help prevent patients heading down the path towards surgery.

A strategy of early intervention for conditions like osteoarthritis will deliver improvements in diagnosis, self-management, education and exercise, weight management, pain management and support prevention strategies.

The teams will integrate with a range of community health services such as GPs, dieticians and physiotherapists. There will also be close links with hospital services such as rheumatology, orthopaedic and pain services. The service will be co-ordinated through general practice.

They will provide nutrition and lifestyle advice, assist with pain management and provide education so patients can better manage their condition themselves.

This approach will enable some patients to be treated early enough to maintain independence, while others will clearly require surgery.

**Faster Cancer Treatment**

National inherited cancer services in 2008 which were totally unacceptable, including the fact under the previous government, over 750 patients were sent to Australia for cancer treatment because of New Zealand’s delays.

National has been working to reduce waiting times throughout a patient’s treatment. Being diagnosed with cancer is a difficult time for patients and their families.

National announced recently new cancer initiatives to better support the emotional needs of cancer patients.

While there has been clear improvement in services and support, cancer services can and need to be improved further.

Our focus is now on speeding up the complex range of tests in the earlier parts of the cancer treatment journey. This includes diagnostic tests such as MRIs, X Rays, CT scans and blood tests – all of which deliver critical information to specialists along the patient’s clinical journey. Ideally, instead of a patient visiting hospital several times for different tests, departments should coordinate appointments so they are all completed in one day.

In addition to improving the diagnostic part of the cancer treatment journey, there is a need to provide patients with confidence that from first GP suspicion of cancer, they will be seen by a specialist quickly.

National will therefore set a new Faster Cancer Treatment Target for the maximum time patients would wait for their first cancer treatment, starting from the time they
are first referred to the hospital because their doctor suspects they have cancer. This will include:

- The target is that 90% of patients will receive their first cancer treatment within 62 days of being referred urgently by their GP with a high suspicion of cancer. This is an international benchmark.
- Currently around 60% of patients commence treatment within a maximum of 62 days; lifting this to 90% would mean a 50% improvement.

Summary

This outline of just some of a re-elected National-led Government’s priorities is necessarily abbreviated, but the direction is clear.

It is about responsible and careful management of our public health service, which National has proven to be committed to protecting and growing.

As the nation’s economy continues to grow, more investment is possible, and Health will continue to be Nationals top spending priority. Only National can be relied on to medium long term, balance the needs of growing the economy and revenue, while at the same time providing as much resource as is possible into public health services.

While other Parties will promise everything to everybody, your National-led Government has demonstrated its commitment to better and sooner health services through difficult world times.

New Zealand has gone through and come out of this difficult period, and with your support is excited about delivering a properly balanced, better sooner health service covering preventative, primary and secondary care to all New Zealanders.

Correspondence: Tony.Ryall@parliament.govt.nz

Editor’s closing comments

All parties’ health policy statements are aspirational and will be affected by the ability to operationalise them with regard to funding and implementation hurdles. The main issues that affect health were well debated in the journal over the last year, and are largely related to equitable access to health care. Specific disease issues are well recognised as needing attention, such as access to mental health, child health, obesity, diabetes, and cancer treatment to name just a few.

I have limited publication of the comments to the three major parties based on the space available, however it is unlikely that any major party or parties can govern alone with our MMP system, and as such it is important to understand that important changes to our health system may come via a minor party as part of a coalition support agreement.

The actual direction that health care will take will be dependent upon who is power after the election on Saturday, 20 September 2014.
Competing interests: Nil.

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The impact of alcohol-related presentations on a New Zealand hospital emergency department

Rebecca Stewart, Manidipa Das, Michael Ardagh, Joanne M Deely, Stuart Dodd, Nadia Bartholomew, Scott Pearson, Ruth Spearing, Tracey Williams, Martin Than

Abstract

Aim To determine the impact of alcohol-related presentations on the Christchurch Hospital Emergency Department (ED).

Methods Over 42 8-hour shifts (2 weeks) between 15 November 2013 and 9 December 2013, patients attending the ED with recent alcohol consumption were classified as screen-positive (consumed alcohol in the 4 hours prior to presentation) or not. A subset of screen-positive patients was classified as impact-positive (alcohol consumption clearly contributed to the reason for presenting). Data were analysed in relation to days/shifts for gender, age, disruptive behaviour, medical reasons for presenting, and completeness of ED records.

Results Of the 3619 patients screened in the study, 268 (7.4%) and 182 (5%) were screen-positive and impact-positive, respectively. Most patients attended the ED on the weekends (58%; 105/182), particularly on Saturday night (31%; 56/182). More males (118) than females (64) were impact-positive. Of the impact-positive males, most were 16–25 years old (37%; 44/118) or 41–61 years old (32%; 38/118), attended the ED on weekend night shifts (24%; 28/118), and sought treatment for non-interpersonal trauma (38%; 45/118) or interpersonal trauma due to violence (17%; 20/118). Of the female impact-positive patients, most were 16–25 years old (41%; 26/64) or 41–60 years old (33%; 21/64), and presented for deliberate self-harm (36%; 23/64) or non-interpersonal trauma (27%; 17/64). Of the 182 impact-positive patients, 86% (156) were recorded in the ED computer system.

Conclusions Alcohol-related presentations had a significant impact on the ED, particularly on weekends. Teenagers, young adults and middle-aged adults contributed to the alcohol-related patient impact on weekends. Male patients were a significant burden on Saturday evening and night shifts.

Alcohol is deemed the most commonly-used recreational drug in New Zealand.\textsuperscript{1} with consumption per capita higher than in the United States of America and Canada. Up to 25% of New Zealand alcohol consumers are classified as heavy drinkers.\textsuperscript{2}

Alcohol contributes to violence, suicide, injuries, approximately 60 medical conditions,\textsuperscript{2} and is responsible for over 1000 deaths and 12,000 years of life lost each year in New Zealand.\textsuperscript{3} Consequently, alcohol is thought to have a significant impact on New Zealand health systems, specifically on emergency departments (EDs).

Between 2006 and 2011, alcohol-related admissions to New Zealand hospitals increased by 18.4% with Canterbury District Health Board hospital alcohol-related admissions rising from 16,220 patients per year to 19,180. The cost of approximately
6000 patients was estimated at NZ$27.4 million, meaning around 20,000 patients would cost ~$80 million.

The Sale and Supply of Alcohol Act 2012 was passed partly to reduce the harm caused by alcohol. Among other measures, it gave territorial authorities the power to develop local alcohol policies (LAPs) to control licensing and restrict access to, and availability of alcohol.

The Christchurch City Council’s proposed LAP includes restrictions on trading hours, and is due to be implemented in 2014. To assess the impact of the LAP on drinking behaviours, it was considered necessary to characterise drinking behaviour before, and after, its introduction. This study is part of the ‘before’ component of such an assessment.

Christchurch Public Hospital is the largest tertiary, teaching and research hospital in the South Island. It has one of the busiest emergency departments (EDs) in Australasia, treating more than 83,000 patients a year. The purpose of this study was to determine the impact of alcohol-related presentations on the ED before the Christchurch City Council LAP implementation.

**Methods**

**Patient enrolment**—Over 42 8-hour shifts between 15 November 2013 and 9 December 2013, patients were enrolled who presented to the ED with recent alcohol consumption or alcohol-related medical conditions. Data collection was not consecutive, but totalled 2 full weeks of time with all three shifts covered per day. The shifts were defined as ‘day’ (8:00 to 16:00), ‘evening’ (16:00 to 23:00), and ‘night’ (23:00 to 8:00 the following day).

All patients were asked if they had consumed alcohol in the 4 hours prior to their time of triage, and if they thought their ED attendance was related to alcohol consumption. Clinician judgement contributed to answering the latter question. Patients were eligible for the study if they answered yes to one or both questions (defined as ‘screen-positive’). Of the screened-positive patients, if alcohol contributed to a patient’s reason for attending the ED, s/he was classified as ‘impact-positive’. Patients under the age of 16 were included only if both patient and parental consent were obtained.

Patients who could not be interviewed and had no family or friends available to assist with the interview were tracked retrospectively to determine their eligibility, using notes and staff consultation. If there was a strong suspicion of alcohol contributing to the presentation these patients were listed as ‘unknown.’ Similarly, any sober patients who had been drinking, but for whom it was unclear if their presentation was alcohol-related, were also classified as ‘unknown’. By recording these patients as ‘unknown’, the number of patients recorded as ‘alcohol impacted’ would be underestimated, but the possible extent of the underestimation would be defined.

The following information was recorded for all the patients enrolled in the study: admission date and time, National Health Index number, date of birth, age, gender, ethnicity, current residential address, reason for attendance, length of stay in the ED, and any disruptive behaviour. Disruptive behaviour was defined as physical or verbal abuse that intimidated ED medical and nursing staff, or a physical or verbal action that impeded the process of care (as reported by ED staff).

The study also aimed to determine the completeness of data routinely entered into the ED computers. Records were checked on alcohol consumption in the four hours before patients were triaged and the number of presentations where alcohol consumption contributed to the problem.

The ED computer system has fields for recording answers to these questions, which are filled when patients are discharged. Datasets were extracted from the computer system for both the study period and comparable time intervals outside the study period (Box 1), to determine if the presence of the researchers in the ED influenced record keeping.
Box 1. Time periods of clinical record analysis

<table>
<thead>
<tr>
<th></th>
<th>Study period</th>
<th>Comparison period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study period</strong></td>
<td>15 November 2013 to 9 December 2013</td>
<td>26 November 2012 to 9 December 2012</td>
</tr>
<tr>
<td><strong>Comparison period</strong></td>
<td>28 November 2013 to 10 November 2013</td>
<td>29 October 2012 to 11 November 2012</td>
</tr>
<tr>
<td><strong>Two weeks beforehand</strong></td>
<td>10 September 2013 to 23 September 2013</td>
<td>9 September 2012 to 22 September 2012</td>
</tr>
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</table>

The contexts or types of illnesses and injuries that patients presented to the ED with were recorded and grouped into six general categories: non-interpersonal trauma, interpersonal trauma caused by violence, deliberate self-harm (including patients suffering from psychological effects of withdrawal symptoms), alcohol excess, motor vehicle accident trauma, and other.

Data were summarised descriptively using Microsoft Excel software, version 2010 (Microsoft, Redmond, WA).

Ethical approval was granted by the local Health Research Council Regional Ethics Committee.

**Results**

**Patient recruitment**—A total of 3,619 patients were screened during the 42 shifts of the study (Figure 1). Of these patients, 297 were eligible for the study. Twenty-nine of the eligible patients were recorded as ‘unknown’, either because their clinical conditions prevented an interview, or because they left the department before enrolment.

**Figure 1. Consort diagram for patient recruitment (ED=emergency department)**
Of the 268 screen-positive patients, 182 were impact-positive (i.e. alcohol consumption clearly contributed to the reason for their presentation). The remaining 86/268 screen-positive patients answered yes to having consumed alcohol in the 4 hours prior to their arrival, but alcohol did not contribute to their attendance. The latter generally included patients who had a glass of wine or a beer with dinner, but attended the ED for unrelated reasons. Fourteen of the 268 (5%) screen-positive patients were repeat presentations.

**Numbers of patients per shift and day**—Table 1 and Table 2 present numbers of screen-positive and impact-positive ED attendances per shift and day of the week. Most impact-positive patients (57%; 103/182) presented to the ED during the weekend from Friday evening through to Sunday evening (Table 2). Most of these patients (54%; 56/103) attended on Saturday.

In total, impact-positive patients accounted for approximately 10% (56/583) of all patients that attended the ED on Saturdays. The most impacted shift was Saturday night, when 25% (30/122) of all patients who attended the ED were impact positive. This was followed by 14% on Friday night (14/100), 8% on Sunday day (18/226), 6% on Saturday day (16/260), and 5% on Saturday evening (10/201). On the two Sunday nights, the number of impact-positive attendances had dropped to two patients.

During the week (Monday to Friday) day shifts, <5% of all patients attending the ED screened positive (Table 1), but alcohol consumption contributed to most of these presentations (83%; 15/18). On most week days, the percentage of impact-positive attendances increased between day and evening shifts.

Between Monday and Thursday, fewer impact-positive patients attended the ED at night compared with the evening. Many impact-positive patients attended the ED on Tuesday night.

**Gender distributions**—Figure 2 and Table 3 present the gender distributions per shift for each repeat day. Approximately two-thirds (65%) of impact-positive patients (118/182) were males. Of these, 68% (80/118) attended the ED between Friday and Sunday and 29% (23/80) attended on Saturday nights.

The numbers of impact-positive males who attended the ED increased throughout the day on Friday to level off on Saturday and peak on Saturday night (Figure 2). During Sunday, numbers dropped to parallel Friday day and evening shifts. The two Sunday night shifts received one male in total.

Slightly more than half (56%) of the impact-positive female patients (36/64) attended the ED between Friday and Sunday. Twice as many impact-positive males (n=62) than females (n=29) presented to the ED during the weekend. On Saturday night, the ratio of males to females was 3:1. Females attended the ED in even numbers across the weekend shifts, except Saturday evening when no impact-positive females attended (Table 3). The gender difference was less significant on Thursdays.
Table 1. Screen-positive patients per day and shift*

<table>
<thead>
<tr>
<th>Weekday</th>
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<th>Evening</th>
<th>Night</th>
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<tbody>
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<td></td>
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<td>Screen n (%)</td>
<td>Total n</td>
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<td>12 (5)</td>
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<td>207</td>
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<td>25 (12)</td>
<td>201</td>
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<tr>
<td>Sunday</td>
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<td>226</td>
<td>21 (10)</td>
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<tr>
<td>Total</td>
<td><strong>55 (4)</strong>*</td>
<td><strong>1537</strong></td>
<td><strong>118 (8)</strong>*</td>
<td><strong>1442</strong></td>
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*The numbers are for two shifts/days. Screen=all patients who screened positive for consuming alcohol in the 4 hours prior to attending the emergency department. Total=total number of patients who were screened.
Table 2. Impact-positive patients per day and shift*

<table>
<thead>
<tr>
<th>Weekday</th>
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<td>49 (3)</td>
<td>1537</td>
<td>65 (5)</td>
<td>1442</td>
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*The numbers are for two shifts/days. Impact= all patients who had alcohol consumption clearly contribute to their reason for attending the ED. Total= total number of patients who were screened.
Figure 2. Impact-positive attendances per day and shift (males=118; females=64; the data are for repeat days over a 2-week period)

Table 3. Gender distributions*

<table>
<thead>
<tr>
<th>Day</th>
<th>Shift</th>
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<th>Female positives</th>
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<tr>
<td></td>
<td>Total</td>
<td>20</td>
<td>28</td>
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</tbody>
</table>

*The numbers are totals for two shifts/days. Impact= patients who had alcohol clearly contribute to their reason for attending the emergency department. Screen=all patients screened positive for consuming alcohol in the four hours prior to arrival.
During the week (Monday to Thursday), impact-positive attendances were low for both genders. No females attended the ED during the day shifts of Wednesday and Thursday (Figure 2). Male impact-positive attendances were slightly higher on Tuesday and Wednesday evenings.

**Age distributions**—More males than females of all ages were impact-positive (Table 4; Figure 3).

The most significant age group was 16–25 years for both genders (males 37% (44/118); females 41% (26/64)). More than half of the <25 year old impact-positive patients (males 61% (28/46); females 52% (14/27)) attended the ED during the nights shifts. Most young males (n=17) attended during the Saturday night shifts.

The second most significant age group was 41–60 years where 32% of males (38/118) and 33% of females (21/64) were impact-positive (Figure 3a and 3b). In contrast to 16-25 year old impact-positive males, 58% of middle-aged males (22/38) attended the ED during the evening shifts (Table 4).

During the week days (Monday to Thursday), impact-positive females aged 16-20 years more frequently attended the ED than males of the same age (Figure 3b). Males aged 41-55 years and 46-50 years also peaked between Monday and Thursday.

**Table 4. Age ranges (years) for impact-positive attendances**

<table>
<thead>
<tr>
<th>Variables</th>
<th>0–15*</th>
<th>16–25</th>
<th>26–40</th>
<th>41–60</th>
<th>61–90</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td>0</td>
<td>4</td>
<td>7</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Evening</td>
<td>2</td>
<td>12</td>
<td>9</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>Night</td>
<td>0</td>
<td>28</td>
<td>10</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2</td>
<td>44</td>
<td>26</td>
<td>38</td>
<td>8</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>Night</td>
<td>1</td>
<td>14</td>
<td>7</td>
<td>1</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>1</td>
<td>26</td>
<td>15</td>
<td>21</td>
<td>1</td>
</tr>
</tbody>
</table>

*Age 0–15 years. All data are sums for repeat shifts over a 2-week period.

**Disruptive behaviour**—Among the screen-positive patients, 16 displayed disruptive behaviour and 13 of these were impact-positive. Except for Saturday, generally one disruptive patient was observed on either of the two evening or night shifts (Table 5). On Saturday, a total of seven disruptive patients attended during the two evening and night shifts—six of these patients were impact-positive.
Figure 3. Age and impact-positive attendances (males=118; females=64; the data are for repeat shifts and days over a 2-week period)

Table 5. Disruptive behaviour

<table>
<thead>
<tr>
<th>Weekday/shift</th>
<th>Day positives Impact</th>
<th>Screen</th>
<th>Evening positives Impact</th>
<th>Screen</th>
<th>Night positives Impact</th>
<th>Screen</th>
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<tr>
<td>Monday</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Tuesday</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Impact=Patients who had alcohol clearly contribute to their reason for attending the emergency department.
Screen=All patients screened positive for consuming alcohol in the 4 hours prior to arrival.

Context of medical conditions—Of the impact-positive males, 38% (45/118) attended the ED for non-interpersonal trauma (Table 6; Figure 4a). Non-interpersonal trauma accounted for 39% (17/44), 50% (13/26), and 29% (11/38) of 16–25, 26–40, and 41–60 year-old male presentations, respectively. Interpersonal trauma due to violence was also a common reason why 16-25 year old males (32%; 14/44) attended the ED on Saturday nights (Figure 4b).

Alcohol excess was the third most common reason males attended the ED (Figure 4c). In contrast to males, impact-positive females more frequently attended the ED for deliberate self-harm (36%; 23/64) on the weekends and on Mondays and Tuesdays (Figure 4d).

Almost half of the impact-positive female patients treated for deliberate self-harm were under the age of 25. Non-interpersonal trauma was the second most common reason females attended the ED and most presentations were during the weekend.
Figure 4. Gender and reason for impact-positive patient presentations (males=118; females=64; data are for repeat days and shifts)
Table 6. Age and context or reason for presentation

<table>
<thead>
<tr>
<th></th>
<th>0–15*</th>
<th>16–25</th>
<th>26–40</th>
<th>41–60</th>
<th>61–90</th>
<th>Total</th>
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<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol excess</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>19</td>
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<td>2</td>
<td>8</td>
<td>1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Interpersonal trauma/violence</td>
<td>14</td>
<td>4</td>
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<td>20</td>
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<tr>
<td>Motor vehicle accident</td>
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<td>5</td>
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<td></td>
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</tr>
<tr>
<td>Non-interpersonal trauma</td>
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<td>13</td>
<td>11</td>
<td>4</td>
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<td>7</td>
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</tr>
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<td>Total</td>
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<td>44</td>
<td>26</td>
<td>38</td>
<td>8</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Alcohol excess</td>
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<td>2</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliberate self-harm</td>
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<td>10</td>
<td>5</td>
<td>7</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Interpersonal trauma/violence</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle accident</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-interpersonal trauma</td>
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<td>6</td>
<td>5</td>
<td>1</td>
<td>17</td>
<td></td>
</tr>
<tr>
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<td>6</td>
<td>2</td>
<td>3</td>
<td>11</td>
<td></td>
<td></td>
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<td>Total</td>
<td>1</td>
<td>26</td>
<td>15</td>
<td>21</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

*Aged 0–15 years. Data are for repeat days and shifts.

Table 6 compares Males and Females by the different reasons they presented in the ED.

Accuracy of routinely recorded ED data—Patient data captured in the ED computer system accurately identified 86% (156/182) of the impact-positive patients.

Table 7. Impact-positive patient clinical records

<table>
<thead>
<tr>
<th>Interval#</th>
<th>Patients n</th>
<th>Percentage increase %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov/Dec 2013</td>
<td>156*</td>
<td>8.3</td>
</tr>
<tr>
<td>Nov/Dec 2012</td>
<td>144</td>
<td></td>
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<tr>
<td>Oct/Nov 2013</td>
<td>123</td>
<td>0.8</td>
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<tr>
<td>Oct/Nov 2012</td>
<td>122</td>
<td></td>
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<tr>
<td>Sept 2013</td>
<td>110</td>
<td>7.8</td>
</tr>
<tr>
<td>Sept 2012</td>
<td>102</td>
<td></td>
</tr>
</tbody>
</table>

*See Box 1 for dates. Data are sums for 2-week periods.

Table 7 compares ED records for impact-positive patients between three two-week intervals in 2012 and 2013 (See Box 1 for full dates). For October/November, the number of alcohol related patients recorded is similar for both years.

The difference between years for September and November/December is more significant. The percentage of patients attending the ED increased between September 2012 and December 2012 and the respective interval in 2013.

A notable increase in patient attendances was recorded between September and October/November (20 in 2012; 23 in 2013) and between October/November and November/December (22 in 2012; 33 in 2013).

Discussion

This study found that patients with alcohol-related injuries or illnesses had a significant impact on the ED. The percentage of screen-positive attendances (7.4%) is...
similar to that reported by McDonald et al\textsuperscript{5} (7.9\%) for EDs throughout the United States of America.

In comparison, Slack and Nana’s\textsuperscript{1} estimated 6,211 patients attended hospitals (not just the Christchurch Hospital ED) for all alcohol-related causes throughout Canterbury in 2011 at a cost to the hospital system of $27.4 million. Our figure suggests that this total number of cases of alcohol-related hospital attendances, and therefore the cost, may in fact be an underestimate.

The high prevalence of Friday and Saturday night impact-positive attendances is consistent with international reports. For example, a review of 28 EDs from six countries (US, Mexico, Spain, Italy, Canada and Australia), noted that alcohol-related presentations most often occurred between midnight and 4:59am on Fridays, Saturdays, and Sundays.\textsuperscript{6} Similarly, in Ireland, Hope et al\textsuperscript{7} found that most alcohol-related ED presentations were between midnight and 6am.

The 16–25 year age group was over-represented in both genders. Binge drinking amongst teenagers, especially males, is an international problem. Data from surveys in nine European countries and the US report that adolescent drinkers became intoxicated during 25\% of their drinking sessions, compared with 17.5\% of other adult drinkers.\textsuperscript{8} Binge drinking by young people in New Zealand has increased since the purchase age was lowered from 20 to 18 years in 1999.\textsuperscript{2}

The high proportion of young males relative to females who attended the ED for alcohol-related reasons is consistent with the findings of Rehm and Room,\textsuperscript{9} who noted that, worldwide, 21.6\% of injuries to males were alcohol-related, compared with 7.7\% to females. However, in New Zealand, Kypri et al\textsuperscript{10} found that after the minimum alcohol purchase age was lowered, 51\% more females aged 18 and 19 years were involved in alcohol-related vehicle crashes and hospitalised injuries. We found that young females who drink were more likely to present during the weekend.

The high percentage of impact-positive middle-aged males compared with females is consistent with the results of some overseas studies. For example, Lowenstein et al,\textsuperscript{11} found that the mean age of severely-intoxicated patients presenting to a US ED was 34 years and 70\% were male.

Similarly, McDonald et al\textsuperscript{5} reported that patients between the ages of 30 to 49 years had the highest rate of alcohol-related presentations to EDs across the US, and the group was dominated by males. Furthermore, a review of 28 EDs from six countries reported that alcohol-affected males aged between 18 and 45 years presented most often.\textsuperscript{6}

In New Zealand, the Ministry of Social Development\textsuperscript{12} reported that from 1996/97 to 2006/07, the percentage of ‘potentially hazardous drinking’ by males aged between 35 and 44 years had increased from 25.5\% to 29\%.

Alcohol-related disruptive behaviour is more likely to occur during evening and night shifts, especially on Saturday. The impact of the disruptive behaviour of even one patient can affect many staff, patients, and supporting friends and family members.

Physical or verbal abuse is intimidating and impedes the process of care. The Law Commission\textsuperscript{5} noted that alcohol abuse has led to a ‘…disturbing level of anti-social
behaviours; from abusive and offensive language, intimidation, sexual harassment, graffiti and vandalism; to urinating, excreting and vomiting in public places.

The high proportion of alcohol-related medical problems on weekend night shifts is consistent with international reports. However, studies classifying medical conditions associated with alcohol-related ED presentations are rare. Most studies evaluate a single context, such as motor vehicle accidents and compare it with blood alcohol concentration, or compare the rate of alcohol-related presentations with the rate of unrelated presentations (e.g. Cherpitel, 2007).  

We found that the genders differed in their types of alcohol-related medical problems. Non-interpersonal trauma (other than motor vehicle accidents) was the most common injury suffered by impact-positive males of all ages, but only the second most common for females.

In the 16-25 year age group, interpersonal trauma caused by violence was also common. In a review of studies from eight countries, Cherpitel reported that alcohol consumption was implicated in between 22% and 84% of violent interpersonal injuries. Similarly, Lowenstein et al found that 23% of intoxicated patients presenting to a US ED were the victims of violent assault, and a review of six EDs in Ireland found that it ranged from 32 to 42%.

The relationship between alcohol consumption and self-harm in young females is alarming and raises the need for further research in this area. Excessive alcohol intake was the third most common reason for male attendance. These findings reflect the results of the NZ Mental Health Survey, which found that 12.3% of the population had abused alcohol or drugs at some time in their life, and that abuse was most prevalent in the 15–24 year age group.

Males are more than twice as likely to be represented in substance abuse statistics as females, but more females (56.6%) than males (36%) experience anxiety, a mood disorder or an eating disorder at some time in their life.

There was a low percentage of alcohol-related motor vehicle accident trauma in Christchurch, which might relate to stricter enforcement of drink driving laws over recent years. The incidence of vehicle crashes in New Zealand that involved alcohol causing death fell from 38% in 1993 to 33% in 2012, while those which resulted in injury fell from 20% to 15%. In some less-developed countries, motor vehicle accident-related trauma of alcohol-affected patients has been reported to be considerably higher than in this study (e.g. 8.3 to 16.8% in Mexico).

The increase in the number of impact-positive patients recorded by clinical staff between 2012 and 2013 may relate to the influence of the researchers. Our findings suggest that at least 14% of impact-positive attendances are not recorded.

Under-reporting of alcohol-related presentations is a general concern. US studies that reported 2.7% and 3.1% of all presentations to EDs as alcohol-related were thought to have underestimated the true figure by half. McDonald et al concluded that patient disclosure and/or physician documentation of alcohol-related presentations are unreliable. In the UK, Alcohol Concern reported that surveys of alcohol consumption in the UK under-estimate the volume of alcohol consumed by 40%.
The increase in numbers of impact-positive presentations in late November/early December may in part relate to greater alcohol consumption associated with festivities in the build-up to Christmas, because numbers had been increasing since September. The same pattern was also evident in 2012.

However, the significant increase in the months of November and December between 2012 and 2013 warrants more research, because it might reflect an important on-going trend. For example, Slack and Nana\(^1\) reported that alcohol-related ED presentations in Canterbury increased by 8.4% between 2006 and 2011.

Similarly, Rehm and Room\(^9\) noted that throughout the world, years of life lost from injuries attributable to alcohol increased by 6.3% from 2000 to 2005: the increase was twice as great for females (8.8%), as for males (4.1%).

**Limitations**—This study had a number of limitations. Firstly, the timing of the study might not be representative of drinking behaviours throughout the year. Alcohol consumption would be expected to rise during the lead-up to the Christmas/New Year period. A number of events traditionally involving heavy alcohol consumption (such as the New Zealand Trotting Cup, Christchurch Show Day and the Christchurch Wine and Food Festival) fell within the study period.

The time between arrival and observation at the ED could have affected a patient’s level of intoxication. ED waiting times can be long for non-urgent presentations, so some patients might have sobered while waiting for care, and subsequently been classified inappropriately. Finally, 29 patients (about 15%) who were missed and retrospectively tracked through notes might or might not have been eligible to consent – there was reasonable, but unconfirmed suspicion of alcohol involvement or intoxication in their presentation. It is possible that more were missed during the busy weekend periods. If these patients were included in the study, there could have been a higher number of impact-positive patients.

**Conclusion**—This study demonstrated that alcohol has a significant impact on the ED, particularly during the weekends. Male patients aged 16-25 years and 41-60 years presenting on Saturday evenings and nights had the biggest impact. The present system where busy ED staff routinely record the impact of alcohol appears to underestimate the true impact of alcohol consumption on the ED and therefore on the wider community at the time of this study. Future studies could help determine if the increase in alcohol-related presentations between 2012 and 2013 are part of an on-going trend.
Competing interests: Nil.

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Acknowledgments: The authors thank Melanie Browne (Information Analyst) for the datasets from the Emergency Department computer system, Malcolm Main (JMD Writing Consultants) for literature review, writing and editing assistance; and the staff at Christchurch Hospital Emergency Department and those who have contributed to reviewing the article.

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References:


Patterns and sources of alcohol consumption preceding alcohol-affected attendances to a New Zealand hospital emergency department

Manidipa Das, Rebecca Stewart, Michael Ardagh, Joanne M Deely, Stuart Dodd, Nadia V Bartholomew, Scott Pearson, Ruth Spearing, Tracey Williams, Martin Than

Abstract

Aim To perform a descriptive study of the drinking behaviour (amounts, types, sources of alcohol consumed) preceding alcohol-affected presentations to Christchurch Hospital Emergency Department (ED).

Methods Over 336 hours in the ED, patients with recent alcohol consumption or alcohol-related attendances were identified, classified as alcohol-affected or alcohol-unaffected, and invited to consent to answering questions on types, amounts and sources of alcohol consumed in the drinking session preceding or implicated in their ED attendance. Demographic information and level of intoxication were also recorded. Data were summarised descriptively.

Results Alcohol-affected patients were more frequently young (16–25 years) and male. Median alcohol consumption was 14 (range 1 to 71) standard drinks. Beer was the most popular beverage (34%), but spirits (23%), ready-to-drink mixes (21%) and wine (20%) were also popular. Liquor stores (45%) were the most popular source of alcohol, followed by on-licence premises (25%), and supermarkets (21%). The popularity of different types of beverages and their source varied according to patient age and gender.

Conclusions Consumption of large amounts, as well as allegedly ‘safe’ amounts, of a range of alcoholic beverages, most commonly from an off-licence source, contributed to alcohol-affected presentations to the ED. Beverage and source popularity varied by age and gender.

Alcohol is an important part of social life for many New Zealanders, but it also causes a great deal of harm. Alcohol is responsible for over 1,000 deaths and 12,000 years of life lost each year in New Zealand,¹ has known contribution to around 60 medical conditions,² and is implicated in violent offending and other social ills.³

The harms that arise from alcohol relate to the pattern (amount and frequency) of consumption,¹ which are partially shaped by the nation’s sociopolitical environment. Deregulation since 1989 has resulted in cheap, readily-available alcohol, allowing a culture of excessive use, with over 25% of NZ adults drinking hazardously.⁴

The Sale and Supply of Alcohol Act 2012 was passed to moderate the nation’s drinking behaviours and limit the harm caused by alcohol.⁵ Among other measures, it gave Territorial Authorities the power to develop Local Alcohol Policies (LAPs) to control licensing and restrict access to and the availability of alcohol.
The Christchurch City Council’s proposed LAP includes restrictions to trading hours, and is due to be implemented in 2014 or later. To assess the impact of the LAP on drinking behaviours, it was considered necessary to characterise drinking behaviours before, and at some time after, its introduction. This study is part of the ‘before’ component of such an assessment.

The setting of Christchurch Hospital Emergency Department (ED) allowed us to assess drinking behaviours that resulted in health-related harms and intoxication. We are aware of the existence of overseas studies looking at how alcohol-related ED admissions change with alcohol-related law changes,6–9 and New Zealand studies on the drinking behaviour of the general population.10–12

However, international and national evidence on the types, amounts and sources of alcohol consumed preceding ED admissions is sparse. We aimed to find the age and gender of alcohol-affected patients, their pattern of consumption (amount and type of alcohol consumed in their last/implicated drinking session), and their source of alcohol.

Methods

Data were collected by two investigators (MD and RS) over a sample time equivalent to two full weeks (24 hours/day, seven days/week) in the ED. All triaged patients were asked whether they had consumed alcohol in the 4 hours prior to their time of triage, and whether they thought alcohol contributed to their ED attendance.

Clinical judgement of staff (doctors and nurses involved in the patient’s care) also helped inform the latter question. Patients were eligible for the study if they had positive answers to either or both of these questions. Eligible patients had demographic data (age and gender) and their observed level of intoxication – outwardly sober (sober) or outwardly not sober (not sober) – noted (using an ‘intoxication assessment tool’13) on a ‘pre-consent form’. They were invited to answer questions about their most recent or implicated drinking session to allow completion of a ‘post-consent form’. Eligible patients under 16 years of age could only participate if consent was obtained from an accompanying parent/guardian.

Consenting patients were asked about the type, amount and purchase place of all alcoholic beverages they had consumed in their last or implicated drinking session. Recall of volumes and strengths of the alcohol consumed was encouraged to allow conversion to standard drink units by use of a conversion formula, or a ‘standard drinks guide’14 (where one standard drink equates to 10g of ethanol).

If the drinking session that contributed to the ED presentation was not the patient’s most recent drinking session (for example, if they had injured themselves the previous day during a prior drinking session), then alcohol consumption in the former (implicated) session was recorded.

Patients who could not be interviewed and who had no family or friends available to assist with the interview were tracked retrospectively using notes and by consulting clinical staff involved in their care. They were recorded as ‘missed patients’.

Cases included retrospectively with suspicion of alcohol involvement were noted as ‘unknown’. Any sober patients for whom it was unclear if alcohol contributed to their presentation were also classified as ‘unknown.’ By recording these patients as ‘unknown’ the number of patients recorded as ‘alcohol affected’ would be underestimated, but the possible extent of the underestimation would be defined.

Consenting patients were divided into two groups: those who were ‘alcohol-affected’ (were presenting to ED because of an alcohol-contributed problem and/or were not outwardly sober at ED), and those who were ‘alcohol-unaffected’ (consumed alcohol in 4 hours prior to triage, but appeared outwardly sober at ED and not presenting for an alcohol-contributed problem).

Data were summarised descriptively within Microsoft Excel software, version 2007 (Microsoft, Redmond, WA) using counts and percentages for categorical variables, and medians, interquartile ranges and ranges for continuous variables.

Ethical approval was granted by the local Health Research Council Regional Ethics Committee.
Results

**Patient participation**—Figure 1 shows the process of patient inclusion and exclusion. Over the study period, all 3,619 patients who presented to the ED were screened; 297 were eligible for the study and had pre-consent forms completed. Of these, 29 were excluded as they fell into the ‘unknown’ category; one more was a repeat presentation. Of the remaining 267 patients, 169 (63%) gave informed consent to be questioned about their drinking session. Reasons for non-consent are shown in Table 1.

Of the 98 non-consenters, 20 (20%) were sober, 66 (67%) were not sober. An additional five patients (5%) were not sober, but it was unclear what proportion of this was due to alcohol and what proportion due to other factors (such as drug use, psychosis, or delirium). The level of intoxication of 23 patients (23%) was unknown (in most cases because they were retrospectively tracked).

A further six presentations were excluded due to consumption of large amounts of methylated spirits, which could otherwise result in over-estimation of binge-drinking behaviours. Of the remaining 163 presentations, 113 (69.3% or 3.1% of all presentations) were ‘alcohol-affected’ (alcohol contributed to presenting complaint and/or patient was not sober), and 50 (30.7%) were ‘alcohol-unaffected’ (had consumed alcohol but were sober and presenting with a complaint to which alcohol did not contribute).

![Figure 1. Inclusion and exclusion of patients](attachment:image.png)
Table 1. Consent and primary reason for non-consent/exclusion (n=267)

<table>
<thead>
<tr>
<th>Consent/primary reason for non-consent</th>
<th>Number of eligible patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consented</td>
<td>169 (63%)</td>
</tr>
<tr>
<td>Consented but excluded due to methylated spirit consumption</td>
<td>6 (2%)</td>
</tr>
<tr>
<td>Not approached for consent</td>
<td>85 (32%)</td>
</tr>
<tr>
<td>Inappropriate to interview</td>
<td>38 (14%)</td>
</tr>
<tr>
<td>Missed patient</td>
<td>27 (10%)</td>
</tr>
<tr>
<td>Aggressive/uncooperative/unsafe to approach</td>
<td>14 (5%)</td>
</tr>
<tr>
<td>No recent alcohol consumption, chronic-use associated</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>Presenting due to someone else’s alcohol consumption</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Approached but did not give consent</td>
<td>13 (5%)</td>
</tr>
</tbody>
</table>

Age and gender profile—The age and gender profile of alcohol-affected patients is shown in Figure 2. It shows a bimodal distribution; 45 of the 113 (40%) patients were 16–25 year olds, and there is a smaller peak in 41–55 year olds.

The youngest patient was 14 years old, and the oldest was 87 years old. Males accounted for 72 (64%) of alcohol-affected patients, compared to 41 (36%) females, making the male to female ratio 1.8:1.

Figure 2. Alcohol-affected patients by age and gender (n=113)

Amount consumed by alcohol-affected vs. alcohol-unaffected patients—The median number of standard drinks consumed in the last/implicated drinking session by alcohol-affected patients was 14.0, the minimum 1.0, the maximum 70.6, and the interquartile range 7.5–20.7.
In comparison, the median number of standard drinks consumed by alcohol-unaffected patients was 2.5, the minimum 0.5, the maximum 15.2, and the interquartile range 1.8–4.0 (Figure 3).

**Figure 3. Number of standard drinks consumed by alcohol-unaffected vs alcohol-affected patients (n=163)**

**Binge drinking by type of presentation**—The number of patients whose last/implicated drinking session was a binge, as defined by the Health Promotion Agency (seven or more standard drinks), was 91 of 113 (81%) for alcohol-affected presentations, and 5 of 50 (10%) for alcohol-unaffected presentations.

**Type of alcohol consumed by alcohol-affected patients**—Beer was the most common of the beverage types consumed (34%), followed by spirits (23%), ready-to-drinks (RTDs; 21%), and wine (20%; Table 2).
Table 2. Number of standard drinks consumed collectively by the alcohol-affected patient group by type, amount and source of alcohol (n=113)

<table>
<thead>
<tr>
<th>Alcoholic beverage</th>
<th>NUMBER OF STANDARD DRINKS CONSUMED</th>
<th>Total on-licence</th>
<th>Off-licence source</th>
<th>Total off-licence</th>
<th>Total on- and off-licence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Liquor store</td>
<td>Supermarket</td>
<td>Untaxed*</td>
<td>Total off-licence</td>
</tr>
<tr>
<td>Beer</td>
<td>253 (14%)</td>
<td>131 (7%)</td>
<td>125 (7%)</td>
<td>13 (1%)</td>
<td>75 (4%)</td>
</tr>
<tr>
<td></td>
<td>131 (7%)</td>
<td>125 (7%)</td>
<td>13 (1%)</td>
<td></td>
<td>75 (4%)</td>
</tr>
<tr>
<td></td>
<td>125 (7%)</td>
<td></td>
<td>13 (1%)</td>
<td></td>
<td>75 (4%)</td>
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<td></td>
<td>13 (1%)</td>
<td></td>
<td>75 (4%)</td>
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</tr>
<tr>
<td></td>
<td>75 (4%)</td>
<td></td>
<td>344 (25%)</td>
<td></td>
<td>597 (34%)</td>
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<td></td>
<td>344 (25%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spirits</td>
<td>50 (3%)</td>
<td>319 (18%)</td>
<td>45 (3%)</td>
<td>0 (0%)</td>
<td>369 (28%)</td>
</tr>
<tr>
<td></td>
<td>319 (18%)</td>
<td>45 (3%)</td>
<td>0 (0%)</td>
<td></td>
<td>369 (28%)</td>
</tr>
<tr>
<td></td>
<td>45 (3%)</td>
<td></td>
<td>0 (0%)</td>
<td></td>
<td>369 (28%)</td>
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<td></td>
<td>0 (0%)</td>
<td></td>
<td>0 (0%)</td>
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<tr>
<td></td>
<td>369 (28%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RTDs†</td>
<td>77 (4%)</td>
<td>295 (17%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>295 (22%)</td>
</tr>
<tr>
<td></td>
<td>295 (17%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td></td>
<td>295 (22%)</td>
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<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>295 (22%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wine</td>
<td>48 (3%)</td>
<td>32 (2%)</td>
<td>245 (14%)</td>
<td>0 (0%)</td>
<td>307 (23%)</td>
</tr>
<tr>
<td></td>
<td>32 (2%)</td>
<td>245 (14%)</td>
<td>0 (0%)</td>
<td></td>
<td>307 (23%)</td>
</tr>
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<tr>
<td></td>
<td>307 (23%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy mixers††</td>
<td>9 (1%)</td>
<td>26 (2%)</td>
<td>N/A**</td>
<td>0 (0%)</td>
<td>26 (2%)</td>
</tr>
<tr>
<td></td>
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<td>N/A**</td>
<td>0 (0%)</td>
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<td>0 (0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26 (2%)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>All types of alcohol</td>
<td>437 (25%)</td>
<td>803 (45%)</td>
<td>370 (21%)</td>
<td>58 (3%)</td>
<td>1336 (75%)</td>
</tr>
<tr>
<td></td>
<td>803 (45%)</td>
<td>370 (21%)</td>
<td>1336 (75%)</td>
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<tr>
<td></td>
<td>370 (21%)</td>
<td>1336 (75%)</td>
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<td></td>
<td>1336 (75%)</td>
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</tr>
</tbody>
</table>

* “Untaxed” alcohol consists of duty-free and home-brewed alcohol.
** Spirits and RTDs are not available for purchase at supermarkets.
†”RTDs” are ready-to-drinks (pre-mixed spirits and mixers).
††“Energy mixers” consist of spirits and an “energy drink” mixer.

**Beer consumed by alcohol-affected patients**—Beer was popular among males of a range of ages, and had noteworthy consumption among 31–55 year-old females (Figure 4). Off-licence consumption of beer (58% of total beer) was slightly greater than on-licence (42% of total beer). Comparable amounts of beer were sourced from supermarkets and liquor stores (21% and 22% of total beer, respectively; Table 2).

Figure 4. Beer consumed by alcohol-affected patients (n=113)
**Spirits consumed by alcohol-affected patients**—Spirits were most popular among young males (21–25 years) and very young females (16–20 years; Figure 5). Like RTDs, the majority of spirits (77%) came from off-licence sources (namely liquor stores; Table 2). Untaxed (duty-free or home-brewed) spirits comprised 11% of the total spirits consumed (Table 2).

**Figure 5. Spirits consumed by alcohol-affected patients (n=113)**

![Bar chart showing consumption of spirits by age and gender]

**RTDs consumed by alcohol-affected patients**—Ready-to-drinks (RTDs) are pre-mixed spirit-based beverages. RTDs were particularly popular among young people (<30 years; Figure 6). The majority (79%) came from liquor stores (Table 2).
Wine consumed by alcohol-affected patients—Wine was notably more popular among females than males (Figure 7). The majority of wine was sourced off-licence (87%). Supermarkets were the most popular source of wine, accounting for 80% of off-licence and 69% of on- and off-licence wine. In comparison, liquor stores accounted for 10% of off-licence and 9% of on- and off-licence wine consumed by alcohol-affected patients (Table 2).

On-licence sources of alcohol consumed by alcohol-affected patients—78 alcohol-affected patients (69%) had consumed alcohol exclusively from off-licence sources, 21 patients (19%) from both on- and off-licence sources, and 14 patients (12%) exclusively from licensed premises. Hence, 88% of patients had consumed off-licence alcohol. Overall, 436 standard drinks (25%) came from on-licence premises, while 1336 standard drinks (75%) came from off-licence premises (Table 2).

Alcohol consumption at on-licence venues had greatest popularity among young males (21–25 years; Figure 8). Bars and pubs were the most frequented on-licence venues. Beer was the most popular on-licence beverage, comprising 58% of all on-licence standard drinks (Table 2).
Figure 7. Wine consumed by alcohol-affected patients (n=113)

Figure 8: On-licence alcohol consumed by alcohol-affected patients (n=113)
**Liquor store-sourced alcohol consumed by alcohol-affected patients**—Liquor stores were a popular source across most age groups, with greatest use from young males (16–30 years) and young females (16–20 years; Figure 9). Almost half the standard drinks consumed by alcohol-affected patients were purchased from liquor stores, and most of this was comprised of spirits (40% of alcohol from liquor store) and RTDs (37% of alcohol from liquor store; Table 2).

**Figure 9. Liquor store-sourced alcohol consumed by alcohol-affected patients (n=113)**

[Graph showing alcohol consumption by age group for males and females]

**Supermarket-sourced alcohol consumed by alcohol-affected patients**—31 to 35 year-old females were the greatest consumers of supermarket-sourced alcohol (Figure 10). Beer and wine are the only major alcoholic beverages that supermarkets are permitted to sell.

Supermarkets accounted for 21% of the standard drinks of alcohol consumed by alcohol-affected patients. Of this, two-thirds was wine (69% of all wine) and one-third beer (21% of all beer; Table 2).
Discussion

Many alcohol-affected patients drank hazardously—People with alcohol-affected presentations had relatively high levels of alcohol consumption; for the most part it was well into the range of binge drinking.

Consumption of more than four standard drinks in one session doubles the risk of injury within the following 6 hours and the risk increases with further consumption.15

To reduce the risk of immediate injury, the Health Promotion Agency recommends that women consume no more than four standard drinks and men no more than five in any single drinking session.16

Notably, a small proportion of alcohol-affected patients had consumed four or fewer standard drinks prior to presentation, suggesting that alcohol may have intoxicating or harmful short-term effects for some individuals even when consumed within recommended “safe” levels.

Youth were over-represented and drank a lot (of a range of beverages, most commonly liquor store-sourced) as a group—People aged 16–25 were over-represented in the study. They comprised 40% of the alcohol-affected group, compared to the general population of Christchurch, in which 15–24 year-olds make up approximately 15% of the population.17

Large amounts of a range of alcoholic beverages were consumed by the young alcohol-affected patient group (most often from a liquor store)—this might be due to
the large number of alcohol-affected patients in that age category, and/or due to consumption of large amounts of alcohol by the individuals in these groups.

Other studies have found that young adults aged 18 to 24 are twice as likely as the general drinking population to drink large amounts of alcohol at least once a week (34% vs. 15%), tend to have greater per occasion alcohol consumption, and also experience more harm per standard drink compared with older drinkers. Their over-representation in this study is therefore unsurprising.

There is also a second, smaller peak in middle-aged drinkers (41–55 years; Figure 2), which we are not aware of in other NZ literature.

**Males were over-represented**—There were considerably more males with alcohol-affected presentations compared with females. This is consistent with previous evidence showing males are more likely to be drinkers than females, drink more frequently, and tend to drink more heavily when they do drink. It also reflects a global pattern, and Rehm and Room (2009) noted that globally 21.6% of injuries to males were alcohol-related, compared with 7.7% to females.

**Females aged 16 to 20 outnumbered their male counterparts and had high consumption of spirits and wine**—There was, however, a female predominance in two age brackets: 16–20 year-olds and 41–45 year-olds. The 16–20 year age bracket is of interest, as it was the second-highest 5-year age bracket represented (after 21 to 25 year-olds; Figure 2).

According to Rankine et al (2013), the proportion of 16–17 year old females consuming eight or more standard drinks in a session has tripled between 1995 and 2011. The 2011/2012 NZ Health Survey found that among past-year drinkers, the proportion of men who had consumed hazardous levels of alcohol in the last year significantly outnumbered women in all age categories except for the 15–17 year old age category. In this age group, the difference between males and females was not found to be statistically significant.

The large numbers of 16–20 year old females in our study could perhaps be a result of a similar phenomenon, coupled with the possibility that young female drinkers were more likely to come to harm and require ED attendance compared to their male counterparts because of a lower alcohol tolerance.

Alcohol-affected females aged 16–20 were amongst the highest consumers of spirits and wine; liquor stores were the most common source of alcohol consumed by this group, with smaller contributions from supermarkets and on-licence premises.

**A minority of alcohol was consumed at on-licences premises, predominantly by young males drinking beer**—Young males were the biggest consumers of on-licence alcohol in our study. The Alcohol Use in New Zealand 2004 report states that people aged 18–24 were significantly more likely than most other age groups to have consumed large amounts of alcohol at pubs, hotels, taverns and/or nightclubs, and that males were significantly more likely to have consumed large amounts of alcohol at pubs, hotels and/or taverns compared with females (by age-standardised analysis).

Beer was the most popular on-licence alcoholic beverage, and is the most popular alcoholic beverage in New Zealand.
The majority of alcohol was consumed off-licence—Off-licence alcohol consumption was more popular than on-licence among our alcohol-affected study participants, with 75% of the alcohol being from off-licence sources.

A common and worrying phenomenon is that of “pre-loading”, where there is significant consumption of off-licence alcohol prior to patronising on-licence settings. A major reason pre-loading occurs is because of the significant price difference between on- and (cheaper) off-licence alcohol.

In our study, 19% of alcohol-affected patients had consumed both on- and off-licence alcohol, while 69% had only off-licence alcohol. The Alcohol Use in New Zealand 2004 report states that in the previous 12 months, 47% of drinkers had consumed large amounts of alcohol in their own home, compared with 16% having consumed large amounts of alcohol at a pub, hotel and/or tavern.\textsuperscript{18}

The popularity of off-licence alcohol has increased over time—it was estimated that 59% of all alcohol was consumed off-licence prior to deregulation (which occurred from 1989),\textsuperscript{23} compared to 68% in 2007–8.\textsuperscript{24}

Property damage from earthquakes in Christchurch in 2010 and 2011, reduced access to on-licence premises and forced closure of parts of the central business district, may partially account for the dominance of off-licence drinking observed in our study.

The majority of wine was sourced from supermarkets—It is interesting to note that for the beverages which could be sold at either supermarkets or liquor stores (namely, wine and beer), comparable amounts of beer came from the two sources. In contrast, the vast majority of wine came from supermarkets, with very little contribution from liquor stores.

The justification for the introduction of wine into supermarkets was to foster a “wet” drinking culture in NZ, where regular consumption of small amounts of wine (for example, with meals) was the norm.\textsuperscript{3} This was intended to replace our traditional “dry” culture of less frequent but greater per occasion consumption, which is associated with greater harm.\textsuperscript{10}

Since its introduction to supermarkets in 1989, wine consumption has increased from 25 bottles, to 37 bottles per capita (15 years plus) in 2008.\textsuperscript{3} Wall and Casswell (2012) commented that the step-change increase in wine consumption following its introduction to supermarkets might have been further amplified by increasing affordability of wine as a result of supermarkets’ more aggressive pricing policies.\textsuperscript{25}

The Law Commission (2009) noted that the introduction of wine to supermarkets failed to dissipate our heavy drinking culture,\textsuperscript{3} and our study suggests that supermarket-sourced alcohol makes a noteworthy contribution to harm.

Additionally, the purchasing power of the New Zealand’s two primary supermarket chains and their growing market share has been identified as a key factor in the development of the highly competitive off-premise liquor retail market.\textsuperscript{3}

Study limitations—This study had a number of limitations. Firstly, the timing of the study might not represent drinking behaviours throughout the year (for example, alcohol consumption would be expected to rise over the lead-up to the Christmas/New Year period).
A number of events traditionally involving heavy alcohol consumption (such as the New Zealand Trotting Cup, Christchurch Show Day and the Christchurch Wine and Food Festival) fell within the sampling period, so recorded drinking behaviour might not be typical. However, these accounted for only a small portion of the two week sample time.

Secondly, 66% of those not consenting were not sober. The people with the highest levels of intoxication were unable to consent (due to, for example; critical state, safety concerns etc.), and a high level of intoxication is associated with memory-loss, which limits patients’ ability to answer questions about their drinking accurately. The sampling bias due to the most intoxicated being unable to contribute and the recall bias of those with impaired memory from intoxication, have most likely led to underestimation of the true level of drinking.

Thirdly, while most patients seemed happy to answer questions about their drinking, there might have been a response bias relating to stigma, or conversely pride, associated with alcohol consumption, leading to an under- or over-estimation of alcohol consumption. Fourthly, the time of observation of patients’ level of intoxication varied according to waiting room times and the workload within the ED. Some patients might have sobered up in this time and subsequently been categorised inappropriately.

Finally, 29 patients who were missed and retrospectively tracked through notes might or might not have been eligible to consent. These patients were not included in the study. Therefore, there has probably been an underestimation of the number of alcohol-affected patients.

Even with these limitations, this study establishes a baseline with which the effects of any policy changes can be compared in the future.

Competing interests: Nil.

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References:


Abstract

Aim To estimate average infant daily intake of chlorinated persistent organic pollutants (POPs) through the consumption of breast milk in New Zealand.

Method Breast milk of 39 first-time mothers aged 20–30 years was collected during 2007–2010 and analysed for persistent organic pollutants including dioxin-like compounds and organochlorine pesticides. The quantity of POPs consumed by infants assuming exclusive breast feeding was estimated by calculating the Estimated Daily Intake (EDI) expressed as amount consumed through breast milk per kilogram of body weight per day.

Results Of all POPs quantified, the EDI of DDT (principally in the form of its metabolite p,p'-DDE) was the highest (1.6 µg/kg/day), and above the tolerable daily intake (TDI) of 0.5 µg/kg/day. The mean EDI for dioxin-like compounds (including PCDD/Fs and PCBs) was 19.7 pg TEQ (toxic equivalency)/kg/day, which is among the lowest reported worldwide, yet above the TDI of 1 pg TEQ/kg/day. The EDI of HCH, HCB, dieldrin, heptachlor and mirex were 32.9, 37.9, 39.4, 2.0, and 0.9 ng/kg/day respectively, all of which were below the current TDI. Age of the mother was positively associated with higher EDIs for the infant, particularly for total-TEQ and total-DDT.

Conclusion Infant daily intakes of chlorinated POPs through breast milk estimated for New Zealand are low or average by international comparison, and 5 times lower than 25 years ago. Future breast milk monitoring will determine whether this diminishing trend is continuing as well as providing monitoring information on other POPs.

Persistent organic pollutants (POPs) include a range of organic chemicals that enter the environment as a result of human activities, are persistent in the environment, and become widely distributed through air and water.

This group of chemicals includes polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs: unintentional by-products of industry), polychlorinated biphenyls (PCBs: historically widely used in electrical transformers and other applications) and organochlorine pesticides (OCP) such as dichlorodiphenyltrichloroethane (DDT), which have now largely been phased out. For example, the use of DDT peaked in the 1950s and 60s, was restricted in the 1970s, and banned in 1989.

Due to their stability and lipophilic properties, POPs are stored in fatty tissue and bioaccumulate in the food chain. Most POPs have long half-lives in humans, can
cross the placenta, and are excreted in breast milk, resulting in exposure of offspring. During the first year of life, breast milk is the primary source of postnatal exposure to POPs.

Exposure to POPs has been associated with a range of toxic effects in wildlife and humans, and children are thought to be particularly vulnerable to their effects. For example, early life exposure to background levels of POPs has been reported to affect the thyroid hormone system, immunological functions and neuropsychological development.

The Stockholm Convention (www.pops.int) embodies the international recognition that through concerted action the environmental levels of POPs can and should be reduced. The Convention, which was ratified by New Zealand in 2004, requires parties to take measures to eliminate or reduce the release of POPs and regularly quantify the body burdens of POPs in order to measure the effects of the parties’ actions to reduce exposure and allow for international comparisons.

The preferred matrix for these bio monitoring studies has been breast milk, as it can be obtained non-invasively and is lipid rich. In addition, breast milk bio monitoring studies of POPs provide the opportunity to estimate infant exposures to these compounds.

In New Zealand, three consecutive breast milk surveys have been conducted, measuring POPs in the milk of first time mothers in the 20–30 year age range, conducted in 1988, 1998 and 2008. These surveys have shown a substantial decline in breast milk levels of chlorinated POPs in nursing women, reflecting the effectiveness of national and international regulations related to POPs.

Here we report the findings of the latest breast milk survey and calculate the estimated daily intake (EDI) of POPs through breast milk for infants in New Zealand, and compare them with EDIs reported for other countries and reference dose values set by regulatory agencies.

Methods

Breast milk collection—The recruitment methodology was modelled on the fourth WHO-Coordinated Survey of human milk for persistent organic pollutants and is described in detail elsewhere. Briefly, first-time mothers in the 20–30 year age range, exclusively breastfeeding, and resident within the study area for the last five years, were included in the study.

Participants were recruited from four study areas: Wellington (urban area in the North Island), Wairarapa (rural, North Island), Christchurch (urban, South Island) and North Canterbury (rural, South Island). Participants were recruited through midwives, medical doctors and breast feeding consultants, depending on what was most practicable in each area.

A total of 39 women self-collected breast milk, usually during the second but sometimes during the third month after birth; it was collected through hand expression directly into provided glass collection containers and stored in their home freezer.

When a maximum of up to 250 ml of breast milk was collected, or all of the eight provided collection containers had been used, the milk sample was collected for central storage in a -20°C freezer at the Centre for Public Health Research (CPHR) in Wellington until transport to the laboratory.

Laboratory analyses—All samples were analysed at AsureQuality (Lower Hutt, New Zealand) for a range of POPs including PCDD/Fs, PCBs, and OCPs. Concentrations of all analytes were determined through High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS) with detail described elsewhere and lipid content. OCPs and their metabolites that were detected in all samples included: Lindane (hexachlorocyclohexane (HCH): of which beta-HCH was detected in all
samples); hexachlorobenzene (HCB); Dieldrin; heptachlor-epoxide; dichlorodiphenyltrichloroethane (DDT) (of which \( p,p' \)-DDT; \( o,p' \)-DDT; \( p,p' \)-DDD and \( p,p' \)-DDE were detected in all samples); Mirex. Because two samples were of insufficient volume to allow testing for all analytes, PCDD/Fs and PCBs were tested for in all 39 samples, while 37 samples were analysed for OCPs. All breast milk concentrations were expressed as pg/g lipid or ng/g lipid. Toxic equivalences for the PCDD/Fs and PCBs were calculated using 2005 WHO Toxic Equivalency Factors \(^{15} \) (also including half the limit of detection (LOD) if below LOD \(^{15} \)).

**Estimated daily intakes**—The estimated daily intake (EDI) was calculated for each individual based on the following formula:

\[
\text{EDI} = \text{concentration} \times \text{lipid content} \times \text{daily milk consumption/infant weight.}
\]

EDI: estimated daily intake (expressed in pg/kg/day).

Concentration: individual levels from the breast milk survey (½ LOD included for non-detects) pg/g lipid (mean breast milk concentrations have been reported\(^ {13} \))

Lipid content: individual levels from the breast milk survey (fraction)

Daily milk consumption: assumed to be 690 mL/day (<3 months) and 770 mL/day (3 to 6 months) (USEPA 2011)

Infant weight: assumed to be 5.9 kg (<3 months), 7.4 kg (3 to 6 months).\(^ {16} \)

The EDI was averaged over 6 months (assuming the individually determined POPs concentration and lipid content to be representative for a 6-month period\(^ {17} \)), and the total intake over 6 months was calculated, under the assumption of exclusive breast feeding over 6 months.

Ethical approval for the study was obtained from the Multi-Region Ethics Committee, reference MEC/06/10/119 and informed consent was provided by all participants.

**Results**

**Study population**—The study population included 39 mothers: 17 from Wellington, 10 from Wairarapa, 9 from Christchurch, and 3 from North Canterbury. The average age was 27.7 (range 20–30).

The average lipid concentration of the breast milk was 3.85% (SE 0.21) which was statistically significantly higher in urban areas 4.18% (SE 0.27) compared to rural areas 3.19% (SE 0.27).

**Estimated daily intake**—Table 1 lists the estimated infant daily intake of POPs through breast milk, under the assumption of exclusive breast feeding over their first 6 months of life. The highest EDI was observed for DDT, primarily in the form of its main metabolite \( p,p' \)-DDE, with infants consuming 1.6 µg/kg per day, which equals a total consumption of almost 2 milligram of DDT related compounds (primarily \( p,p' \)-DDE) over a 6-month period of exclusive breast feeding.

Table 1 also includes the tolerable daily intakes (TDI) set by various international agencies. The TDI is considered to be the quantity of a substance that can be ingested per kilogram bodyweight per day over a lifetime that is unlikely to produce adverse effects.

Table 1 indicates that breast feeding infants’ EDI for total TEQ including dioxins, furans and PCBs (WHO-TEQ\(_{DFFP}\)) is above the TDI set by New Zealand and FAO/WHO for all analysed samples. The EDI for total DDT is also above the New Zealand TDI for the majority of samples (32 out of 37).

The dieldrin EDI exceeded the US EPA TDI in a minority a samples (10 out of 37), and 1 out of 37 exceeded the New Zealand and FAO/WHO TDI. For all other POPs the EDI was below the TDI for all analysed samples.
Table 1. Estimated daily intake from breast milk (first-time mothers in the 20–30 age range in 2007–2010), and tolerable daily intake

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<tr>
<td>PCDD/Fs and PCBs</td>
<td>(pg/kg/d)</td>
<td>(pg/kg/d)</td>
</tr>
<tr>
<td>WHO-TEQ&lt;sub&gt;QP&lt;/sub&gt;</td>
<td>19.7</td>
<td>6.7–42.1</td>
</tr>
<tr>
<td>WHO-TEQ&lt;sub&gt;PCDD/FS&lt;/sub&gt;</td>
<td>14.3</td>
<td>4.7–34.2</td>
</tr>
<tr>
<td>WHO-TEQ&lt;sub&gt;PCBs&lt;/sub&gt;</td>
<td>5.3</td>
<td>1.2–14.6</td>
</tr>
<tr>
<td>Organochlorine pesticides</td>
<td>(ng/kg/d)</td>
<td>(ng/kg/d)</td>
</tr>
<tr>
<td>HCH (total)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>32.9</td>
<td>2.7–421.4</td>
</tr>
<tr>
<td>HCB</td>
<td>37.9</td>
<td>6.8–82.3</td>
</tr>
<tr>
<td>dieldrin</td>
<td>39.4</td>
<td>7.8–108.3</td>
</tr>
<tr>
<td>heptachlor (total)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.0</td>
<td>0.3–6.8</td>
</tr>
<tr>
<td>DDT (total)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1,612.4</td>
<td>420–5,627</td>
</tr>
<tr>
<td>mirex</td>
<td>0.9</td>
<td>0.3–3.3</td>
</tr>
</tbody>
</table>

PCDD/Fs: polychlorinated dibenzodioxins and polychlorinated dibenzofurans
PCBs: polychlorinated biphenyls
WHO-TEQ:<sub>QP</sub> Toxic Equivalence including PCDD/Fs and PCBs
HCH: hexachlorocyclohexane (gamma-HCH is Lindane)
HCB: hexachlorobenzene
DDT: dichlorodiphenyldichloroethane
<sup>a</sup> (consisting of: alpha-HCH: 0.2; beta-HCH: 31.5; gamma-HCH: 0.9; delta-HCH: 0.3 ng/kg/day)
<sup>b</sup> (consisting of: heptachlor: 0.05; heptachlor-exoclopoxide: 2.0 ng/kg/day)
<sup>c</sup> (consisting of: p,p′-DDT: 20.7; o,p′-DDT: 2.2; p,p′-DDD: 0.5; o,p′-DDD: 0.1; p,p′-DDE: 1,588.3; o,p′-DDE: 0.6 ng/kg/day)
* TDI for Lindane

Comparison with previous New Zealand breast milk surveys—Two previous breast milk surveys have been conducted in New Zealand measuring POPs in the milk of first time mothers in the 20–30 year age range, 20 years<sup>11</sup> and 10 years<sup>12</sup> before the 2008<sup>13</sup> survey.

The breast milk concentrations reported for these studies indicate that the EDIs through breast milk of children born 15 years ago would have been up to 2 times higher, and for children born 25 years ago would have been approximately 5 times higher than the EDIs reported here for most POPs.<sup>13</sup>

Comparison with breast milk surveys overseas—Table 2 includes EDIs reported for other countries. To provide a fair comparison, only the EDIs reported in the most recent years (since 2000) are listed, given the significant decline in the measured concentrations of POPs in breast milk over time in most countries.
Table 2. Estimated daily intakes (EDI) through breast milk of POPs reported for different countries over the last 10 years

<table>
<thead>
<tr>
<th>Compound</th>
<th>Location</th>
<th>Year sample collected</th>
<th>Mean EDI</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCDD/Fs and PCBs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHO-TEQ(_{DFP})</td>
<td>New Zealand</td>
<td>2007–2010</td>
<td>19.7</td>
<td>this study</td>
</tr>
<tr>
<td></td>
<td>12 provinces, China</td>
<td>2007</td>
<td>14.2–48.6</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Shenzhen, China</td>
<td>2007</td>
<td>48.2</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Turkey</td>
<td>2007</td>
<td>37.1–70.0</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Spain</td>
<td>2004</td>
<td>49.6</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Belgium</td>
<td>2000–2001</td>
<td>103</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Norway</td>
<td>2000–2001</td>
<td>68</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td>2000–2002</td>
<td>131</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Czech Republic</td>
<td>1999–2000</td>
<td>117–271</td>
<td>29</td>
</tr>
<tr>
<td>Organochlorine pesticides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCH (total)</td>
<td>New Zealand</td>
<td>2007–2010</td>
<td>32.9</td>
<td>this study</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>2007</td>
<td>420–2,960</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Egypt</td>
<td>2001</td>
<td>192</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Poland</td>
<td>2000–2001</td>
<td>65</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Vietnam</td>
<td>2000–2001</td>
<td>60–170</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Czech Republic</td>
<td>1999–2000</td>
<td>110</td>
<td>34</td>
</tr>
<tr>
<td>HCB</td>
<td>New Zealand</td>
<td>2007–2010</td>
<td>37.9</td>
<td>this study</td>
</tr>
<tr>
<td></td>
<td>Beijing, China</td>
<td>2009–2011</td>
<td>200</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Shanghai, China</td>
<td>2006–2010</td>
<td>100</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>2007</td>
<td>10–340</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Egypt</td>
<td>2001</td>
<td>47</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Poland</td>
<td>2000–2001</td>
<td>86</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Vietnam</td>
<td>2000–2001</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Czech Republic</td>
<td>1999–2001</td>
<td>910</td>
<td>34</td>
</tr>
<tr>
<td>DDT (total)</td>
<td>New Zealand</td>
<td>2007–2010</td>
<td>1,612</td>
<td>this study</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>2007</td>
<td>1,100–11,370</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
<td>2001–2002</td>
<td>3,290</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Egypt</td>
<td>2001</td>
<td>1,940</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Poland</td>
<td>2000–2001</td>
<td>3,789</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Vietnam</td>
<td>2000–2001</td>
<td>7,000–11,000</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Czech Republic</td>
<td>1999–2001</td>
<td>3,010</td>
<td>34</td>
</tr>
<tr>
<td>mirex</td>
<td>New Zealand</td>
<td>2007–2010</td>
<td>0.9</td>
<td>this study</td>
</tr>
<tr>
<td></td>
<td>China</td>
<td>2007</td>
<td>10–60</td>
<td>30</td>
</tr>
</tbody>
</table>

As different countries only differ slightly with regards to their assumptions for volume of breast milk consumption and infant weight when calculating the EDI it is valid to compare EDIs between countries.

Table 2 indicates that for most POPs the daily intake through breast milk estimated for New Zealand is low or average by international comparison.
Figure 1. The association between age and EDI for POPs, based on the 39 participants in the 2008 New Zealand POPs breast milk survey.

WHO-TEQ$_{DFP}$

HCH (total)

HCB

dieldrin

heptachlor (total)

DDT (total)

mirex
Comparison with a variety of countries, including European countries, was available for dioxin-like compounds (as expressed by the TEQDFP); New Zealand’s EDI was among the lowest internationally. For most organochlorine pesticides the number and variety of comparison countries was more limited.

Among these countries, New Zealand’s EDIs are low for HCH, heptachlor and mirex, while being low to average for HCB, dieldrin and DDT.

**EDI and age of the mother**—Figure 1 depicts the associations between the age of the mother and EDI for dioxin-like compounds (TEQDFP), HCH, HCB, dieldrin, heptachlor, DDT and mirex. For TEQDFP and DDT there is a strong and statistically significant positive association between the age of the mother and EDI.

Infants of 30-year-old mothers have, on average, a higher EDI of TEQDFP compared to infants of 20 year olds, a difference of 10.8 pg/kg/day, almost a doubling of EDI. Also, the EDI for DDT is strongly associated with the age of the mother: 10 year older age is associated with a higher EDI of 1,409 ng/kg/day.

Hexachlorocyclohexane and HCB have a very similar association with age, for both a 10 year older age of the mother is associated with 18 ng/kg/day higher EDI.

Heptachlor and mirex were only weakly associated with age, while the EDI for dieldrin was not associated with the age of the mother, within the age range of this study.

**Discussion**

This is the first study to estimate the daily intake of common chlorinated POPs through breast milk for New Zealand infants. It shows that New Zealand infants’ estimated daily intake of dioxin-like compounds through breast milk is among the lowest world-wide and that EDIs are also low for the organochlorine pesticides HCH, heptachlor and mirex, while being low to mid-range for HCB, dieldrin and DDT.

This study also showed that breast milk concentrations of POPs have dramatically declined, and currently are 5 times lower than 25 years ago. This indicates that international efforts to reduce environmental contamination by POPs continue to have a positive impact on current and future generations.

A large number of studies that have compared health effects in breast fed children with those of formula fed children, have consistently reported a number of better health outcomes in breast-fed children compared to formula-fed children. Considering that formula contains significantly lower levels of POPs, this indicates that any negative effects possibly associated with POPs contamination are largely out-weighed by the positive effects of breast feeding.

Studies into the health effects of low dose POPs exposure in infancy are limited, and the strongest evidence of negative effects of early life exposure to POPs stems from highly-exposed populations. For example, health effects in children from mothers exposed to PCBs and PCDFs are evident from studies in the Yucheng cohort of Taiwan, who were highly exposed to these chemicals from ingesting contaminated rice oil in 1978–1979.
Children from exposed mothers experienced long-lasting cognitive, behavioural, dermatological, immunological and endocrine effects, and effects on tooth and sexual development. Prenatal exposure was reported to be associated with the health effects, but for some developmental effects the duration of breast feeding was also associated, indicating an additional role for postnatal exposure through breast milk.

More recent studies in populations exposed to much lower background levels of PCBs and dioxins have also reported health effects. Perinatal and/or postnatal exposure to POPs including pesticides, PCBs and PCDD/Fs, has been associated with significantly decreased infants’ serum levels of thyroid hormones.

Mothers with higher serum concentrations of PCBs have also been reported to give birth to neonates having smaller indices of thymus size at birth, suggestive of an effect on early immune development. Neurotoxic effects of exposure to POPs (including PCBs, DDT and HCB) on infants have been reported repeatedly, but have been suggested to be mainly attributable to prenatal exposure and not breast feeding.

In utero as well as lactational exposure of children to relatively low dioxin doses has also been reported to permanently reduce sperm quality. Several studies thus suggest that early life exposure to POPs, even at relatively low background levels, can be associated with a range of health effects, but the significance of both levels and the timing of exposure with respect to adverse health outcomes remains uncertain. These studies nonetheless illustrate the importance of limiting early life exposure to POPs, both prenatal and postnatal, through limiting mothers’ body burdens of POPs.

Although a significant reduction in breast milk contamination of POPs has been achieved and New Zealand’s EDIs are relatively low internationally, EDIs of New Zealand infants continue to exceed the TDI, particularly for dioxin-like compounds and DDT. This needs to be interpreted in the light of the limitations of TDIs. TDIs are usually assessed based on animal experiments and limited human data, and their relevance to human health outcomes is not certain.

The doses considered to be safe vary among regulatory agencies, further illustrating the uncertainties around TDIs. In addition, TDIs are determined for chronic exposure over a lifetime, while exposure through breast milk usually continues for less than 1 year. During this period breast-fed infants accumulate higher body burdens of POPs compared to formula-fed infants, but over time differences in body burden between breast fed and formula fed children diminish. For example, relatively high EDIs of the dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) associated with breast feeding may not lead to high body burdens in later life, due to the short half-life of TCDD in infants which is estimated to be only 5–6 months, much shorter than the 7–11 years estimated for adults.

The short half-life for POPs in young children is thought to be due to a combination of factors, including the effect of dilution from the rapid growth of the adipose mass, a faster rate of faecal lipid excretion, and increased metabolism. Although the first year of life may represent a particularly vulnerable period in child development, TDIs set specifically for exposures in infants are not available.

This study also showed that a 10 year higher age of the mother is associated with an almost doubled EDI of the infant. The relatively narrow age range (20–30 years) is
therefore a limitation of this study, as the EDI for children of mothers older than 30 are likely to be higher than those presented here.

This age effect is however largely related to the birth year of the mother, rather than age itself, with women born in earlier years (and therefore older at time of sample collection) having been exposed to higher levels of POPs through diet and the environment than those born in later years when many measures had taken effect, as also illustrated by the time trend determined from the three breast milk surveys conducted to date.\textsuperscript{13}

Another limitation of this study is that it only included primiparous mothers, which is likely to over-estimate the EDI resulting from breast milk of multiparous women. It has been estimated that over 6 months of breast feeding, women can lose 5\%\textsuperscript{49} or even up to 25\%\textsuperscript{51} of their PCB body burden.

Second and later order children will thus have lower prenatal exposure as well as lower postnatal exposure through breast milk, due to their mothers’ lower body burden after having breast fed previous children.

A study from Germany reported that PCDD/F concentrations at 1 year of life were about half as high in the second infant as in the first one at the same age,\textsuperscript{17} a pattern also seen for HCH, HCB and DDT.\textsuperscript{52} It should also be noted that this study deliberately excluded women who could be occupationally exposed to POPs and it is therefore likely that EDIs may be significantly higher for some.

Higher POPs body burdens have been associated with consumption of foods from animal origin such as fish, milk, dairy products and meat.\textsuperscript{53} As all mothers in this study consumed animal products, the effect of other dietary habits on EDIs could not be determined.

The here presented results did not include more recently introduced POPs such as the brominated and perfluorinated POPs, for which time trends of breast milk concentrations have not yet been determined in New Zealand.

We recently reported on EDIs for polybrominated diphenyl ethers (PBDEs) commonly used as flame retardants based on the same breast milk samples,\textsuperscript{54} indicating they are currently below U.S. EPA reference dose values.

For the perfluorinated POPs, including for example perfluorooctane sulfonate (PFOS), currently no data are available on New Zealand breast milk concentrations. Further studies are needed to estimate EDIs and time trends in breast milk concentrations for these compounds.

In conclusion, the estimated daily intake of dioxin-like compounds through breast milk for New Zealand infants is among the lowest reported world-wide, and the estimated daily intakes for organochlorine pesticides are in the low or mid-range.

Future studies will show whether the notable decline in breast milk concentrations of chlorinated POPs is continuing and what the EDIs are for more recently introduced POPs.

Breast milk remains the best source of nutrition for babies, and on-going measures to assess and reduce POPs contaminants in the environment are therefore needed to protect breast milk as the first food source for infants.
Competing interests: Nil.

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References:


A new web-based Medication Error Reporting Programme (MERP) to supplement pharmacovigilance in New Zealand—findings from a pilot study in primary care

Desirée L Kunac, Michael V Tatley, Mary E Seddon

Abstract

Aims To determine if primary care clinicians would report medication errors using a new web-based system, and to obtain data illustrating the potential of the information collected to improve medication safety.

Method The New Zealand Pharmacovigilance Centre led the development of the Medication Error Reporting Programme (MERP) which was then piloted over an 8-month period involving 38 general practice and 28 community pharmacy staff. The Pharmacy Defence Association also contributed dispensing error claims. An analysis of the characteristics of errors was undertaken.

Results A total of 376 reports were submitted; 55 (15%) reported patient harm, 1 of which required lifesaving intervention. The therapeutic groups most commonly implicated were medicines for managing ‘nervous’ and ‘cardiovascular’ systems. Wrong dose (25%) and wrong medicine (22%) were the most common error types, occurring predominantly with the prescribing and dispensing of medications. The most frequent contributing factors to errors in general practice were problems in the process of prescribing whereas in community pharmacy they related to product name and packaging factors. Time pressures, workload and interruptions were commonly cited for both settings.

Conclusion Primary care clinicians who volunteered for the pilot were willing and able to use the MERP system to report medication errors. The standardised data obtained through MERP enables rapid analysis and has the potential to inform initiatives for improving patient safety.

Medication errors occur commonly across all healthcare settings and have been defined as “any unintentional error in the prescribing, dispensing, administration or monitoring of a medicine while under the control of a healthcare professional, patient or consumer”.

Whilst the vast majority of medication errors do not result in patient harm, those that do, termed ‘preventable adverse drug events (pADEs), are costly and responsible for significant patient morbidity and mortality.

Much of what we know about the epidemiology and seriousness of medication errors and pADEs has been gathered from research undertaken in the hospital setting, and has resulted in considerable attention and resource being targeted to implementing harm reduction strategies in hospitals.

Much less is known about the magnitude and seriousness of pADEs in the primary care environment, but international evidence suggests that primary care should
receive greater attention. A systematic review of 29 studies found that ADEs in primary care are common, with an incidence estimated at 15 ADEs per 1000 person-months, of which 20% were deemed preventable. The median incidence of pADEs requiring hospital admission was 4.5 per 1000 person-months.

Medication errors may arise during any stage of the medication use process: prescribing, dispensing, administration and monitoring. In community practice in the United Kingdom (UK), 1 in 20 prescriptions written by general practitioners contained an error, and 1 in 550 a serious error; whilst in community pharmacy, 1.7% of dispensed items had a content error and 1.6% a labelling error, with 33% of these resulting in a serious clinical outcome for the patient. Inadequate monitoring of drug therapy is reported as the most common factor implicated in pADEs requiring hospital admission.

In New Zealand (NZ), there is a paucity of data about the extent and characteristics of medication errors and pADEs in primary care, especially with regard to the possible causes of events.

In 2012, the number of funded prescriptions in NZ was approximately 41 million. If we extrapolate the UK figures, a rough estimate could translate to 74,000 serious prescribing errors and 450,000 serious dispensing errors occurring annually in NZ.

To gain a greater understanding, the NZ Pharmacovigilance Centre (NZPhvC) led the development and piloting of a Medication Error Reporting Programme (MERP); a web-based, voluntary, confidential reporting system for primary care.

Traditionally, pharmacovigilance centre activities have focused on adverse drug reactions (ADR), however, the World Health Organization (WHO) has highlighted the importance of identifying medication errors and is working toward expansion of existing roles of pharmacovigilance centres to include monitoring these events. The NZPhvC initiated MERP to contribute to this critical international initiative from a NZ perspective.

In this report, we describe the underlying principles and design features of MERP and present the findings of the pilot study undertaken in primary care in NZ.

Methods

Based on examination of successful reporting systems elsewhere and a review of the required components for an effective system, the project’s steering group developed the MERP concept.

Aim and underlying principles of MERP

Aim—To coordinate the capture, analysis and dissemination of timely information on medication errors in primary care, to enhance the safety of medication use for New Zealanders.

Principles—

- Non-punitive with a systems-oriented approach.
- Operate within a data secure environment with strict policies and procedures to safeguard the integrity, privacy and confidentiality of data.
- Encourage voluntary participation and receive and record reports of actual and potential errors.
- Predominantly electronic.
- Utilise a minimum core dataset to standardise reporting and to minimise the burden on reporters.
Design features of MERP

Online report form—The MERP report form was designed to capture a core dataset of standardised but critical information about the event so that priorities for prevention could be easily and quickly identified. The form utilises a mix of free text boxes to capture the story of the event and drop down lists providing fixed choices to facilitate rapid analysis of event details (Table 1). It was considered essential that the user interface should be easy to navigate and simple to use. The reporter is guided by explanations of what is required for each field at the point of data entry. Where possible the system utilises branching based on previous selections to focus questioning and streamline the user interface.

Table 1. MERP system data fields and format

<table>
<thead>
<tr>
<th>Description</th>
<th>Field</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event</td>
<td>Date of event</td>
<td>Select from calendar</td>
</tr>
<tr>
<td></td>
<td>Time of event</td>
<td>4 time frame options</td>
</tr>
<tr>
<td></td>
<td>Event description (narrative)</td>
<td>Free text</td>
</tr>
<tr>
<td></td>
<td>Care setting where event occurred</td>
<td>Fixed choice options</td>
</tr>
<tr>
<td></td>
<td>Event type</td>
<td>Fixed choice options</td>
</tr>
<tr>
<td></td>
<td>Stages of medication use process involved</td>
<td>Fixed choice options</td>
</tr>
<tr>
<td></td>
<td>Discovery of event</td>
<td>Discipline – fixed choice options</td>
</tr>
<tr>
<td></td>
<td>Likelihood of recurrence</td>
<td>Fixed choice options</td>
</tr>
<tr>
<td>Patient</td>
<td>Patient outcome</td>
<td>Degree of harm – fixed choice options</td>
</tr>
<tr>
<td></td>
<td>Patient age</td>
<td>Age groupings – fixed choice options</td>
</tr>
<tr>
<td></td>
<td>Patient gender</td>
<td>Fixed choice options</td>
</tr>
<tr>
<td>Medicine</td>
<td>Medication name, strength, dose form</td>
<td>Real time look up to NZ Universal List of Medicines</td>
</tr>
<tr>
<td></td>
<td>Upload image</td>
<td>Facility to upload photo of products involved</td>
</tr>
<tr>
<td>Contributing factors</td>
<td>Possible causes of event</td>
<td>Fixed choice options to select based on ISMP 10 key element categories</td>
</tr>
<tr>
<td>Prevention</td>
<td>Actions taken at local level</td>
<td>Free text box</td>
</tr>
<tr>
<td></td>
<td>Recommendations for national learning</td>
<td>Free text box</td>
</tr>
<tr>
<td>Follow up</td>
<td>Reporter details (optional)</td>
<td>Name and contact details</td>
</tr>
</tbody>
</table>

ISMP denotes Institute for Safe Medication Practices.

An innovative aspect of the online form is the medication selection field that allows the reporter to select the exact medication, strength and dose form involved in the error through a real-time look up to the New Zealand Universal List of Medicines (NZULM). Use of the NZULM automatically assigns for each medicine the World Health Organisation “Anatomical Therapeutic Chemical, ATC” code which greatly facilitates analysis by medicine or medication class.

Classification of events—Many different classification schemes are in use to describe safety incidents in primary care. To align with accepted international classifications, terms and definitions, the MERP
classifications are largely based on “The Conceptual Framework for the International Classification for Patient Safety, (ICPS)” developed by WHO. \(^{15}\) Importantly, use of the ICPS enables standard reporting of events, and allows sharing of medication safety experiences across healthcare settings, between countries and overall alignment with a patient safety framework.

The Institute for Safe Medication Practices’ (ISMP) “Key medication use system element” framework, was used (with permission) to categorise the contributing factors of medication error. \(^{16}\)

**NZPhvC data verification and analysis**—In line with current NZPhvC processes, reports undergo verification and validation to ensure the integrity and anonymity of the data. Incoming reports undergo individual report analysis to identify high priority reports, such as those with serious patient consequences or those that have important learnings to be shared. Aggregate analysis of clusters of reports involving common factors will be possible as the database grows.

**National risk communication**—A mechanism has been established where MERP data concerning serious medication errors are communicated to the NZ Health and Quality Safety Commission (HQSC) through its Medication Safety Expert Advisory Group (MSEAG) to allow national dissemination of warnings or precautions in a timely manner.

**Pilot study**

A prototype of the MERP was tested in this pilot study. Healthcare professionals representing community pharmacy and general practice were invited through professional body newsletters to participate in the pilot. Participants were encouraged to submit an online report of any actual or near miss medication errors encountered during the period 1 October 2011 to 31 May 2012. A toll-free phone number as an alternative method of reporting was also provided. Reporters did not receive any monetary or other incentives for submitting reports.

The NZ Pharmacy Defence Association, (PDA) also participated in the pilot providing anonymised information extracted from community pharmacy dispensing error claims and these reports are included in the analysis.

**Analysis**

A descriptive analysis was undertaken to determine the nature and characteristics of the medication errors submitted to MERP.

**Results**

**Participants**

A total of 38 general practice and 28 community pharmacy healthcare professional volunteers were recruited, with the PDA also contributing dispensing error claims.

**Number and characteristics of reported medication errors**

During the 8-month pilot, a total of 376 reports were received (all through the MERP portal); 278 of these submitted by individual healthcare professionals (206 community pharmacist or intern, 65 general practitioner, 4 hospital-community liaison pharmacist, and 3 by residential care nurse manager) plus 98 reports contributed by PDA.

A breakdown of the characteristics of these reports is shown in Table 2.
Table 2. Characteristics of medication error reports

<table>
<thead>
<tr>
<th>Characteristics of medication error reports</th>
<th>Number of reports</th>
<th>Percentage of reports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Care setting where error originated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community pharmacy</td>
<td>215</td>
<td>57.2</td>
</tr>
<tr>
<td>General practice rooms</td>
<td>96</td>
<td>25.5</td>
</tr>
<tr>
<td>Outpatient clinic</td>
<td>23</td>
<td>6.1</td>
</tr>
<tr>
<td>Public hospital</td>
<td>21</td>
<td>5.6</td>
</tr>
<tr>
<td>Aged residential care facility</td>
<td>9</td>
<td>2.4</td>
</tr>
<tr>
<td>Patients home</td>
<td>7</td>
<td>1.8</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>1.1</td>
</tr>
<tr>
<td>Private hospital</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>376</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

| **Category of error**                        |                   |                       |
| Wrong dose                                   | 95                | 25.3                  |
| Wrong medicine                               | 84                | 22.3                  |
| Wrong strength or concentration              | 60                | 16.0                  |
| Wrong patient                                | 43                | 11.3                  |
| Wrong duration or course                     | 30                | 8.0                   |
| Omitted medicine                             | 19                | 5.1                   |
| Wrong dose form                              | 15                | 4.0                   |
| Drug-drug interaction                         | 14                | 3.7                   |
| Other                                        | 5                 | 1.3                   |
| Expired medicine                             | 4                 | 1.1                   |
| Wrong route of administration                | 3                 | 0.8                   |
| Documented drug allergy                       | 3                 | 0.8                   |
| Documented drug interaction                   | 1                 | 0.3                   |
| **Total**                                    | **376**           | **100.0**             |

| **Patient age and gender**                   |                   |                       |
| **Age categories**                            |                   |                       |
| < 1 month                                     | 5                 | 1.3                   |
| 1-23 months                                   | 0                 | 0.0                   |
| 2-11 years                                    | 28                | 7.5                   |
| 12-17 years                                   | 9                 | 2.4                   |
| 18-64 years                                   | 158               | 42.0                  |
| 65+ years                                     | 109               | 29.0                  |
| Age group not completed                       | 44                | 11.7                  |
| Unknown                                       | 23                | 6.1                   |
| **Total**                                     | **376**           | **100.0**             |

| **Gender**                                    |                   |                       |
| Female                                       | 196               | 52.1                  |
| Male                                         | 144               | 38.2                  |
| Unknown                                      | 10                | 2.7                   |
| Gender not completed                         | 26                | 7.0                   |
| **Total**                                    | **376**           | **100.0**             |

| **Stage of Medication Use Process, n=509**    |                   |                       |
| Prescribing                                  | 161               | 42.8                  |
| Dispensing                                   | 245               | 65.2                  |
| Administration                               | 85                | 22.6                  |
| Monitoring                                   | 5                 | 1.3                   |
| Supply                                       | 5                 | 1.3                   |
| Delivery                                     | 8                 | 2.1                   |
Characteristics of medication error reports

<table>
<thead>
<tr>
<th>Top ranking medicines reported**</th>
<th>Number of reports</th>
<th>Percentage of reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin/clavulanic acid</td>
<td>10</td>
<td>2.8</td>
</tr>
<tr>
<td>Nortriptyline</td>
<td>9</td>
<td>2.5</td>
</tr>
<tr>
<td>Aspirin</td>
<td>8</td>
<td>2.1</td>
</tr>
<tr>
<td>Cilazapril</td>
<td>8</td>
<td>2.1</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>8</td>
<td>2.1</td>
</tr>
<tr>
<td>Prednisone</td>
<td>8</td>
<td>2.1</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>7</td>
<td>1.9</td>
</tr>
<tr>
<td>Levothyroxine</td>
<td>7</td>
<td>1.9</td>
</tr>
<tr>
<td>Sodium valproate</td>
<td>7</td>
<td>1.9</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>6</td>
<td>1.7</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>6</td>
<td>1.7</td>
</tr>
</tbody>
</table>

* More than one stage could be selected; percentage of reports therefore totals greater than 100%.

** Medication field not completed for 19 reports (n=357).

More than one stage of the medication use process could be selected by the reporter (Table 2). Excluding PDA dispensing error reports, the prescribing 158/278 (57%) and dispensing 148/278 (53%) stages were most frequently reported, followed by administration 39/278 (14%). For 55 reports, two stages of the medication use process were involved and in 11 reports, the three stages, prescribing, dispensing and administration were involved.

An analysis of medication error reports by clinical outcome (Table 3) revealed that for 55 (14.7%) errors, the reporters judged there was actual patient harm. Of the harm events, 19 required additional treatment or hospitalisation and in one case, lifesaving intervention with folinic acid rescue therapy was needed after the patient had inadvertently received 10mg strength methotrexate tablets instead of 2.5 mg, resulting in a 100mg dose instead of 25mg. There were no fatal errors reported.

Table 3. Medication error reports by clinical outcome

<table>
<thead>
<tr>
<th>Clinical outcome category</th>
<th>Description</th>
<th>Number of reports</th>
<th>Percentage of reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>There is reason to believe that the event caused the patient’s death or hastened the patient’s death</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Serious</td>
<td>Symptoms required major treatment to save life or caused major permanent or long term harm</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Moderate</td>
<td>Symptoms required additional treatment or operation; event caused hospital admission or prolonged hospital stay</td>
<td>19</td>
<td>5.1</td>
</tr>
<tr>
<td>Mild</td>
<td>Symptoms mild, short term; no treatment or minor treatment</td>
<td>35</td>
<td>9.3</td>
</tr>
<tr>
<td>No harm 3</td>
<td>Error reached patient, additional monitoring or tests to confirm no patient harm</td>
<td>29</td>
<td>7.6</td>
</tr>
<tr>
<td>No harm 2</td>
<td>Error reached patient, but no harm</td>
<td>129</td>
<td>34.3</td>
</tr>
<tr>
<td>No harm 1</td>
<td>Error intercepted and did not reach patient</td>
<td>150</td>
<td>39.9</td>
</tr>
<tr>
<td>Unsafe situation</td>
<td>Situation has the potential for error, no specific patient involved</td>
<td>7</td>
<td>1.9</td>
</tr>
<tr>
<td>Unknown outcome</td>
<td></td>
<td>6</td>
<td>1.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>376</td>
<td>100.0</td>
</tr>
</tbody>
</table>
An analysis of reported clinical outcome by therapeutic group (Figure 1), shows that the largest number of reports and those associated with harm related to ‘nervous system’ (mainly antidepressants, anticonvulsants, analgesics), ‘cardiovascular system’ (mainly agents acting on the renin-angiotensin system and beta blockers), and ‘alimentary tract and metabolism’ (mainly medications used in diabetes).

Figure 1. Clinical outcome of medication error reports by therapeutic group

![Figure 1](image)

*Harm = severe, moderate or mild clinical outcome.

For the majority (85%) of reports, at least one possible contributing factor was identified. Environmental problems (due to time pressures, workload or interruptions) were commonly reported for both general practice and community pharmacy.

For community pharmacy, medication name, label or packaging problems (faulty medicine identification, look/sound alike names or incorrect dispensing label) were the leading cause of errors (Figure 2).

For errors in general practice, the leading factors cited were miscommunication of medication order (misunderstood, incomplete or ambiguous prescription) and missing critical drug information (inadequate medication reconciliation process or inadequate computer screening).
Discussion

This small pilot study has demonstrated that this web-based system can successfully harvest reports from busy primary care health professionals and yield useful information about the type, causes and outcomes of medication errors in the primary care setting; an area of healthcare where there has been relatively little information available.

The number of reports received through MERP, given the small number of participants, is very encouraging since there are many known barriers to medication error reporting including, uncertainty about what to report, fear of blame, and lack of feedback about errors.17

This pilot did however recruit volunteer participants who are likely to be more motivated reporters. Nevertheless, with the paucity of data for primary healthcare, this represents a promising beginning that can be further encouraged and stimulated to lead to improvements in reporting.

The majority of the reported medication errors were found to originate in the community pharmacy setting reflecting the predominant source of reports. However, when PDA dispensing claims were excluded, the prescribing and dispensing stages of medication use were found to have similar rates of errors reported and almost a quarter of reports (66/278) involved two or three stages highlighting the multifactorial nature of errors.

Only five errors were associated with monitoring which is surprising given that inadequate monitoring of drug therapy is reported as the most common factor implicated in pADEs requiring hospital admission.8 Monitoring errors may not be
well detected by voluntary reporting systems in primary care as others have also noted that few monitoring errors are reported from general practice. This study found that over 80% of reported errors do not cause patient harm. This finding is similar to previous studies involving medication error reporting from Family Practice in the USA and in an analysis of community pharmacy errors in Canada and the Netherlands, where no harm errors accounted for between 69 to 84% of reported errors.

Although most reported errors result in no harm, our study revealed that overall, 84/376 (22%) of the reports did require some type of intervention; either monitoring or intervention to prevent harm, or an intervention to manage harm that did occur. Whilst these were mainly managed in primary care, 19 patients (5%) required hospital treatment or admission as a result of an error.

The leading types of error were wrong dose, wrong medicine and wrong strength. These findings are consistent with those of ISMP Canada who analysed a cluster of community pharmacy medication incidents reported to the Ontario College of Pharmacists. Their top three contributing factors were lack of quality control or independent check systems (37%); environmental, staffing or workflow problems (22%); and medicine name, label or packaging problems (21%).

The MERP utilises the ISMP framework to classify contributing factors, and whilst we also identified these factors to be possible leading causes of errors, we observed a much stronger indication that medicine name, label and packaging, which was cited in 75% of reports, is particularly important.

The four medication classes most often associated with medication errors reported to MERP are identical to those found by Hickner et al (2010) when using a web based medication event reporting system designed for Family Practice in the USA.

A systematic review has shown that the frequency of ADEs are higher in the elderly population and our study revealed a significant proportion (29%) of reports relating to the 65 year and over age group.

At the opposite age extreme our findings reveal that 11% of errors were in the <17 year age group. However, there is likely under-reporting to MERP of errors in the paediatric age group; a recent prospective observational study conducted in the homes of children with cancer revealed errors were common, with 72 medication errors identified in just 92 home visits. Consequently, efforts to enhance reporting of paediatric medication errors are needed.

Selected error examples have been shared with the HQSC and were featured in the first issue of the HQSC “Medication Safety Watch” bulletin. Furthermore a list of “Confused Medicine Names in Community Healthcare” has been prepared by the NZPhvC and consists of those look-alike name pairs that have been implicated in medication errors reported through MERP.

This list will be used by the HQSC as background to inform the “Tallman lettering” initiative, which is an error prevention strategy used to reduce the risk of look-alike medicine name errors. Rather than relying on data from other countries, MERP has enabled NZ specific information to be gathered.
Implications for practice—For general practice, our findings suggest that the process of prescribing is error prone, particularly misunderstood or incomplete prescriptions and inadequate patient history checks and suggest that further investigation to understand the reasons for this should be undertaken.

The prevalence and causes of prescribing errors in UK general practice study, (the PRACtICe Study), also highlighted problems in the process of prescribing, but unlike our study found that failure to monitor and review patients adequately are chief causes of errors in general practice.\textsuperscript{9}

For community pharmacy, our findings suggest that ways to improve the safe naming, labelling and packaging of medicines, may reduce errors in dispensing. The International Medication Safety Network (IMSN) has recently released a position statement “Making Medicines Naming, Labelling and Packaging Safer” which provides useful recommendations and guidance for Regulators, Pharmaceutical Industry and Healthcare providers, which would be a useful starting point for review of products for safety.\textsuperscript{24}

In both community pharmacy and general practice, time pressures, workload and interruptions were perceived to contribute to errors. Further investigation into the circumstances surrounding these factors and the impact of local corrective actions is needed. Lessons learned and the consequent improvements and enhancements arising from these episodes need to be recorded and shared more broadly.

Data quality—Despite there being no mandatory fields contained in the MERP report form, most fields were completed by the reporter, and the overall quality of information was found to be very good. For example, use of the NZULM to populate the medication field which includes medicine name, dose form and strength was completed in 95\% of reports to MERP.

In a review of 6 years of medication incidents reported to the National Reporting and Learning System (NRLS) in England and Wales, only 40\% of reports had the name of the medicine in the specified medication name field.\textsuperscript{25}

Limitations—Given the limited source of data (small number of pilot participants and short time frame), the results reported here cannot be generalised to represent primary care practice.

The rate of medication errors and pADEs cannot be determined by voluntary reporting systems due to the absence of a denominator and the well-known limitation of underreporting of events.\textsuperscript{26} However, voluntary reporting complements formal assessment of harm rates as it holds the greatest potential for the discovery of failure-prone systems and near miss events,\textsuperscript{13,27} offering a more proactive and more timely approach to error reduction.

Even single reports may contain valuable lessons as important as observations from clusters, patterns or trends derived from aggregated report analysis. Furthermore, voluntary reporting raises staff awareness of the kinds of errors encountered in practice promoting a culture of safety amongst staff.\textsuperscript{18}

Future direction—A second phase of development is currently underway to extend MERP to a wider group of primary care reporters, and to work closely with front-line
staff to establish the learning framework for timely dissemination of information about medication safety issues.

The real challenge for the future is to demonstrate that medication error reporting in primary care is sustainable where the data from reporting translates into continuous learning to correct systems problems encountered in primary care. Ways to streamline reporting so that MERP aligns with current reporting requirements is also being explored.

As the MERP is housed within the NZPhvC, medication errors can be considered alongside Adverse Drug Reactions (ADRs) (sometimes consciously or inadvertently also documenting error) which will build a more complete picture of patient harm as related to a particular medicine or class.

As the number of events increases, there will also be the opportunity to apply pharmacovigilance analysis methodologies to the MERP database, such as signal recognition algorithms, to further enhance our understanding of medication errors and pADEs.

In the future, extension of MERP to residential care and to secondary care, where variable systems currently exist, would facilitate the collection and analysis of standardised data on medication errors and pADEs across all healthcare settings to provide a greater understanding of the burden of harm that occurs across NZ.

**Conclusion**

Primary care clinicians in this pilot were willing and able to use the MERP system to report medication errors. The standardised data obtained through MERP provides valuable timely insights into the types and causes of medication errors in primary care which has the potential to inform initiatives for improving patient safety. Further development to demonstrate greater utility and value of MERP is warranted.

**Competing interests:** Nil.

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References:


Current trends and projections in the utilisation rates of hip and knee replacement in New Zealand from 2001 to 2026

Gary Hooper, Alex J-J Lee, Alastair Rothwell, Chris Frampton

Abstract

Aim This study aimed to estimate the demand for total hip (THR) and knee replacements (TKR) by 2026 within New Zealand (NZ) and show how demographic factors are likely to influence this projection.

Method Yearly population data from the NZ Census was compared to the NZ Joint Register from 2001–2011 and ethnic and gender specific data was organised into 5 year age groups from 35 years to calculate the incidence for each age group. Poisson regression analysis was used to project the incidence for 2026 and to evaluate the independent associations between age, gender and ethnicity.

Results Between 2001 and 2011 the incidence of THR and TKR increased by 8.20% and 52.20% respectively with a peak incidence in the 70–74 age group. Men were less likely to undergo both THR and TKR (OR 0.91, 95% CI 0.89–0.94 and OR 0.88, 95% CI 0.89–0.90). By 2026 the absolute number of THR and TKR is estimated to increase by 84% (8950 procedures) and 183% (8613 procedures) respectively. Europeans were the most likely to undergo THR compared to Māori, Pacific people or Asians (OR 0.72, 95% CI 0.67–0.74). There was a large increase in the age standardised incidence of TKR for Pacific people and they were more likely to undergo TKR than Europeans (OR 1.00, 95% CI 0.97–1.04).

Conclusion Over the past decade, incidence of THR and TKR have increased, and by 2026, the number of THR and TKR is projected to increase by 84% and 183% respectively. This increase will create a significant socioeconomic burden which will necessitate prudent and focused healthcare strategies to ensure that there are adequate resources to meet this demand.

Osteoarthritis (OA) is the commonest form of arthritis and is present in a large number of adults in various populations, with the lifetime risk of developing symptomatic OA of the knee estimated to be up to 47%.

The incidence of OA increases rapidly in patients over 50 years of age. According to the World Health Organization Global Burden of Disease 2013 Study, osteoarthritis is ranked 18th amongst all diseases/road injury in the Western Pacific region, and is responsible for an increasing burden on the health expenditure.

Total hip (THR) and total knee replacement (TKR) are two common operations which reduce pain and improve function and quality of life in patients with hip and knee disorders.

In New Zealand, OA of the hip and knee is the commonest condition for which joint replacements are indicated. Total hip and knee replacements have been shown to be excellent surgical procedures with predictable results both in controlling the
debilitating pain secondary to arthritis, and in returning compromised patients to a satisfactory functioning lifestyle.\(^7\)

The improvements in implant design and surgical technique have resulted in a decreasing threshold for offering patients these procedures, which in turn, has resulted in younger, more active individuals accessing this surgery.

Osteoarthritis predominantly affects the older population and with the increased ageing population it is reasonable to predict that the incidence of THR and TKR will increase.\(^6\)-\(^8\). This projection is supported by data from the USA, where the incidence for THR and TKR is estimated to increase by 174\% and 674\% respectively by 2030.\(^10\)

The population of NZ is ageing, with the 65+ age group likely to make up over one quarter of the population in the late 2030’s. This will result in an increase from 550,000 in 2009 to 1 million in the late 2020s, exceeding the number of children aged 0–14 years.\(^11\)

Not only is the population ageing, but this group of society is more likely to remain healthy and active for a longer period compared to previous generations, with an increased expectation of being productive and active during this time.

As a result of this, not only will all joint replacements be expected to perform at a higher level and to survive longer than has previously been reported, but patients are likely to demand an earlier replacement in order to live the remainder of their life without pain and with improved function.

Osteoarthritis is, and will remain, a major public health problem in the foreseeable future which will have major implications for health planning. Currently there is only limited epidemiological data on the utilisation of THR and TKR in New Zealand. Reliable projections of the demand for THR and TKR are necessary in order to implement appropriate healthcare strategies and for the training of the surgical workforce.

The primary objective of this study was to estimate the incidence rate of THR and TKR in New Zealand by 2026. We hypothesise that this will increase substantially in the next two decades. The secondary objective was to analyse the trends in the utilisation of THR and TKR over a 10-year period, and how it varies according to age, gender and ethnicity.

**Method**

Yearly population data between 2001–2011 were extracted from the New Zealand Census.\(^11\) Age and gender specific data on European, Māori, Pacific (mostly of Samoan, Tonga, Niuean, or Cook Islands origin), and Asian ethnic groups were collected and organised into 5 year age brackets from 35 years. Ethnic data from the New Zealand Census were available either by ‘Total Response’ (a person who identifies with multiple ethnicities is counted in each of the identified ethnic group), or ‘Prioritised Ethnicity Data’ (assigning the ethnicity of a person who has identified with multiple ethnicities to just one ethnicity). This study uses ‘Total Response’. The rationale for this choice is expanded in the discussion.

Procedures for patients under the age of 35 were excluded, as these numbers were low and it was considered that they were unlikely to have a significant influence on the future trend and projections.

The total number of elective THR and TKR performed between 2001–2011 was extracted from the New Zealand Joint Registry (NZJR) to provide a yearly rate. The NZJR was established in 1999 by the New Zealand Orthopaedic Association, and collects data on all patients undergoing THR and TKR...
within New Zealand in both the public and private sectors. The NZJR undergoes constant audit and has been shown to have >95% compliance rate.\textsuperscript{12}

The data was categorised for age, gender, and ethnic group in accordance with the data obtained from the New Zealand Census.

The THR and TKR incidence rates were calculated by dividing the total number of THR and TKR in each age gender group over the total population in that group. The trends in rates were compared between the two time periods 2001–2006 [period 1] and 2006–2011 [period 2].

Age and gender-standardised arthroplasty incidences were calculated to adjust for different gender and age distributions to allow rate comparisons between ethnicities during period 2. The female European population model was used for standardisation. Rate ratios calculated with the use of Poisson regression model were used to evaluate the independent associations between demographic characteristics (age, gender, ethnicity) and arthroplasty rates of THR and TKR.

The estimates generated from the Poisson regression model were combined with projected population data from Statistics New Zealand to provide gender, age, and ethnicity arthroplasty incidences up to 2026.

**Results**

From 2006 to 2011, there were 31,260 THR and 31,958 TKR performed. The average age was 66.9 (range 15.3–101.0) years and 68.5 (range 8.2–100.5) years for THR and TKR respectively.

The highest incidence of THR was observed in the 75–79 age group whereas the highest incidence of TKR was in the 75–79 age group for men, and 70–74 age group for women (Figures 1a, 1b).

**Figure 1a. The mean annual incidence of total hip replacement per 100,000 from 2006–2011, separated by gender and age**
Incidence of THR and TKR—The incidence of TKR increased by 31% from 2001 to 2006 with a 16% increase from 2006 to 2011. This pattern was not observed in THR, with 1.9% decrease from 2001 to 2006 and 10.3% increase from 2006 to 2011. (Figures 2a, 2b).

Overall increases from 2001 to 2011 in the THR and TKR incidences were 8.2% and 52.2% respectively. Men had a lower incidence of THR. Compared with women, the age standardised rate ratio (RR) for THR in men was 0.91 (95% confidence interval [CI] 0.89–0.94) (Table 1).
Figure 2b. The incidence of total knee replacement per 100,000 of population

Table 1. Poisson regression model representing associations of demographic factors with rates of THR and TKR

<table>
<thead>
<tr>
<th>Variables</th>
<th>THR Rate Ratio*</th>
<th>95% Confidence Interval</th>
<th>TKR Rate Ratio*</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55–59</td>
<td>1</td>
<td>1.45–1.66</td>
<td>1.57–1.76</td>
<td></td>
</tr>
<tr>
<td>60–64</td>
<td>1.56</td>
<td>1.98–2.25</td>
<td>2.29–2.55</td>
<td></td>
</tr>
<tr>
<td>65–69</td>
<td>2.11</td>
<td>2.33–2.64</td>
<td>2.63–2.92</td>
<td></td>
</tr>
<tr>
<td>70–74</td>
<td>2.48</td>
<td>2.40–2.71</td>
<td>2.77</td>
<td></td>
</tr>
<tr>
<td>75–79</td>
<td>2.55</td>
<td>2.74–3.02</td>
<td>2.90</td>
<td></td>
</tr>
<tr>
<td>80–84</td>
<td>1.86</td>
<td>1.50–1.71</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>85+</td>
<td>1.60</td>
<td>0.89–0.94</td>
<td>0.85–0.90</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
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<td>Men</td>
<td>0.91</td>
<td>0.89–0.94</td>
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<td>Women</td>
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<td>0.85–0.90</td>
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<td><strong>Ethnicity</strong></td>
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<td>0.73–0.79</td>
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<td>0.70–0.74</td>
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<td>Asian</td>
<td>0.13</td>
<td>0.12–0.14</td>
<td>0.54</td>
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* Poisson regression model included all factors in the table.

Ethnic differences in incidence—A small increase in the incidence of THR was observed from 2006 to 2011 in all ethnic groups. Comparisons of ethnicities were performed after standardising for the different age and gender makeup for each ethnicity. Europeans were most likely to undergo THR compared to Māori, Pacific
people, and Asian (RR 0.72, 95% CI 0.70–0.74, RR 0.15, 95% CI 0.14–0.16, RR 0.13, 95% CI 0.12–0.14, respectively) (Table 1, Figure 3a).

There was a large increase in the age standardised incidence of TKR for Pacific people, and they were slightly more likely to undergo TKR than Europeans (RR 1.001, 95% CI 0.97–1.04) (Table 1). An overall decrease over the five years was seen in the incidence of TKR for Māori and Asian groups (Figure 3b).

Figure 3a. The ethnic variations of the age and gender standardised incidence for total hip replacement per 100,000 from 2006–2011

Figure 3b. The ethnic variations in the age and gender standardised incidence of total knee replacement per 100,000 from 2006–2011
**Projections for 2026**—Based on the poison regression model, the absolute number of THR was estimated to increase by 84% from 4875 in 2001 to 8950 by 2026. The absolute number of TKR was estimated to increase by 183%, from 3049 in 2001 to 8613 by 2026. Using these estimates, the incidence of THR and TKR in 2026 will be 306.3 and 294.8 per 100,000 respectively (Figure 4).

**Figure 4. The projections for the number of total hip and knee replacements expected to be performed in 2026 (2001–2011 shows actual numbers, 2011–2026 shows the projected number of operations based on our projection model)**

![2026 projections in the number of THR and TKR](image)

**Discussion**

Health planning relies on reliable data to provide estimates and projections for the allocation of funds for the rational provision of care to the community. The NZJR has been audited regularly and has continued to demonstrate at least a 95% compliance rate\(^{12}\), making it the most reliable and robust source of demographic data for THR and TKR in this country.

The epidemiological data gathered in this study has provided both crude incidence rates and age and sex adjusted incidence rates to give a more reliable representation of the change in rate for each population, particularly when considering different ethnic groups.

This study has shown that the incidence of THR and TKR is progressing at a concerning rate and although the estimated projections in 12 years is not as high as in the USA\(^{16}\), a relative increase in the incidence of THR (84%) and TKR (183%) over 26 years (2001–2026) equates to a incidence of 306.3 and 294.8 per 100,000 respectively (in 2026). This means that approximately 6000 further joint replacements will need to be performed.
It is important to note, that this is only a projection, and the relative contributions of biological, lifestyle, and socioeconomic factors may influence the observed trend in this study. However, since there does not seem to be any other treatment for osteoarthritis that will surpass joint replacement surgery in the immediate horizon, it would be safe to assume that the incidence of THR and TKR will continue to rise in the future.

Currently the NZJR (2013 data) shows that an orthopaedic surgeon in New Zealand performs approximately 36 hip and 32 knee replacements per year on average\textsuperscript{12}. To service the predicted increase in replacement surgery means that approximately 80 extra surgeons will need to be trained if current practise standards continue, and this does not take into consideration the other demands that this ageing population will place on orthopaedic services. There are significant implications on both education and training as well as funding increased positions within public hospitals.

The incidence rates per 100,000 for THR and TKR in New Zealand is high when compared to other countries. Kim et al.\textsuperscript{13} reported the 2005 South Korean incidence of TKR as 157/100,000 for women and 20/100,000 for men compared to the New Zealand 2006 incidence of 208/100,000 and 207/100,000 respectively. Knee replacement is far more common in South Korea compared to THR but even so this result shows a wide variance which is unlikely to be explained by socioeconomic factors alone.

Other, so called, first world countries also show a significantly lower incidence rates compared to New Zealand with Denmark (Pedersen et al\textsuperscript{14}) having a 2002 incidence of 131/100,000 and the USA (Kurtz et al\textsuperscript{10}) of 69/100,000 for THR compared to 254/100,000 in this country. The reason for this large variance is not obvious.

Some may suggest that the figures reflect an over-servicing within New Zealand, but it is unlikely that joint replacements are being performed on patients with minimal symptoms as over 50% of the replacements are performed within public hospitals who comply with national health scoring criteria, identifying patients with significant discomfort and functional need.

It is more likely that the high incidence reflect a health system which has identified an area of need and responded to this, with strategies such as the Ministry of Health Joint Replacement Initiative, which has achieved reasonable success in treating this patient demand.

The fact that the USA predictions for the number of TKR are almost three times the predictions in New Zealand over the next 18 years suggests that we have been more proactive in dealing with this problem over the preceding years and therefore have a smaller predicted increase.

The largest relative increase in the number of replacement surgery has been seen in TKR. These results are similar to other studies\textsuperscript{15,16} which have shown both an increase in the absolute number and incidence rates of TKR, and also an increasing incidence in younger patients (<60 years).

Several factors are likely to be responsible for this differential increase in TKR. Firstly, not only is the New Zealand population ageing but the prevalence of obesity is
also increasing and it has been shown that there is a direct link between obesity and OA of the knee,\textsuperscript{17,18} which is not seen in THR.

Secondly, knee replacement is more common in women who have a longer life expectancy when compared to men, and therefore a larger population base in the 70-79 age band with the highest utilisation rate.

The main age bands responsible for this increased incidence rates were the 75-79 year group for THR and the 70–79 year groups for TKR which was likely to be associated with the improved life expectancy and subsequent increased functional demands from this older patient group.

Census data demonstrates a wide difference in life expectancy when comparing the Māori and Non-Māori populations with the current life expectancy for Māori men 70.4 years compared to Non-Māori men of 79 years\textsuperscript{11}. These results may partially explain why the incidence of joint replacement has not increased within the Māori population, where the increased rate of obesity might suggest otherwise.

Furthermore, it has been well established that the Māori population are lower users of primary health care services.\textsuperscript{19,20} Since elective THR and TKR are dependent on referrals from primary care, poorer access to primary care may explain the lower incidence rates of both THR and TKR in Māori compared to European population.

This observation is similar to that found by Singleton et al.\textsuperscript{21} Similar patterns have been observed for the Māori population in other health intervention rates, such as coronary artery revascularisation procedures and cancer treatment.\textsuperscript{22–24}

Further research in the prevalence of osteoarthritis in Māori and non-Māori populations may assist in addressing the potential ethnic disparities of THR and TKR in New Zealand.

The Asian population demonstrated a low incidence rate for replacement, especially TKR, where it would be anticipated that the rate would mirror other data from Asian countries. The incidence rate of 120/100,000 for TKR was markedly lower than the 2005 Korean data\textsuperscript{13} (157/100,000) suggesting that changing countries and environmental factors may affect the incidence for joint replacement. This may reflect specific cultural behaviour that leads to adult immigrants returning to their country of origin to receive major operations, such as THR and TKR.

The population of Pacific people within New Zealand is increasing and the incidence rate for joint replacement, particularly TKR, has increased at a rate higher than the European population. The reason for this is not clear.

Due to the lack of surgeon expertise and surgical instrumentation, non-residents who do not contribute to the denominator (population number) used in this study, may be immigrating to New Zealand to receive replacement surgeries, resulting in the apparent observation. This effect may be amplified given that the Pacific people have the smallest population number in New Zealand, as a small change in the number of surgeries will affect the incidence significantly. Further analysis was not possible as data regarding citizenship status was not collected by the NZJR.

According to the New Zealand Health Survey 2013\textsuperscript{25}, obesity rates were highest in Pacific adults (68% of the population), followed by Māori adults where 48% were
obese. However, the obesity rate has increased significantly for Māori adults since 2011, whereas a similar increase was not observed in Pacific adults. This may partly explain why the incidence of TKR is highest in the Pacific population in 2011, and one may speculate that the prevalence for Māori may increase in the future.

There are several limitations of this study. First, Poisson regression analysis to predict utilisation rates has limitations in that it assumes the population demand for replacement surgery will continue unabated until everyone will have had a replacement. Obviously that is not the case and we can assume that there will be a point when saturation will occur. This is difficult to predict and the current data would suggest that with the population ageing, being healthier and having higher functional expectations that we are still some way form this saturation point.

Second, there are inherent assumptions when estimating population projections into the future. This study incorporates New Zealand Census data, which reflect the best available projections, taking into account the current fertility, mortality and net migration rates.

Third, we have assumed that the prevalence of hip and knee osteoarthritis will remain constant until 2026. With the ageing population and increase in the prevalence of obesity in our population, it would be reasonable to assume that the prevalence of osteoarthritis will increase, and in fact, projections presented in this study will underestimate the future incidence for THR and TKR.

Furthermore, improving non-operative treatment for osteoarthritis may decrease the need for joint replacement surgery in the future, and the effect of this has not been taken into account in our predictions.

Fourth, by using the ‘Total Response’ ethnicity data, we have inevitably overestimated the population number, which may affect the accuracy of the presented results. This difference was 3.7% for the age bracket used in this study. However, a similar error (under-estimation) would be made if prioritised ethnicity data was used, and in doing so, conceals diversity within ethnic groups, and is avoided across official statistics.\(^6\)

Of note, the difference in population estimates if all ages were included is 9.6%, which further supports our study design.

Lastly, although the incidence rates amongst various ethnicities have been discussed in this study, details of socioeconomic status of patients receiving THR and TKR was not available for analysis. This would provide further indication of the potential discrepancies that exist in the incidence of THR and TKR.

In conclusion, the demand for THR and TKR is projected to increase significantly by 2026, and as far as the continued care for the community is concerned, the trends and projections presented in this study will need to be factored into the continuing service and training requirements for the delivery of an efficient and effective National Orthopaedic Service.
Competing interests: Nil (and no external funds were received for this study).

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Translation of research into clinical practice: a case study of calcium supplement prescribing in New Zealand

Mark J Bolland, Andrew Grey, Ian R Reid

Abstract

Aims Researchers are commonly requested to describe potential benefits of their research for New Zealand in funding applications, but such benefits can be difficult to precisely determine. Recently, we reported that calcium supplements increase cardiovascular risk. We investigated the impact of this research on prescriptions of calcium supplements in New Zealand.

Methods Data on the number of calcium supplement prescriptions in New Zealand from 2000-2012 were obtained from the Ministry of Health and the total costs of calcium carbonate from PHARMAC.

Results Calcium prescriptions increased rapidly between 2000 and 2007, plateaued after the publication of a randomised controlled trial in 2008, and then rapidly declined after publication of a meta-analysis in 2010. Since 2007, monthly prescriptions have decreased by 66%. From 2000 to 2006, the annual cost of calcium carbonate increased from $1.2 to $2.4 million, but from 2007 to 2012, the annual cost decreased by $1.5 million, with a cumulative reduction in cost of $3.9 million. There were substantial regional variations in declines in prescription numbers, and in 2012 prescribing rates.

Conclusion Public-good funding of independent researchers to conduct randomised clinical trials with meaningful clinical outcomes and meta-analyses of such trials can translate into substantial benefits through cost savings.

Researchers are often asked to describe the potential benefits of their research for New Zealand in applications to funding bodies. However, precise benefits from outcomes of research can be difficult to determine. In 2008, we reported that calcium supplements increased the rate of cardiovascular events in a randomised clinical trial in older women funded by the Health Research Council of New Zealand (HRC).1 Subsequently, we confirmed this finding in meta-analyses of trials of calcium monotherapy and trials of co-administered calcium and vitamin D.2,3 These publications received worldwide media coverage, and were also widely discussed in the medical literature.

Clinical practice has been altered by this research, with calcium supplements no longer being routinely recommended to prevent osteoporosis.4 Results from randomised controlled trials that are inconsistent with established practice are reasonably common. However, changes in clinical practice in response to such trials are often resisted and can be slow and incomplete, even when the evidence base for the existing practice is weak.5
We set out to quantify the impact of the recent research on cardiovascular safety of calcium supplements on prescription of these supplements in New Zealand.

**Methods**

Data on calcium supplement prescription numbers in New Zealand from 2000-2012 by month and by District Health Board (DHB) were obtained from the Ministry of Health. The annual costs of prescribed calcium carbonate from 2000-2012 were obtained from PHARMAC.

Rates of prescriptions by DHB were calculated by dividing the total number of prescriptions by the total DHB population for 2012 obtained from Statistics New Zealand (http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/SubnationalPopulationEstimates_HOTPYe30Jun12/Tables.aspx).

**Results**

Figure 1 shows substantial differences in rates of calcium supplement prescriptions in New Zealand from 2000-2012. Monthly prescriptions increased rapidly before the publication of the randomised controlled trial in February 2008, and then plateaued until publication of the first meta-analysis in July 2010.

Subsequently, monthly prescriptions rapidly declined. Since 2007, monthly prescriptions have decreased by 66%.

**Figure 1. Calcium prescriptions in New Zealand by month from 2000-2013. The coloured lines are lines of best fit for the periods defined by publication of the articles.**
Figure 2 shows the annual cost of prescribed calcium carbonate in New Zealand. From 2000-2006, the annual cost steadily increased, from $1.2 million to $2.4 million, despite a reduction in the underlying cost of calcium carbonate. From 2007 to 2012, the annual cost decreased by $1.5 million, and the cumulative reduction in cost was $3.9 million.

**Figure 2. Annual cost of prescription calcium carbonate in New Zealand from 2000-2012**

Figure 3 shows substantial variation in the decrease in calcium supplement prescribing across New Zealand between 2007 and 2012, ranging from the largest decreases in Northland, Waitemata, and Auckland of 74–78% to the smallest decreases in Tarawhiti, Waikato, and Whanganui of 30–33%.
Figure 3. Percentage decrease in prescriptions from 2007 to 2012 by District Health Board

Figure 4 shows marked variation in the rate of calcium supplement prescriptions in 2012 across New Zealand, ranging from the highest rates of 69–77 prescriptions/1000 people for Canterbury and South Canterbury to the lowest rates of 18-27 prescriptions/1000 people for Northland, Capital and Coast, Waitemata, Counties Manukau, and Auckland.

In 2012, the highest number of calcium supplement prescriptions was from Canterbury DHB, which accounted for 21% of all prescriptions. The next four highest number of prescriptions were from Waikato (9.2%), Southern (8.3%), Waitemata (8.0%), and Counties Manukau (7.6%). In 2007, the corresponding figures for the highest 5 DHBs were Canterbury (18.4%), Auckland (13%), Waitemata (13%), Counties Manukau (9%), and Southern (7.7%).
Discussion

These findings show that the research on cardiovascular safety of calcium supplements has had both a substantial effect on clinical practice and a substantial economic impact.

There has been a 66% reduction in the number of prescriptions for calcium supplements, translating into savings in the pharmaceutical budget of New Zealand of up to $3.9 million over 5 years. In 2012, the annual cost of prescribed calcium carbonate had decreased by $1.5 million compared to the 2007 cost. This annual saving is likely to continue for the foreseeable future.
While part of the cost savings may have arisen through alterations in the base price paid for calcium carbonate supplements by PHARMAC, the majority of savings are attributable to the reduction in prescription numbers. We are also aware of recent reductions in the use of calcium supplements in Europe and the United States.

This research was funded from two HRC programme grants which supported this research at a level of $150,000 annually over 6 years, and one Auckland School of Medicine Foundation grant from which $120,000 was spent on this research. Therefore, for a total cost of approximately $1 million all funded by public good research through competitive funding processes, cost savings by PHARMAC in New Zealand alone to date of up to $3.9 million may have been achieved, and these savings will continue to accumulate.

This research and its consequences are unusual because it is often difficult to quantify direct effects of research. In this case, there were rapid and striking changes in prescriptions for calcium supplements in response to the relevant publications. This suggests that the widespread media coverage of the publications may have influenced prescribing behaviour. The rapid changes are surprising given that long delays in changing clinical practice by abandoning established treatments in response to publication of high-quality evidence are well described.5

The focus of the media coverage was that calcium supplements cause heart attacks. This alone is likely to have led many patients to discontinue their medication. While the changes in prescribing behaviour may have been principally influenced by concerns about cardiovascular safety, it is also likely these concerns were the tipping point following identification of a number of problems with their widespread use.

Calcium supplements are poorly tolerated with only 40-60% long-term compliance,6-9 and have side-effects of causing constipation,6-9 kidney stones,7 hypercalcaemia10 and acute gastrointestinal symptoms,8 and increased cardiovascular risk.2,3 Furthermore, their efficacy in preventing fractures is modest. Calcium supplements reduce total fractures by about 10%,12 but do not prevent hip fractures in community-dwelling individuals,13,14 and may actually increase hip fracture risk.13,15

These adverse effects of calcium supplements all have associated indirect costs that are difficult to quantify. The reduction in these adverse effects resulting from the reduction in prescriptions for calcium supplements is likely to have generated further savings arising from a reduced need for medical care. Because calcium supplements are very inexpensive compared to costs of medical care, these indirect savings are likely to be substantially greater than the direct savings from reduced prescriptions.

There were substantial regional variations within New Zealand in both the reductions in prescriptions and the current rate of prescriptions for calcium supplements. These variations are hard to explain, and we are not aware that such variations for calcium supplements have been previously reported internationally. One possibility is that the views of prominent local/regional experts may substantially influence regional prescribing rates, acting to either maintain or reduce them.

Widening access for researchers and clinicians to anonymised or summary data held in the national Pharmaceutical Information Database might highlight more regional variations.
variations in prescribing, and allow DHBs to identify where their prescription rates unexpectedly differ substantially from national averages.

An important limitation of this research is that we did not quantify the impact of reductions in calcium supplement use on both cardiovascular disease and fracture incidence. Because of the modest effects of calcium supplements on both conditions, major changes in calcium prescription rates are unlikely to have any detectable effect on incidence of myocardial infarction or fracture at a population level.

Retrospective observational studies are theoretically possible, comparing incidence of these conditions in calcium users and non-users. However, such studies are limited by confounding, so that it would be difficult to be sure that any differences in incidence rates were due to calcium use rather than other differences between calcium users and non-users.

In summary, randomised clinical trial research on calcium supplements has been associated with savings in the pharmaceutical budget of $3.9 million in New Zealand to date, with perhaps on-going annual savings of at least $1.5 million. Indirect savings on medical care are difficult to quantify but are likely to be substantially greater than these direct savings.

This research therefore has produced substantial economic benefits for New Zealand, by altering clinical practice so that a medication with an unfavourable risk/benefit profile is no longer widely recommended and by reducing the direct and indirect costs associated with use of that medication.

These findings highlight the benefits of funding agencies supporting independent researchers to conduct clinical research that includes randomised clinical trials with meaningful clinical outcomes and meta-analyses of such trials.

Public-good funding of this type of clinical research should be strongly supported by funding agencies because of its key role in informing clinical practice, which will translate into substantial benefits for New Zealand (and the rest of the world). Such research does not necessarily need to involve development of new treatments, because evidence-based reductions in ineffective/harmful treatments are also economically beneficial.

**Competing interests:** Nil.

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Direct-to-consumer advertising of prescription medication in New Zealand

Susanna Every-Palmer, Rishi Duggal, David B Menkes

Abstract
The last decade has seen increasing measures aimed at regulating the influence of ‘Big Pharma’ following a number of scandals relating to unethical marketing. Despite these international trends, New Zealand continues to tolerate direct-to-consumer advertising (DTCA) of prescription medication, a controversial pharmaceutical marketing strategy that has been prohibited in all but two countries in the industrialised world.

While the pharmaceutical industry asserts that DTCA is informational and empowers consumers, in this viewpoint article we argue that DTCA is a heavily biased source of health information that favours representation of benefits over harms, and is associated with unnecessary prescribing, iatrogenic harm and increased costs to the taxpayer.

In this paper, we show that DTCA provides unbalanced information to consumers who may misconstrue DTCA as public health messages, and fail to recognise inherent commercial bias. We describe how DTCA has been linked with inappropriate prescribing and overtreatment, with evidence indicating that patients request and receive specific medications in response to DTCA, even when treatment is not clinically indicated. This exposes patients to unnecessary adverse effects and iatrogenic harm, and increases costs for the health-care sector through the prescription of expensive branded medication. We use local examples to illustrate these points.

New Zealand remains an outlier in allowing DTCA to continue which, in our view, is a controversial and harmful practice. The available evidence suggests that consumers and health care professionals are generally opposed to DTCA. Therefore, we believe that the New Zealand government should review its stance on DTCA.

Background
In recent years numerous pharmaceutical companies have incurred financial and reputational damage from scandals relating to unethical marketing.

Since 2009 many of the major pharmaceutical players including GlaxoSmithKline (GSK), Johnson & Johnson, Eli Lilly, Abbots and Astra Zeneca have been found civilly and criminally responsible for multiple offences including unlawful promotion of medicines and failure to report safety data, resulting in record, billion dollar fines. Furthermore, the pharmaceutical industry continues to attract criticism from the scientific community over suppression of unfavourable results, ghostwritten publications, and undeclared payments to health professionals. The selective
publication and flawed design of industry-funded studies has been argued to be so extensive as to undermine the entire medical evidence base. Consequently, there have been increasing calls over the last decade to regulate the influence of ‘Big Pharma’. The winds of change are clearly in the air. In December 2013, GSK announced it would stop paying doctors to promote its medications and would abolish prescription targets for marketing staff. American pharmaceutical companies are now legally obliged to disclose payments to doctors, with similar legislation coming into force in Europe from 2016.

Despite these international trends, New Zealand continues to tolerate DTCA of prescription medication, a controversial pharmaceutical marketing strategy prohibited almost everywhere else in the industrialised world.

DTCA in New Zealand

Turn on the television and New Zealand viewers might find celebrity Jude Dobson expounding on the merits of a proprietary intravenous infusion for osteoporosis, or the well-modulated Mark Perry chatting about remedies for erectile dysfunction. Mark and Jude are hosts of the ‘Family Health Diary’, described by its parent company to be “a health information network that aims to keep you informed on health conditions and current issues” (www.familyhealthdiary.co.nz/).

Such industry funded ‘health information’ campaigns have been banned in almost all industrialised countries since the 1940s. New Zealand and the United States are lonely exceptions. To what does New Zealand owe this dubious honour? While most other developed countries enacted legislation prohibiting this practice approximately three quarters of a century ago, the New Zealand Medicines Act 1981 failed to address DTCA, seemingly more by accident than design.

Prescription medications were simply not being advertised in 1981, so DTCA had little visibility at a time when the ethical frameworks governing relationships between the pharmaceutical industry and health care sector were but inchoate concepts. Following the United States relaxing regulations around broadcast advertising in 1997, lawmakers failed to anticipate the dramatic increase in DTCA that occurred in New Zealand. DTCA is now the most rapidly growing form of pharmaceutical marketing in the United States. American pharmaceutical companies spend in excess of US$4 billion per year on DTCA. In comparison, this advertising budget exceeds the entire Food and Drug Administration (FDA) budget for the evaluation of new drugs by approximately 10 fold. In New Zealand, expenditure on DTCA has been estimated to be in the tens of millions of dollars annually.

DTCA is controversial. Advocates assert that the advertisements are informational and empower consumers with medical knowledge, encourage dialogue with health practitioners and enable informed choices about treatment options.

Opponents argue that the information presented in commercials provides an unbalanced view of prescription medications in favour of benefits over harms, leading to unnecessary prescription, iatrogenic harm and increased costs.

In the following paragraphs we discuss these points in more detail.
DTCA provides information to consumers—Advocates of DTCA argue that DTCA is informational and represents a net positive transfer of information to consumers. Is this correct?

While both American and New Zealand regulations and codes (e.g. the government’s Therapeutic Products Advertising Code; also the Code of Practice issued by Medicines New Zealand, an industry lobby group) emphasise the need for balance such that consumers are informed of both benefits and adverse effects of advertised products, it is common for this not to occur in practice. Misleading promotion of prescription medication has led to recent billion dollar settlements paid by large pharmaceutical companies to compensate for damages.

The pharmaceutical industry is subject to the same commercial incentives as any other manufacturer marketing their wares. Even DTCA that does not breach regulations employs overt and covert methods to enhance the attractiveness of the advertised product over any detriments. For example, while implying high success rates, most pharmaceutical advertisements in magazines fail to report the actual likelihood of treatment response or to compare this with alternative (or indeed no) treatment.

Research published in the Lancet found 87% of the direct-to-consumer advertisements studied described benefits in only vague terms, often utilising emotive language (for example: “help your child out of the jungle of allergies”). Only 13% of advertisements provided any evidence to support claims. The minority of DTCA that did provide evidence, tended to present data in ways that exaggerated the magnitude of the benefits such as citing relative rather than absolute risk reduction.

This should not come as any surprise. Johnny Mercer’s lyrics “accentuate the positive, eliminate the negative” would be widely accepted as an Advertising 101 theme tune. Unfortunately, the biases inherent within DTCA have tended to remain largely hidden from the public eye compared with other forms of advertising.

Research from the United States indicates that many consumers believe that a state agency is responsible for ensuring that all DTCA is balanced, accurate and truthful. In one survey, 29% of consumers believed that only medications that were regarded as completely safe could be advertised on television. In California, 42% of respondents thought that only the safest medications could be advertised. ‘Health information platforms’ were commonly and erroneously perceived to be more informational than other advertisements.

Naturally, these misperceptions are exploited by marketing campaigns. In the United States it is not uncommon for industry-employed celebrities to confer a veneer of independence while discussing their ‘personal’ positive experience with a particular branded pharmaceutical product. New Zealand’s best-known version of this practice is the Family Health Diary.

Brandworld, the company responsible for Family Health Diary, openly claims that the success of their advertising platform depends on the infomercials being “highly trusted and perceived as an independent source of information… Our research shows that Jude Dobson, Mark Perry and other presenters are considered to be trusted friends and that Family Health Diary is [considered] a third-party endorsement, rather than simply another ad.”

Thus, marketing information provided by the pharmaceutical industry can mislead consumers who believe in the independence and reliability of the claims being made.
Consumers are unlikely to have the means or inclination to critically appraise the scientific evidence supporting any purported health benefits. Thus while DTCA does present information, it is routinely biased and unreliable.

**Unnecessary prescribing**—DTCA has been linked with inappropriate prescribing and overtreatment. Comparing prescribing in Canada (where DTCA is banned) with the United States, Gilbody et al\(^1\) found American patients were more likely to believe they needed medication, to request products advertised on television, and to receive prescriptions for these.

No similar research has been conducted in New Zealand, but it is widely accepted that advertised treatments are more commonly requested and received by consumers. Brandworld claims to have surveyed pharmacists about the impact of these DTCA strategies, with 94% of pharmacists believing Family Health Diary increased sales and 99% of pharmacists reporting fielding customer enquiries about advertised products.\(^1\)

The effect of DTCA on prescribing practice in vivo was demonstrated by Kravitz et al.\(^2\) Trained actors (‘standardised patients’) were sent to family practices in the role of a 48-year-old woman with a short and uncomplicated presentation of mild to moderate depression. The actors were randomly assigned to behave in one of three ways: to describe having seen advertisements for paroxetine (a selective serotonin reuptake inhibitor (SSRI)) antidepressant, and request it by name; to describe having seen advertisements for antidepressants and request generic medical treatment; or to make no specific request.

Patients requesting paroxetine were seven times more likely to receive this medication than those making no requests. Prescribing SSRIs at the behest of the patient may not seem unreasonable, but meta-analyses indicate the benefits of SSRIs over placebo for mild to moderate depression are minimal at best,\(^2\) with best practice guidelines recommending non-pharmacological therapies to be offered as first line treatment.\(^3\)

More dramatically, when more actors—now no longer feigning depression, but reporting stress following redundancy—specifically requested paroxetine, 55% received prescriptions for antidepressants, with almost 40% receiving paroxetine, despite the absence of any evidence supporting SSRIs for what was clearly an adjustment disorder. In contrast only 10% of those making no request were prescribed antidepressants (and none received paroxetine).

Understandably, doctors want to please their patients and the evidence suggests that when a patient requests a specific medication (as instructed to do in advertisements), they are more likely to receive this, even when that treatment is not clinically indicated.

Pharmaceutical companies are well aware of the added value of advertising; indeed promotional budgets often exceed those allocated to research and development of new medications.\(^4\) This also explains why pharmaceutical companies have lobbied vigorously to defend the legality of DTCA in USA and NZ, and to extend the practice to other jurisdictions, notably Europe.\(^5\)

**Iatrogenic harm**—Related to the issue of unnecessary (and therefore increased) prescribing,\(^1\) DTCA can serve to promote pharmaceuticals for milder health problems, for which safer, non-pharmacological therapies can be as effective.\(^6\) Thus, DTCA can result in the unnecessary exposure of consumers to potential harm.
Rofecoxib (Vioxx) and celecoxib (Celebrex), non-steroidal anti-inflammatory drugs used in treating arthritic pain, are now infamous examples where DTCA has been implicated as a major contributor to iatrogenic harm. At the time they were introduced, rofecoxib and celecoxib were amongst the most heavily advertised products in the market with $US161 million and $US78 million spent marketing them respectively. These drugs were later found to have potentially fatal side-effects leading to large-scale population mortality and morbidity; Celecoxib was restricted and rofecoxib withdrawn, but not before the occurrence of thousands of avoidable deaths.

**Increased costs**—Alongside unnecessary prescribing, DTCA also may increase costs through the preferential use of expensive branded medication over equally effective generic medication and other less costly alternatives.

Overall, the pharmaceutical industry spends approximately twice as much on marketing and promotion as it does on research and development. These costs are passed on to the consumer through high costs of new medications which persist until patents lapse. Industry is incentivised to promote the ongoing prescription of expensive branded medication, and DTCA is a means to achieve this. Almost all DTCA focuses on patented or branded medication.

DTCA of injectable risperidone (an antipsychotic medication) and venlafaxine (an antidepressant medication) provide salient New Zealand case studies. A large scale marketing campaign promoting long-acting injectable (depot) risperidone was launched in May 2013. This included prominent advertisements on free-to-air television (including Maori TV), with linked print and internet advertising. Articulate young New Zealanders were portrayed discussing the benefits of the depot preparation and remarking on the convenience of no longer needing to remember their daily tablets.

Depot on-patent risperidone is an expensive medication, over 50 times the price of its oral (no longer patented) counterpart (see [http://www.pharmac.govt.nz/patients/PharmaceuticalSchedule](http://www.pharmac.govt.nz/patients/PharmaceuticalSchedule)), although these costs are not borne by consumers who meet criteria, rather, by the taxpayer.

Depot risperidone may have value for patients with schizophrenia who have tried but failed to comply with oral antipsychotic medication. However, it does not offer efficacy advantages over the oral form, nor does it necessarily improve adherence rates. The campaign messages extolling convenience and choice naturally failed to raise these issues.

The 2011 advertising campaign for proprietary venlafaxine followed soon after the expiry of its patent. Consumers were informed that branded venlafaxine was fully funded and urged to, “Just remember, you can stay on Efexor-XR if you want, you don’t need to change, especially if it’s working for you. Efexor-XR: ask your doctor and pharmacist if it’s right for you.” Unsurprisingly, there was no mention of equivalent alternatives such as generic venlafaxine which costs one-third the price of the branded version.

The costs to the New Zealand taxpayer of the increased demand that results from such campaigns have not been quantified, but are likely to be significant. For example if, as a result of the risperidone advertising, 1000 people switched from the oral to depot preparation, this would cost the country over $5 million per annum. A study in
Britain found that potential savings of £1 billion (out of a total NHS pharmaceutical budget of £9 billion) could be achieved by doctors prescribing generic alternatives. Thus, through unnecessary prescribing and promoting branded medications over generics, DTCA can undermine the principles of distributive justice and impose a significant opportunity cost on the health-care sector.

Attitudes towards DTCA

Empowering consumers to make informed choices about their healthcare is a central tenet of modern medicine. It is on the coat tails of this philosophy that pharmaceutical companies typically justify DTCA. However, many prescribers and consumers do not accept this justification.

In 2002 nearly one half of all New Zealand GPs responded within a week to an advocacy call from several General Practice Academics who were concerned about misleading DTCA campaigns. Four out of five of those respondents were supportive of a ban on DTCA, with many citing personal examples and experiences of harms to the doctor-patient relationship and to public health.

Between 2002 and 2004, many health professional groups in New Zealand issued position statements supporting the prohibition of DTCA, advocating that it be replaced with centrally funded independent (and unbiased) health information.

In 2006, The Ministry of Health reviewed DTCA. Of those who made submissions, DTCA was opposed by, or of concern to, all consumer groups (n=8), all government agencies (n=5), all educational /research agencies (n=9) and the majority of members of the public (11/12) and academics (10/11). DTCA was unsurprisingly unanimously supported by advertising agencies and pharmaceutical companies. The opinions of health professionals making submissions were divided. However, despite the submissions, no further actions were taken by the government, let alone any legislative change to prohibit DTCA.

Two of us (RD and DM) were recently involved in researching mental health service users’ views about DTCA following the depot risperidone campaign. Service users voiced overwhelmingly negative opinions, expressing concerns about pharmaceutical company motivation, unbalanced medication information, the over-emphasis of medical treatments, neglect of other treatment modalities, and potential adverse impact of DTCA on service users, families, and the doctor-patient relationship. It was felt that this campaign in particular might be capitalising on the fears of a vulnerable population.

Other consumer groups have also recently expressed disquiet about DTCA overall, and particularly about the risperidone depot campaign.

While critical of DTCA, service users emphasised the importance of unbiased information, a sound doctor-patient relationship, and shared decision-making in accordance with the principles of evidence based practice.

Consumer criticisms of DTCA have been mirrored in the USA, where successive consumer surveys conducted by the FDA reveal increasingly negative attitudes towards this practice.

In summary we found little consumer or health professional support for DTCA in New Zealand.
Health professionals’ engagement with industry

It might be argued that it is hypocritical for health professionals to condemn DTCA, yet themselves continue to engage with pharmaceutical industry marketing activities. As with DTCA, it has been shown that the quality of information provided by pharmaceutical companies to doctors is often poor, with benefits exaggerated and risks minimised. It is a commonly mistaken presumption that doctors’ knowledge and experience insulates them from the effects of pharmaceutical promotion. Although outside the scope of this paper, these concerns constitute one set of reasons why health professionals’ relationships with industry are also in need of review.

Conclusion

Pharmaceutical companies have touted DTCA as a pro-consumer activity, encouraging dialogue, empowerment and choice. Whilst available evidence is incomplete, it generally refutes this view. DTCA is a biased source of health information and is associated with unnecessary prescribing, iatrogenic harm and unnecessary costs to the taxpayer.

The choice of medical treatment should be made on the basis of best evidence combined with patient history and values, not on the cleverest or most compelling marketing message. Most of the developed world has taken a firm stand against DTCA. Notwithstanding the influence of lobby groups advocating for DTCA, the New Zealand government’s inertia on this matter is concerning.

While we support any initiatives that increase the provision of accurate, accessible and independent sources of health information so consumers and clinicians can make informed choices about treatment, we do not believe DTCA represents an appropriate vehicle for these objectives. In the interests of quality, cost-effective healthcare, we believe that the New Zealand government should review its stance on DTCA.

Competing interests: Nil.

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**Salmonella paratyphi A-infected ovarian cyst in returning traveller—an unusual complication of enteric fever**

Matthew Farrant, Hasan Bhally

**Abstract**

We report a case of *Salmonella paratyphi* A enteric fever in a returned New Zealand traveller complicated by an infected ovarian cyst, which resulted in clinical and microbiological relapse despite appropriate antibiotic treatment. Extraintestinal manifestations of enteric fever are infrequent but should be considered in situations where treatment response to first-line antibiotics for adequate duration is suboptimal.

Enteric fever is a systemic infection caused *Salmonella enterica* serotype *typhi* (*S. typhi*) and *S. enterica* serotype *paratyphi* (*S. paratyphi*) A, B, and C. These *Salmonella enterica* serotypes are well adapted in human intestines, and are important causes of systemic febrile illness in crowded and deprived populations with inadequate sanitation exposed to unsafe water and food.

Travellers to endemic areas like South Central and South East Asia are therefore at risk of infections. In 2000, typhoid fever caused an estimated 21.7 million illnesses and 217,000 deaths, and paratyphoid fever caused an estimated 5.4 million illnesses worldwide.

Although *S. typhi* is considered the dominate pathogen causing enteric fever and complications, infections from *S. paratyphi* types A, B and C are becoming an increasingly common and important since typhoid vaccine is not protective against *S. paratyphi*. In New Zealand, a vast majority of enteric fever cases are acquired overseas.

In 2013–14 (between April and March) there were 1074 notifications on salmonellosis (non-typhi) with an estimated rate of 24/100,000 population compared to *S. typhi* infections in 1/100,000 population. Recently there has been a marked increase in *S. paratyphi* A diagnosed from blood cultures of Cambodian citizens reported between January and August 2013.

Complications are associated with 10–15% of enteric fever with gastrointestinal bleeding or intestinal perforations being the most common, but this is usually much lower in travellers who have access to appropriate treatment more readily. There are sporadic reports of genitourinary infection in literature, and none reported in Australia or New Zealand since 1989.

**Case report**

A 29-year-old female secondary school teacher, with no prior medical history, was referred to hospital in May 2013 with a 3-week history of intermittent fever, abdominal discomfort and occasional non bloody diarrhoea that started while en route to New Zealand from a 2-week history school trip to Vietnam and Cambodia.
She was initially managed in the community by her GP with treatment for presumed giardia, after malaria was ruled out on basis of blood films and antigen testing. Symptoms persisted after which blood cultures were performed. Positive growth was recorded after 24 hours of incubation with Gram-negative bacilli seen on Gram stain, resulting in referral to hospital.

She was previously fit and well, without any comorbidities, and no long-term medications. She received appropriate pre-travel advice, malaria chemoprophylaxis, and vaccination including typhoid polysaccharide vaccine (Typherex®).

Blood cultures were confirmed as *Salmonella paratyphi A* by conventional testing and confirmation by Vitek2® automated identification system. Isolate was fully susceptible to amoxicillin, ceftriaxone and nalidixic acid. On initial examination, she was cardiovascularly stable, febrile at 38°C, without localising signs. She responded well to initial treatment with defervesence, improvement in symptoms, and negative follow-up blood cultures.

She was treated after 3 days of IV ceftriaxone 2 grams once daily and discharged with 10 days oral ciprofloxacin 500 mg bd. C-reactive protein (CRP) decreased from 130 mg/L on admission to 80 mg/L on discharge. However 8 days into ciprofloxacin treatment she developed fever and rigors and intermittent lower abdominal pains, which persisted requiring readmission at day 12. Examination revealed a low grade temperature (37.6°C) and mild right iliac fossa tenderness. Repeat blood and stool cultures were negative.

IV ceftriaxone was again initiated, but intermittent fevers to 38.9°C, ongoing malaise, and a rising CRP resulted in CT abdomen and pelvis being performed which demonstrated a pelvic collection shown and reported in Figure 1.

**Figure 1**

![Figure 1](image_url)

**Note:** There is a large well-defined mass within the Pouch of Douglas, with approximate measurements of 11.0×10.5×8.5 cm, exerting mass effect on the adjacent uterus and rectum. The differential is wide and includes ovarian serous cystadenoma, endometrioma or haemorrhagic ovarian cyst.
Under ultrasound guidance, a 10 French pigtail catheter was inserted and 415ml brown turbid fluid was aspirated. Routine culture grew *Salmonella paratyphi* A. Following drainage the fever resolved, and the CRP normalised during a further 4 weeks of once-daily IV ceftriaxone administered via a PICC line as an outpatient.

**Discussion**

Both *Salmonella typhi* and *S. paratyphi* are known for spread beyond the alimentary track and can infect almost every organ, causing localised suppurative complications. These bacteria avoid significant host immune response when translocating the gut mucosa. After phagocytosis they replicate within cells of the gut-associated lymphoid tissue and of other cells of monocytic lineage that are disseminated throughout the reticuloendothelial system.

Prolonged bacteraemia which is likely in this case, is presumed to have resulted in haematolagous spread to an undiagnosed ovarian cyst or endometrioma. The cystic medium provided a harbour from lethal concentrations of antibiotics over 13 days of treatment, with survival and relapse of a febrile illness and culture of the organism from the tubo-ovarian collection.

There have been at least 17 case reports of *Salmonella* spp. causing ovarian or tubo-ovarian abscesses in the literature since 1975, mostly due to *S. typhi* and nontyphoid salmonella. This would be the third involving *S. paratyphoid* A, and given the lack of effective vaccine may become a more prominent pathogen causing localised suppurative complications in returned travellers.

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Schizencephaly

Sunnya Zarif, Hala Alsafadi

A 71-year-old lady presented to the acute medical unit with dizziness and collapse at home with no loss of conscious. There was no complaint of headache, palpitations or chest pain and there was no evidence of seizures. She had a background of hypertension and hypothyroidism and was on regular bendroflumathiazide and bisoprolol.

On examination her pulse was regular and she had significant postural hypotension on measuring lying and standing blood pressure. It was noted that she has unequal pupils but the rest of her examination was unremarkable. She had a normal ECG and chest X-ray. Routine blood tests were normal as well.

Bendroflumethiazide was stopped and a CT head scan was performed (Figure 1).

Figure 1. The CT scan
The CT scan shows *schizencephaly*. This is an incidental congenital defect in the brain and it was unlikely to account for the patient’s presentation. The skull frontal bony deformity confirms that this is a developmental defect (personal communication, hospital colleague, 2014).

The cause of the collapse in this case was postural hypotension secondary to diuretic use. The patient improved after stopping bendroflumethiazide.

This case was discussed with the neurosurgical team who confirmed the diagnosis of shizencephaly that does not require any intervention.

The total prevalence of schizencephaly is 1.48/100,000 births.1

Schizencephaly is a rare disorder of neuronal migration in which there are one or more fluid-filled clefts in the cerebral hemisphere that communicate with the lateral ventricle.

Two types of schizencephaly have been described:

- Type 1 has small symmetrical clefts and the edges of the clefts are fused within a pia-ependymal seam that is continuous with the ependyma of the lateral ventricle.
- Type 2 has extensive clefts that extend from the ventricle to the surface of the brain and subarachnoid space and the edges are not fused.2

Children with closed-lip schizencephaly present with hemiparesis or motor delay whereas patients with open-lip schizencephaly present with hydrocephalus or seizures.3

Treatment for individuals with schizencephaly generally consists of physical therapy, treatment for seizures, and, in cases that are complicated by hydrocephalus, a shunt.

The prognosis for individuals with schizencephaly varies depending on the size of the clefts and the degree of neurological deficit.4

Schizencephaly is a rare disorder of neuronal migration in which there are one or more fluid-filled clefts in the cerebral hemisphere that communicate with the lateral ventricle.

Arachnoid cysts are collections of cerebrospinal fluid within the layers of the arachnoid membrane; the cyst may or may not communicate with the subarachnoid space.

Arachnoid cysts do not communicate with the lateral ventricles.5

The patient in this case was totally asymptomatic and the presentation on this occasion was secondary to postural hypotension.

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Alcohol availability and sponsorship: integrating research and community voices to shape better public policy.

The use and abuse of alcohol plays an important part in the lives of New Zealanders. Our love-hate relationship with the substance juxtaposes the social and hedonic benefits of alcohol with its darker side. Alcohol is addictive, plays a role in some cancers, and its misuse leads to traffic crashes and people seeking medical attention. During Friday and Saturday nights, 30 to 50% of patients passing through the door of the emergency departments of major hospitals in Auckland are under its influence. Excess alcohol intake leads to impaired judgement and impulsive behaviour, and this is likely to explain the strong association between alcohol use and violent crime, sexual offending, family violence and police arrests.

Between 600 and 1000 New Zealanders are estimated to die from alcohol misuse each year. In this letter, we outline the role of Auckland Regional Public Health (ARPHS) in shaping public policy to limit alcohol-related harm.

First, can policy influence alcohol-related harm? Experience from Western Australia suggests that liberalising trading hours for outlets leads to more alcohol-related traffic crashes. In one study, granting hotels the right to sell alcohol for an extra 2 hours beyond midnight, resulted in a 50% increase in the rate of crashes after leaving the hotel, compared to the more restricted period. Other evidence suggests restricted trading hours can reduce violent incidents.

A study of policy change in Newcastle, Australia, showed that restricting pub closing from 5 am to 3 am in 2008, was associated with a 34% (95% confidence interval (CI): 30 to 45%) lower incidence of assault in surrounding areas, comparing periods before and after the change. A ‘lock-out’ was another feature of the restrictive policy, so that, after 1 am, patrons could continue drinking until 3 am, but no new patrons were allowed into the premises for the last two hours before closing time.

Along with trading hours, the density of alcohol retailers is likely to influence levels of intake. In New Zealand, cross-sectional evidence from a survey of university students (n=1983) showed that proximity to 10 extra off-licence outlets (where patrons drink off-site) within 1 kilometre of a students’ residence was associated with a 9% (95% CI: 2% to 16%) increase in self-reported standard drinks consumed per day. This figure was adjusted for high school binge drinking, age, sex and ethnic group.

Evidence links marketing of alcohol with drinking behaviour, especially in teenagers. In a cross-sectional survey, undertaken in Scotland, 12 to 14-year-old students were asked about their own, family and friends’ drinking behaviour, as well as their awareness of, and participation in, alcohol promotions.

Awareness of alcohol advertising (television, cinema, billboards, discounts) and engaging in electronic marketing (surfing to alcohol branded websites, use of a mobile phone or computer screensaver with an alcohol brand, or using an alcohol
branded home-page) were strongly associated with ever having consumed an alcoholic drink (adjusted odds ratio 2.4; 95% CI: 1.3 to 4.3).9

While the science of alcohol policy leans toward more regulation, public policy should also reflect community opinion. With this in mind, Auckland Regional Public Health Service (ARPHS) commissioned a survey in late 2013 to gauge the public’s outlook toward alcohol regulation.10 The survey sought the attitudes of 800 Aucklanders, with greater weight given to Māori and Pacific peoples.

Response to the survey was 52%. The attitudes expressed support for restricted closing time of on-licence (alcohol consumed on-site) premises in central Auckland (61% did not want the time extended beyond 2 am), with 1 am recommended for larger centres (60% support) and midnight for the rest of Auckland (52% support). Respondents, similarly, favoured no increase in the number of on-licence premises (between 66 and 89% support). Respondents almost unanimously supported limiting the number of off-licence retailers (91% wanted no increase). Two-thirds of respondents (66%) supported a ‘lock-out’, if closing times were to vary between different regions of Auckland.

With these findings, ARPHS submitted to both the local council and national government, to recommend further limits to alcohol advertising and sponsorship, and to toughen local body rules about the trading hours and sales of alcohol. For example, the Auckland Council draft Local Alcohol Policy proposes a 3 am closing for on-licences in the central city, with possible extensions.

Backed by community views and relevant evidence, ARPHS has recommended limiting closing hours to 1 am across the region. If the council regulated for different trading hours between regions, ARPHS suggested the use of ‘lock outs’ to prevent harm from intoxicated patrons driving between premises.

To tackle alcohol-related harm, health professionals are encouraged to think beyond what comes through their doors, to policy that shapes the environment which influences the way New Zealanders drink.

Our hope is that by drawing attention to this information other individuals and organisations will raise their voice to create healthier alcohol-related public policy in this country.

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Is day stay laparoscopic cholecystectomy feasible at a provincial hospital?

Gallstone disease is a major health issue, with an estimated prevalence of 2–40%.\textsuperscript{1} The majority of patients remain asymptomatic; 11.4\% of asymptomatic individuals harbouring stones develop symptoms within 8.7 years.\textsuperscript{2} Laparoscopic cholecystectomy (LC) has become standard management for symptomatic gallstones. The median hospital stay for an elective LC is up to 5.4 days.\textsuperscript{3}

Recently a “day-stay” approach to LC has been adopted: this is standard practise in many centres. A Cochrane review compared patients discharged on the day of their LC with patients who were discharged the following day and there were no significant differences in outcomes.\textsuperscript{4}

Our study describes the implementation of a day-stay approach within a medium-sized provincial hospital in New Zealand. Data was collected prospectively over a 13-month period. A day-stay LC pathway was implemented at the commencement of the study.

Inclusion criteria included ASA 1–3, living in close proximity to the hospital and presence of a responsible adult at home on discharge. Preoperative education commences at the initial specialist appointment and is continued at preadmission clinic.

Surgical initiatives include avoidance of abdominal drainage, non-steroidal anti-inflammatory drugs (NSAIDs) administration and limitation to 500mL intravenous fluid. Local anaesthetic is used for wounds/intraperitoneally. Perioperative anaesthetic and antiemetic regimens are chosen at the anaesthetist’s discretion. Postoperative analgesia consists of paracetamol, NSAIDs and as required opioids. Tramadol is avoided.

Discharge criteria involves adequate analgesia, safe mobilisation, tolerating oral intake and absence of vomiting. Discharge medication consists of paracetamol, ibuprofen, oxynorm and metoclopramide.

Notes were retrospectively consulted and patients were excluded for acute cholecystitis, a planned dual or an open procedure or if ASA 4. Documentation ascertained “successful” day-cases; if not achieved, the reason was attributed to “surgical reason”, “anaesthetic reason” or “protocol failure”. Readmission was assessed up to 30 days following discharge.

This audit involves non-identifiable retrospective data and therefore ethics approval was not required.\textsuperscript{5}

65 cholecystectomies were carried out in a 13-month period. 10 were excluded leaving 55 LCs with intended same-day discharge. 75\% of patients were female. Our cohort had a mean age of 51 years. 33 patients (59\%) were discharged on the same day of their operation. 19 of the 22 patients admitted overnight were discharged the following day. The average stay was 0.64 days.
Figure 1. Inclusion and exclusion criteria along with demographics of our cohort

We had one post-op complication (haematoma) not requiring further intervention. Two further patients had prolonged stays after being admitted for elective ERCP due to CBD stones that could not be cleared in theatre.

Our cohort includes 10 patients aged 70 years or older. Three of these were discharged on the same day of their operation. None of the six patients aged 75 years or older were discharged on the same day.

Reasons for overnight admission are demonstrated on Figure 2. For five patients there was no reason why they were not discharged home; they are classified under protocol failure.
Five patients were readmitted within one month of their operation (three for pain, one with a lower respiratory tract infection and one with a myocardial infarction—whom had atypical pain and a cardiac cause excluded prior to surgery). For three re-presentations readmission was not required (one open-wound, one with pain and one with a seroma).

Day-stay LC is a safe and effective approach that can be effectively applied in a provincial New Zealand hospital. Our cohort contained no deaths and one serious surgical complication. The main reasons for prolonged admission were pain and post-operative nausea/vomiting.

Our “successful day-case” percentage (60%) was lower than the figures of ~80% quoted in a Cochrane review. Potential reasons are our older cohort (mean age some eight years older), inclusion of more comorbid patients (ASA 3 in addition to ASA 1 and 2 in Cochrane review) and our study being conducted in the day-stay unit (hours 0800–2000) at a 24-hour public hospital, as opposed to a purpose-built day-stay hospital.

The message of day-stay must be communicated early to avoid factors such as no transport or responsible adult at home—we believe this led to a number of protocol failures. Similarly, if a patient is admitted to a general ward the emphasis switches from discharge to patient comfort. Five of our patients were admitted from recovery in error and this probably contributed to protocol failures.

Our study supported evidence from a recent review that examined interventions to facilitate ambulatory LC. More standardised, evidence-based protocols involving these areas can be seen to be important in same-day discharges.
Day-stay LC is safe and logistically feasible in a provincial New Zealand hospital. Standard protocol for patient education, pain, antiemetics, fluids and discharge criteria is important. We have shown age to be a limiting factor—higher same-day discharge percentages could likely be achieved with implementation of tighter patient selection criteria.

Reduced resource requirements are highly likely and there are potential tangible benefits to both patients and the hospital system. This study started with the commencement of day-case procedures, accepting there would be a learning curve and examines the barriers to introducing a day-case laparoscopic cholecystectomy pathway in a medium-sized public hospital in New Zealand.

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The subcutaneous injection of atmospheric air in fibrositis and allied affections

Excerpt from an article by Dr Douglas published in NZM March 1914;13(49):21–7.

A few selected cases will illustrate the application of the air injection treatment. Cases are chosen where the action of aspirin or other drug did not confuse the result. Most of the cases were doubtless amenable to other forms of treatment, and we are all familiar with immediate and striking results in certain cases of fibrositis by the injection of drugs, counter-irritation, and so on.

It remains to be judged whether the method of air injections gives a larger proportion of cases of decided and lasting relief than other methods. It is certainly no panacea; it may require to be repeated several times at intervals of a week or ten days and only as an adjunct to the treatment of such conditions as constipation, gout, tobacco-poisoning, and arthritis; but proof of the comparative value of the method is forthcoming when patients who have undergone a variety of forms of treatment, return during subsequent attacks, months or years after, for a repetition of the air injection treatment which they found so effectual.

A thick-set man of thirty, living fifteen miles away, sent for me on account of a sudden disabling pain in the back, which seized him while washing. He had had attacks of lumbago previously. I found him lying on his side, apparently unable to move. He had felt discomfort in his back for a day or two before the sudden acute seizure. Treatment by air injection was carried out, and in a few minutes the patient was able to stand up and pick up articles from the floor. Some weeks after he called to say that some pain continued for a few days but not sufficient to prevent him from moving about freely.

Mrs F., at 45, had been suffering from pain in the occipital region and back of the neck for a fortnight. She was unable to hold up her head. Great relief was afforded by air injection, but there was considerable soreness and discomfort about the neck and throat for several hours during the night.

A young man of thirty-two had been suffering for a few days from a pain in the outside of the leg, from the knee to the ankle. The pain was getting worse and made him lame. Air injection gave relief at once and the pain did not return. This patient is subject to attacks of sciatica which have occasionally continued for several weeks or months, sometimes with intervals of many months of complete freedom from pain. He has visited Rotorua and undergone various modes of treatment, such as high-frequency-currents and electrical baths. For the last few years, when attacked by his old enemy, he always returns for the air-injection and atropine treatment. The attack sometimes requires several applications, but is more effectually relieved by this treatment; than any other. Aspirin and iodides appear to be valueless in this case.
Health and fracking: should the medical profession be concerned?

This interesting paper notes that South Africa is about to embark on exploratory high-volume hydraulic fracturing (fracking) to extract the huge reserves of natural gas contained in shale rock.

Some countries, such as France and Bulgaria, have banned fracking, while others such as the UK believe that it can be performed safely if regulations are strictly enforced. Although fracking has taken place for a decade in the US, there is surprisingly little scientific evidence on the health impacts.

The drilling and fracking processes use hundreds of chemicals as well as silica sand. Additional elements are either released from or formed in the shale during drilling. These substances can enter the environment in various ways: through failures in the well casing; via alternative underground pathways; as wastewater, spills and leaks in the wellpad; through transportation accidents; and as air pollution. Although many of these chemicals and elements have known adverse health effects, there is little evidence available on the health impacts of fracking. These health concerns have not yet been fully addressed in policy making, and the authors recommend that the voice of health professionals should be part of the public debate on fracking and that a full health impact assessment be required before companies are given the go-ahead to drill.


Delayed umbilical cord clamping. Does gravity matter?

The World Health Organization (WHO) recommends delayed cord clamping for 1–3 minutes after birth with the infant held at or below the level of the placenta. This technique allows significant transfusion of blood to the infant and will help prevent infantile iron deficiency. This procedure is cumbersome and may contribute to non-compliance.

This non-inferiority trial in Argentina questions the merit of gravity in this matter. Approximately 400 vaginally born babies were randomised to be held for 2 minutes before cord clamping at the level of the vagina or on the mother’s abdomen or chest. The babies were weighed immediately after birth and after cord clamping. Weight was used as a proxy of placental transfusion volume. The researchers report that gravity did not have an effect on the volume of placental transfusion.

This change in practice might increase compliance with delayed cord clamping, enhance maternal–infant bonding and decrease iron deficiency in infants.

Long term drug treatment strategies to prevent asthma exacerbations

This meta-analysis addresses the question of which drug maintenance treatment is most effective at preventing asthma exacerbations in adults.

The authors compared 16 different therapeutic trials of at least 24 weeks duration. The primary outcomes were severe exacerbations as well as withdrawals as a result of adverse events. The conclusions reached were that compared with low-dose inhaled corticosteroids, combined inhaled corticosteroids and long acting β agonists, either as maintenance and reliever treatment or in fixed daily dose, significantly reduced exacerbations of asthma.

An editorial commentator is a little cynical noting that treatment rankings from network analysis can be unreliable when dominated by indirect evidence. Nevertheless he agrees with the superiority of the combination of long acting β agonists and inhaled corticosteroids over other treatment options for adults with asthma who remain symptomatic despite regular use of inhaled corticosteroids.

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