HIV prevention today: with coordinated action, we can end transmission

Infrequent condom use with casual partners among New Zealand gay and bisexual men

Drug misuse in sport

The first 30 years of HIV in New Zealand: Review of the epidemiology

Maxillofacial fractures at Waikato Hospital, New Zealand: 2004 to 2013

- Late-life self-harm in the Waikato region
- What makes a child a ‘competent’ child?
EDITORIAL
8
HIV prevention today: with coordinated action, we can end transmission
Peter J Saxton, Anthony J Hughes, Massimo Giola

16
Drug misuse in sport: a historical perspective
David Gerrard

ARTICLES
19
Thirty years of condom-based HIV prevention by gay men in New Zealand
Anthony J Hughes, Peter J Saxton

31
The first 30 years of HIV in New Zealand: Review of the epidemiology
Nigel Dickson, Bible Lee, Timothy Foster, Peter Saxton

49
Infrequent condom use with casual partners among New Zealand gay and bisexual men
Peter J Saxton, Nigel P Dickson, Anthony J Hughes, Adrian H Ludlam

62
Drug misuse in sport: a New Zealand perspective
Andrew Curtis, David Gerrard, Peter Burt, Hamish Osborne

69
‘Real-time’ burden of community and healthcare-related infections in medical and rehabilitation patients in a public hospital in Auckland, New Zealand
Kerry Read, Hasan Bhally

75
Late-life self-harm in the Waikato region
WA de Beer, J Murtagh, G Cheung

83
Prescriber compliance with renal function monitoring in patients taking dabigatran (Pradaxa)
Katie Thorne, Stephen Dee, Sisira Jayathissa

88
What makes a child a ‘competent’ child?
Amanda van Rooyen, Tineke Water, Shayne Rasmussen, Kate Diesfeld

96
Maxillofacial fractures at Waikato Hospital, New Zealand: 2004 to 2013
Blake K Moore, Ryan B Smit, Angus N Colquhoun, W Murray Thomson

VIEWPOINT
103
A bug in the ointment: topical antimicrobial usage and resistance in New Zealand
Deborah A Williamson, Stephen R Ritchie, Emma Best, Arlo Upton, Alison Leversha, Alesha Smith, Mark G Thomas

CLINICAL CORRESPONDENCE
110
Successful conservative management of campylobacter cholecystitis occurring post chemotherapy and rituximab: a rare disease entity
Ajay Gupta, Louise Teo
LETTERS

113
Over five years on, we still don't need a pilot bowel cancer screening programme: Please just get on with it!
Guy Hingston

116
Modelling of tobacco endgame interventions: a response
Richard Edwards, Tony Blakely, Frederieke van der Deen

METHUSELAH

119
100 YEARS AGO
120
Post mortem examinations a public service

PROCEEDINGS

122
Selected proceedings of the APAC Forum 2015
Infrequent condom use with casual partners among New Zealand gay and bisexual men

Peter J Saxton, Nigel P Dickson, Anthony J Hughes, Adrian H Ludlam

In 2014, the highest number of gay men were diagnosed with HIV in New Zealand. Our study examined condom use in a large and diverse sample of this population. Of those having intercourse with casual partners, a quarter (27.2%) reported infrequent condom use. Attitudes to condoms and exposure to condom promotion predicted condom use, among other factors such as adoption of condoms early on in life. Internet dating sites are common places to meet sexual partners. The relationship these commercial sites have with HIV prevention and public health agencies is mixed. Cooperative models where dating sites are partners in prevention should be developed. HIV and many STIs are asymptomatic communicable infections. Like vaccination, high levels of condom use are needed to control transmission within communities. The increases in HIV and STI diagnoses seen in New Zealand provide early warning of riskier behaviours happening.

Thirty years of condom-based HIV prevention by gay men in New Zealand

Anthony J Hughes, Peter J Saxton

Three decades after the first government-funded HIV prevention campaign in 1985, gay and bisexual men remain the population most at risk of infection in New Zealand. We review the major reasons why this is the case and describe the approach that has been taken to HIV prevention here. We have a good international record in HIV prevention for gay men, however new HIV diagnoses rates are increasing once again around the world. Lessons from the first three decades must underpin future HIV control efforts and additional intervention strategies will also now be required.

The first 30 years of HIV in New Zealand: Review of the epidemiology

Nigel Dickson, Bible Lee, Timothy Foster, Peter Saxton

New Zealand has a well-described low prevalence epidemic of HIV infection, mostly concentrated in sub-populations of men who have sex with men (MSM), and heterosexual individuals from sub-Saharan Africa and South-East Asia. The former is largely due to transmission within New Zealand, whereas the latter mostly occurred overseas, although the difference has been less marked in recent years. The number of notified cases of AIDS peaked in the late 1980s, and dropped dramatically in the mid-1990s due to the introduction of effective antiretroviral treatments. Presently most cases of AIDS are in people with previously undiagnosed HIV infection. In contrast, currently the annual number of diagnoses of HIV infection is higher than in the late 1990s due to more occurring among MSM. Over the past 30 years each sub-epidemic has demonstrated a distinct pattern reflecting different determinants. Control of HIV in New Zealand is favourable compared to many countries, however challenges remain, especially in prevention among MSM and more timely diagnosis for all, especially those heterosexually infected.
Drug misuse in sport: a New Zealand perspective
Andrew Curtis, David Gerrard, Peter Burt, Hamish Osborne
Drug misuse in sport is an international phenomenon that has not escaped the attention of health professionals in New Zealand. Young athletes are vulnerable to the use of performance-enhancing substances and the increasing use of sports supplements reflects a particularly worrying trend fostered by unscientific endorsements. Drug-Free Sport New Zealand is the national anti-doping agency responsible for the oversight and education of our athletes in an environment where sport is an integral part of our culture. Doctors responsible for the care of athletes have an obligation to respect the Code of the World Anti-Doping Agency.

What makes a child a ‘competent’ child?
Amanda van Rooyen, Tineke Water, Shayne Rasmussen, Kate Diesfeld
To give informed consent to healthcare in New Zealand, competence is a requirement. A person needs to understand the nature, purpose and consequences of treatment and non-treatment in order to give a legally valid agreement to healthcare. However, New Zealand law is unclear on this matter where children are concerned. Although not overtly stated, New Zealand law infers that children under the age of 16 years may give or withhold consent to healthcare, independent of their parents, so long as they are competent to do so. This article raises the questions; what is ‘child competence’, why is it so important to acknowledge and how do healthcare professionals assess for child competence? Unfortunately, there is meagre research in this area and no clear answers. The assessment, recognition and respect for a child's level of competence not only supports ethical arguments regarding respect for their rights and personhood; it has other more tangible benefits to both the child and healthcare services. These include improved treatment adherence, clinical effectiveness, health service delivery and disease prevention. Therefore, this article addresses how these benefits can be realised through a better understanding and assessment of children's abilities to participate in and consent to healthcare.

Maxillofacial fractures at Waikato Hospital, New Zealand: 2004 to 2013
Blake K Moore, Ryan B Smit, Angus N Colquhoun, W Murray Thomson
The rate of facial fractures presenting to Waikato Hospital has been increasing since 1989. In addition the rate of violence-related facial fractures is now at almost double the rate seen in 1998-2000. It continues to be the dominant cause of injury, while road traffic accident related fractures are decreasing. This continual increase in fractures presenting to Waikato Hospital places significant demands on scarce clinical resources, such as operating theatre time and staffing numbers. Violence is an escalating cause of facial fractures that requires urgent and interventional public health prevention strategies.

A bug in the ointment: topical antimicrobial usage and resistance in New Zealand
Deborah A Williamson, Stephen R Ritchie, Emma Best, Arlo Upton, Alison Leversha, Alesha Smith, Mark G Thomas
New Zealand has extremely high rates of bacterial resistance to topical antibiotics such as Bactroban and Foban. This is because we use a lot of these antibiotics. In this article, we look at who gets prescribed topical antibiotics in NZ, and suggest some ways in which we might control and reduce rates of resistance.
SUMMARIES

‘Real-time’ burden of community and healthcare-related infections in medical and rehabilitation patients in a public hospital in Auckland, New Zealand

Kerry Read, Hasan Bhally

This study, performed in a single public hospital in Auckland which does not provide acute surgical services, shows that a high proportion of patients admitted to hospital have a diagnosis of infection as the main or a secondary reason requiring admission—the common types being chest, urine and skin infections. It also confirms the previous finding that hospital acquired infections are relatively common with approximately 1 in 10 patients acquiring it during their hospital stay.

Late-life self-harm in the Waikato Region

WA de Beer, J Murtagh, G Cheung

This paper looked at the attributes of late life suicide attempts i.e. in the group over 65 years of age, in the Waikato region. Elderly people identified that concomitant medical conditions and depressive illnesses were important stresses contributing to their self-harm attempts. The study highlighted some important strategies for identifying and better managing elderly people who may attempt suicide in the future.

Prescriber compliance with renal function monitoring in patients taking dabigatran (Pradaxa)

Katie Thorne, Stephen Dee, Sisira Jayathissa

Dabigatran, a novel anti-coagulant medication, has been licensed for use in New Zealand since 2011. It is a drug that is mainly cleared by the kidneys and if the kidney function becomes impaired there is an increased risk of bleeding. Current guidelines advise checking kidney function before prescribing dabigatran and at least once a year following this. This study looked at whether patients had their kidney function checked in accordance with these guidelines. We identified one third of patients did not have their kidney function checked at least once a year. Many of these patients were elderly and or had pre-existing kidney impairment. We advise that further measures should be implemented to improve kidney function testing. One method might be to introduce an automated electronic reminder.
HIV prevention today: with coordinated action, we can end transmission

Peter J Saxton, Anthony J Hughes, Massimo Giola

New Zealand has an enviable international record in HIV prevention, with diagnosis rates for most-at-risk groups being among the lowest in the world.\(^1\) HIV infection is now treatable, affected communities have established cultures of risk reduction,\(^2,3\) and laws and policies have mostly been aligned to support prevention.\(^3\)

Successes so far cannot be allowed to engender complacency. HIV transmission is preventable, but not declining; an HIV diagnosis is still life changing, and HIV medication is expensive. Government funding for antiretroviral therapy (ART) alone has risen from $14.5 million in mid-2010 to $26.4 million by mid-2014 (prior to PHARMAC discounts) for a relatively small number of patients.\(^4\)

Warning signs of a reversal in control in New Zealand are becoming apparent. Last year 117 gay and bisexual men (GBM) were newly diagnosed with HIV infection—including 86 who were infected here—the highest annual number ever recorded.\(^1\) The proportion of GBM engaging in unprotected casual sex, although low by international standards, increased in 2014.\(^2\) Infectious syphilis cases among GBM reported by sexual health clinics doubled in 2014 in some regions including Auckland, and the number of rectal gonorrhoea cases reported in males rose from 31 in 2010, to 121 in 2014;\(^5\) both are proxies for changes in risky sexual behaviour. The small number of HIV infections acquired heterosexually in New Zealand is incrementally rising.\(^1\) In many countries, we are watching HIV prevention in GBM unravelling, spurring an urgency to adapt our own responses now, before the achievements of the past 30 years are squandered.

If we do adapt quickly we can virtually eliminate HIV transmission in New Zealand, and be the first country to do so. This will take revived political will and adequate resourcing. While 2014 brought harbingers of a worsening epidemic phase, scientific breakthroughs this year, 2015, gave us the tools to constrict transmission through multi-pronged interventions if we respond boldly.

We call this approach ‘comprehensive prevention’, and five locally relevant action points are summarised in Table 1.

First, condom-based HIV prevention for GBM, who remain most at risk in this country, must continue and become even more sophisticated. This is because barrier protection responds so well to qualities of HIV transmission during sexual behaviour, because it is cheap, and because it is easily scaleable.\(^3\) Second and third, we must deploy the full repertoire of treatment-based prevention interventions, particularly immediate ART on diagnosis to minimise HIV transmission risks from those infected, and pre-exposure prophylaxis (PrEP) to minimise HIV acquisition risks for the subset of uninfected individuals at highest risk of exposure. Fourth, HIV testing access and frequency must be improved to provide timely pathways into these twin treatment-based prevention levers. Fifth, vaccination against sexually transmitted infections (STI) such as HPV, HAV and HBV needs to be expanded to all at risk groups, and screening and treatment practices must be enhanced, because of the synergies between STI and HIV control.

Together, these action points synchronise condom-based and treatment-based HIV prevention strategies to reduce the reproductive rate of HIV below replacement. The possibilities of this approach were recently modelled in Australia, where a 44% reduction in HIV diagnoses nationally was estimated in the first year if condoms, ART and PrEP were mobilised in tandem...
Table 1: Five actions to eliminate HIV transmission in New Zealand

<table>
<thead>
<tr>
<th>Action</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Increasingly sophisticated promotion of condoms for protection against HIV and STIs during anal and vaginal intercourse</td>
<td>To interrupt HIV and STI transmission</td>
</tr>
<tr>
<td>(2) Immediate access to HIV antiretroviral treatment post diagnosis</td>
<td>To minimise infectiousness and maximise personal wellbeing of individuals with confirmed HIV infection</td>
</tr>
<tr>
<td>(3) A Government-funded programme of voluntary pre-exposure prophylaxis (PrEP) and quarterly STI screening for the minority of high risk individuals who are unable to sustain consistent and correct condom use during anal and vaginal intercourse</td>
<td>To target the most at risk individuals who play a disproportionate role in fuelling the HIV epidemic</td>
</tr>
<tr>
<td>(4) Prompt HIV testing following intercourse without a condom by rapid testing and potentially home HIV testing or home HIV sampling</td>
<td>To reduce the number with undiagnosed HIV infection</td>
</tr>
<tr>
<td>(5) Improved access to comprehensive STI screening, treatment and vaccination</td>
<td>To control resurgent STI epidemics that synergise with HIV control</td>
</tr>
</tbody>
</table>

There is government enthusiasm to achieve this across the Tasman; New Zealand cannot afford to merely watch and wait. Fortunately, New Zealand has an excellent platform to launch a new phase in our epidemic response, being a low HIV prevalence country with a committed HIV workforce and enjoying the small scale that enables coordinated action. But, we will also need more allies. Regulatory change is urgently needed to remove PHARMAC’s CD4 prescribing obstacle for ART for individuals with confirmed HIV infection, and bring it into line with new WHO guidelines. Protocols for prescribing targeted PrEP to uninfected high-risk individuals need to be accelerated. Funding for NGOs at the frontline should match the increased capacity needed to add testing and PrEP and STI screening promotion onto condom promotion. Research, surveillance and evaluation of the HIV sector’s performance must be resourced on a sustainable basis. Inadequate responsiveness to health issues affecting GBM must be corrected, and greater inclusivity of sexual orientation minorities fostered. And the ongoing stigma surrounding people living with HIV must be stridently challenged—while not diminishing the threat that HIV poses—if we are to motivate individuals to engage with enhanced HIV screening and care options.

Adding ‘test and treat’ approaches to condoms and behaviour change can dramatically alter the trajectory of the HIV epidemic in New Zealand; we discuss some opportunities and challenges.

## Opportunities

### Treatment for confirmed HIV infection

In July 2015, two studies confirmed that early treatment of HIV infection is critical for optimising long term health. Notably, the START study reported that the risk of developing serious illness or death was 57% lower among those treated early when CD4+ counts were above 500 cells/mm3, compared to those in the deferred group treated when their CD4+ counts declined below 350 cells/mm3. Early ART initiation also showed minimal or no increase in adverse events. The WHO and other international bodies now recommend access to ART for all individuals with confirmed HIV infection regardless of CD4+ count, and New Zealand must urgently follow suit. In 2015, the prevention benefits of ART were also confirmed. In final results from a large trial of HIV discordant, mostly heterosexual couples, ART conferred a 93% protective effect on transmission. Interim analyses of two further cohort
Editorial

studies in 2014 and 2015 found no HIV transmissions between HIV discordant gay male couples where the HIV infected partner had an undetectable viral load.\textsuperscript{16,17} Although a low rate of transmission cannot be ruled out, ART undoubtedly offers a strong preventive effect at the individual level with full adherence.

**HIV pre-exposure prophylaxis (PrEP)**

PrEP is the daily use of HIV antiretroviral drugs, such as Truvada, by confirmed HIV negative individuals to reduce the likelihood of HIV acquisition.\textsuperscript{13} PrEP should be taken 5–7 days prior to anal intercourse to achieve optimum protective concentrations and adherence is key for lasting impact. In the iPrEx trial among GBM, PrEP was 44% protective overall, with an adherence-adjusted protection of 92%.\textsuperscript{18} Taking tablets 4 or more days a week appears to achieve full protection.\textsuperscript{19} Interim results of two subsequent clinic-based studies in 2015 (PROUD\textsuperscript{20} and Ipergay\textsuperscript{21}) both reported an overall 86% protective effect.

WHO has now recommended PrEP in populations where HIV incidence exceeds 3 per 100py,\textsuperscript{13} and Australia has several demonstration projects underway among high risk GBM. This includes individuals reporting any of the following in the last 3 months and who are likely to continue this behaviour in the next 3 months: i) an HIV positive partner with whom condoms were not used; ii) receptive anal intercourse with a casual male partner of HIV positive or unknown status; iii) a bacterial rectal STI; iv) methamphetamine use.\textsuperscript{6} Participants in most projects internationally represent a high-risk subset of GBM with low rates of condom use, multiple partners, and high baseline and incident STIs.\textsuperscript{22} Preliminary data suggest that in a high HIV incidence setting, such as the UK, temporary and targeted PrEP to high-risk individuals can be cost effective, or even cost saving, when compared to the cost of lifelong HIV treatment of people whose infection could have been averted, although this depended heavily on assumptions about uptake and future drug discounts.\textsuperscript{23,24} New Zealand needs local data describing anticipated PrEP uptake so that the same cost/benefit calculations and eligibility can be assessed.

**HIV testing**

HIV testing has to improve to fully realise the public health benefits of HIV treatments at the population level, as neither ART nor PrEP can be offered in absence of confirmed HIV status. Of paramount importance is reducing the number of individuals with undiagnosed infection, estimated to be around 600 in New Zealand,\textsuperscript{1} based on a 2011 study that found 1 in 5 HIV positive GBM were unaware they were infected.\textsuperscript{25} Currently, 42% of GBM report having tested in the last year.\textsuperscript{26} A 2015 preliminary study modelled that the estimated 10.3% of Australia’s HIV infected population who remain undiagnosed contributes 44.9% of onward HIV transmissions.\textsuperscript{27} Shifting undiagnosed individuals into clinical management and reducing their viral load through ART as soon as possible is consequently a high priority for HIV control as well as for their own care. Testing access, testing uptake, testing frequency and exploration of new testing technologies, such as home testing or home sampling, therefore need to be key targets in the new HIV prevention era.

**Challenges**

**ART: Matching promise with practice**

Against the undisputed prevention promise of treating HIV positive individuals, ‘test and treat’ approaches have to overcome several hurdles. HIV testing is essential to identify those infected, and increases both in coverage and frequency can reduce HIV incidence.\textsuperscript{28} However, even more frequent testing of all GBM may not intervene soon enough to halt the epidemic, because a small proportion of individuals typically drive clusters of transmission,\textsuperscript{29} the gap length between sexual partners for these men can be very brief, and a large fraction of transmissions therefore occur in the highly infectious period following HIV infection, but prior to testing.\textsuperscript{26} Even in societies with high rates of HIV testing, such as GBM in Australia,\textsuperscript{31} the median time from infection to diagnosis is estimated to be 1.4 years,\textsuperscript{32} implying that those who test often are not always those most at risk. In New Zealand, over a third of GBM newly diagnosed are diagnosed late,\textsuperscript{1} and around half of GBM...
engaging in risky sex in the last six months had not tested since that episode. Increased HIV testing promotion and newer HIV testing technologies should be responsive to the needs of these individuals first.

Then a number of milestones need to be met, such as linking and retaining those diagnosed into specialist care, ensuring treatment access and adherence to medication, and sustaining undetectable viral load. Attrition occurs at each step in this “HIV-care cascade”, and no country to date has achieved the UNAIDS target of 73% of HIV infected individuals having undetectable viral load, although cities such as Stockholm provide a model to emulate. Maintaining access to a range of affordable, effective and tolerable HIV medication as trade agreements are negotiated will also be an important government goal in order to meet the needs of all HIV patients.

Modelling from the UK in 2015 helps us visualise possible targets. Achieving 90% of all HIV infected GBM diagnosed, treated and undetectable within one year of infection would require a more than trebling in the annual number of HIV tests conducted (to 65% of all GBM tested annually), ART being initiated on diagnosis, and retention in care and treatment adherence remaining high and not declining. This would reduce HIV incidence by 79% by 2030, push the epidemic below replacement long term, and be cost effective. Each additional 10% of HIV-infected GBM virally suppressed from the current situation of 58% equated to 37% fewer HIV infections per year.

These potential epidemiological gains from ‘test and treat’ can be counteracted if condom use deteriorates. If the optimistic rhetoric surrounding HIV treatments reduces condom use by a mere 10%, and yet HIV testing levels and ART initiation do not improve, HIV incidence is predicted to double in 15 years. Increases in condomless anal sex can trigger resurgent STI epidemics that are serious in their own right and heighten HIV transmission and acquisition risks. Moreover, a singular focus on HIV testing as the entry point into HIV prevention is also arguably unethical, as it will have delayed intervention until after infection has already happened, neglecting opportunities for earlier condom-based primary prevention. Undoubtedly, the best outcomes will be achieved when condom-based and treatment-based HIV prevention are mutually reinforcing and do not undermine each other. For all these reasons, increased promotion of HIV testing and early treatment must not erode condom advocacy.

**PrEP: uptake, targeting and equity**

Likewise, we need to motivate the most at risk individuals to attend medical clinics if we are to fully capitalise on PrEP. PrEP is a programme, not simply a prescription, involving a high level of clinical monitoring, including regular HIV and STI screening, drug adherence and adverse events, and ongoing safe-sex counselling. Cost-effectiveness will vary by setting and eligibility criteria, being influenced by background HIV incidence and local healthcare costs. It is unclear whether PrEP is a temporary or long-term option for some individuals, and under what circumstances it will be ceased. Affordability is a pressing issue, as Truvada is currently an expensive on-patent medication. Targeting will be necessary to minimise PrEP uptake among low-risk individuals, conserve drug stocks, and avoid drug resistance developing.

There are also concerns about reductions in community-wide condom use, and increases in STIs, resulting from perceptions that the combination of PrEP and ‘test and treat’ have already eliminated HIV acquisition risks, regardless of the actual level of population scale up. Scant consideration has so far been given to equity, despite evidence of uneven access to HIV services within GBM communities particularly by ethnicity, and low rates of sexual orientation disclosure, both of which are required before PrEP can be offered. Unlike a condom, PreP is a pill that has to be taken for several days prior to sex in order to build up protective levels, making it an unverifiable intervention for casual sex partners. This raises important issues of power asymmetry during sexual encounters, as it relies on people communicating honestly and without coercion in the heat of the moment. Nevertheless, if tightly targeted to the most at risk and motivated individuals, PrEP has considerable potential to improve HIV control by interrupting chains of transmission in the most vulnerable subsets of the community.
Accommodating both public health and clinical medicine

The championing of pharmaceuticals for HIV prevention, as well as for HIV care, has shifted the momentum internationally towards clinic-based HIV control. This emerged after 1996 with the effectiveness of the first triple combination ART and hastened following the influential clinical trial results from the HPTN 052,15 iPrEx16 and PARTNER16 studies in the last 5 years. However, some public health practitioners have challenged the privileging of such trials as the gold standard for scientific decision making about interventions in real-world communities. Shelton, for example, has argued that the issue is not only whether an intervention (such as HIV treatment) is efficacious in an RCT, but if it can be made to work practically at scale, be additive rather than zero-sum against other interventions, and be sustained over long periods given available resources and capacity.9,7 Situational variability means that successful interventions may not translate faithfully elsewhere. In this view, ‘what works’ is deducing the optimal combination of interventions for local conditions.37 Research on New Zealand-based experiences would sharpen implementation and help avoid unintended effects.

Avoiding disinvestment in community-based HIV prevention

Disinvestment in behaviour-based HIV prevention programmes has correspondingly become a concerning trend internationally. In the mid-1990s, a contraction in high-level investment and coordination in several Australian jurisdictions, but not in New South Wales, preceded an increase in HIV notifications.38 In England, GBP 2.9 million was spent on national HIV prevention programmes in 2011/12 and reducing, less than half a percent of the GBP 762 million spent on treatment and care and rising.39 Since 2011, government funding for the New Zealand AIDS Foundation (NZAF) has been static (around $4.2 million),40 while HIV treatment expenditure here has risen 57% to $26.4 million.4 The reallocation of HIV funding portfolios towards clinical services overseas has typically been justified by claims of condom-based ‘prevention failure’, because HIV diagnosis rates have not declined.

Community-based advocates in response have pointed to the gradual erosion of an already imbalanced funding quota and the inevitably diminished population-level impact of their work. Economic analysis commissioned by NZAF suggests that investment in HIV risk behaviour change is cost effective,41 but primary prevention will only succeed if delivered at sufficient intensity. And while the substantial investment in HIV clinical medicine has transformed life expectancy for people living with HIV, and treatment has high individual-level prevention efficacy, public health researchers have noted that pharmaceuticals have not so far been a panacea for controlling HIV at the population level.42 Given finite resources, analyses remind us that investment in community-based education is still more cost-effective than ART, and ART is more cost-effective than PrEP.43

Medicalisation of HIV prevention

These shifts have heralded a growing medicalisation of HIV prevention. Some social researchers have argued that clinic-based prevention models privatisate HIV and remove it as a subject of public discussion, debate and action—the latter being foundations of the early, effective, community-based HIV response.42 Medicalisation also tends to position GBM as patients and consumers of diagnostic technologies and pharmaceuticals. Those may be easier identities for the health system to engage with, but it can bypass the topic of sex and sexuality, and sterilises discussions of HIV prevention. In doing so, medicalisation de-emphasises the agency of gay men and other groups to safeguard their own sexual health, and avoids the need to address vulnerabilities driven by social marginalisation.

Furthermore, difficulties achieving the necessary scale, clinical linkage and retention, medication affordability, access and adherence have to date limited the full public impact of pharmaceutical-based prevention interventions.31 These are the same criticisms often levelled against behaviour-based programmes: both require repeated actions to be effective (testing and taking medications regularly; using condoms consistently). Unsurprisingly, some individuals are reluctant to have their sexual lives revolve around clinic appoint-
ments and medication, in much the same way that some men discontinue regular condom use.

**Conclusion**

HIV infection is avoidable and unnecessary. Today's prevention tools offer the possibility of virtually eliminating HIV transmission if we can re-activate the spirit of cooperation that defined New Zealand's early successes. This task now calls for a partnership for prevention: a strategic cooperation between community-based primary prevention (condom promotion), clinic-based primary prevention (PrEP)\(^4\), and clinic-based secondary prevention (‘test and treat’). We must deliver this in a way that maximises, not compromises, the effectiveness of each of these approaches. This recognises that effective clinic-based prevention is dependent on vigorous community-based promotion of testing; similarly, effective community-based condom promotion must be supported by advocacy for continued condom use in the clinic setting. Once such a programme is established, the most challenging task will then be to maintain it over long periods of time, galvanising ongoing political commitment and community engagement, until a sterilising vaccine or cure eventually becomes available.

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Drug misuse in sport: a historical perspective

David Gerrard

ABSTRACT

This editorial draws comparisons between the recent revelations of drug misuse in Russian sport, and the State-sponsored programme of the former German Democratic Republic. While 50 years separates these two regimes, there are commonalities. The history of major incidents involving drug abuse by serious national players in sport suggests a 20-year cycle, with the GDR, China and now Russia employing similar strategies. These events underscore the value placed upon international sporting success by politicians.

Recent doping revelations, implicating Russian athletes, have focused unfortunate, yet familiar, links to elite, contemporary sport. In December 2014, a German television documentary suggested that State-sponsored doping practices were embedded in Russian sport, involving members of the wider ‘athlete entourage’. Spurred by the clamour from an uneasy international sporting community, the World Anti-Doping Agency (WADA) appointed an independent Commission of Inquiry, and one year later the outcomes of their investigation are now in the public domain. The authors of this report have declared a “...deep-rooted culture of cheating...” centred primarily on track and field, but pointing the finger at the Moscow-accredited Laboratory. Prominent sports physicians, scientists, coaches, laboratory personnel and high-ranking officials have been identified in a clandestine collaboration reminiscent of the East German regime of the 1960s. Further, the Report describes State complicity in an orchestrated programme of sports drug misuse with clever cover-ups that hoodwinked the sporting public. These revelations now cast an ominous shadow over the unprecedented success of named Russian medalists at the 2012 London Olympics. Downstream consequences for Russian participation at next year’s Olympic Games in Rio de Janeiro are currently under scrutiny by the International Olympic Committee and the International Athletics Federation.

Pessimists would say that none of this comes as too much of a surprise. After all, history reflects examples of episodic, endemic drug misuse by major sporting nations in approximately 20-year cycles. In the decades between 1960–1980, the former German Democratic Republic (GDR) became responsible for a programme known officially as State-Plan 14.25, sanctioning the delivery of various performance-enhancing drugs to young elite athletes. This was linked to an innovative national scheme of talent spotting that employed special ‘sport schools’ (Kinder und Jugendsportschulen) from which East German stars of the future would emerge having undergone a battery of physiological testing. The consequent, unparalleled Olympic success of female East German athletes in swimming and athletics of the period was deemed a positive reflection of advanced talent-recognition, cutting-edge sport science, specialised coaching and specialist sports medicine. International observers of the time looked enviously at the GDR, but what was not known at the time was that the success of their athletes had been ‘underwritten’ by the use of performance-enhancing drugs.

As if we needed further reminding, sport was indeed a powerful political tool. Much earlier, the so-called Nazi Olympics of 1936 illustrated the potency of major international sport, well ahead of contemporary technology that provides instantaneous updates and dissemination of results. Concerned observers in 1936 were quick to record “… from the proliferation of Nazi emblems around the Olympic stadium, to
the mass Nazi salute from the huge crowds, to the esteemed place of Games Patronage bestowed upon Hitler himself, the Berlin Games remain tainted by a propaganda and political overtone that leaves little doubt as to the political purpose of this sporting occasion. The film of the Berlin Olympics produced by Leni Riefenstahl, regarded by many as the most outstanding cinematic record of any Games, demonstrates the dramatic influence of the Nazi Party, prolific in the presence of the ubiquitous swastika.

And so, until the late 1980s, the GDR rose from comparative athletic obscurity to emerge as one of the most successful sporting nations in history. International prestige, closely aligned with sporting success, became a mechanism to promote socialist policy. GDR athletes of the period were likened to “...missionaries validating the superiority of socialism over capitalism ...

However, the ergogenic influence of agents, including anabolic androgenic steroids, was not formally divulged until the reunification of Germany, when official reports of the East German Ministry for State Security (Stasi) were released to the public. Bioethical considerations for the long-term health consequences of drug administration to young women escaped the judgement of those driving this regime. Chronic anabolic androgenic steroid use, linked with increased risks of cardiovascular disease, liver problems, violent mood swings, virilisation in females and a clear link with certain forms of cancer were highlighted by subsequent prosecutors. It would seem that GDR physicians held little regard for these consequences. The world of clinical medicine and sport science still reels from the revelations. In this contemporary human experiment by the GDR, “...government policy, measured in gold medals, gave scant regard to human suffering and permanent disability.”

In 1984, China—after an absence of 32 years—heralded its return to the international sporting fold with remarkable success at the Los Angeles Olympic Games. Chinese athletes won 15 gold medals across a number of sports, placing them fourth on the international medal table. The rapid rise of Chinese female athletes, particularly in swimming and athletics, drew closer inspection from the international federations governing swimming (FINA) and athletics (IAAF). A few years later, authorities uncovered widespread drug misuse implicating several coaches, many of whom had links to the former East German sports regime. Although not politically sanctioned, there were strong comparisons made of many techniques reminiscent of the former GDR.

Comparisons between the actions of the Russian Ministry for Sport and the State-sanctioned policies of the former East Germany remain valid, despite the intervening 50 years. The relationship between physician and the athlete-patient is articulated by the International Olympic Committee and embodied in the Olympic Movement Medical Code. This includes an overarching statement of safety, ensuring that, “... sport is practised without danger to the health of athletes and with respect for fair play and sports ethics.” And further, the relationship between athlete and healthcare provider is “... subject to mutual respect”.

Typical of the attitude adopted by most countries is the 2010 statement of the Medical Council of New Zealand. Entitled “Prescribing performance-enhancing medicines in sport”, this states:

“Any doctor who knowingly prescribes, administers, traffics, supplies or otherwise assists in the use of prohibited substances, for the deliberate purpose of enhancing sports performance and helping a sports person to cheat, may be subject to disciplinary proceedings and may be liable to a charge of professional misconduct.”

The autonomy of physicians to practise safely and in the best interests of their patients should never become influenced by external, non-clinical agents. At the highest level in New Zealand, those in positions of sports medical leadership remain unconstrained to provide athletes with appropriate, quality care. While politics and sport remain irrevocably linked, what appears to have occurred in the context of Russian sport can never be condoned. In contrast, the antics of our political leaders basking in the Rugby World Cup success of the All Blacks are trivial by comparison and raise nothing more than a wry, somewhat embarrassed grin.
EDITORIAL

Competing interests:
Dr. Gerrard reports he is currently the Chair of the World Anti-Doping Agency (WADA) Therapeutic Use Exemption Committee and a member of the WADA Health Medicine and Research Committee, both voluntary positions.

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ARTICLE

Thirty years of condom-based HIV prevention by gay men in New Zealand

Anthony J Hughes, Peter J Saxton

ABSTRACT

Three decades after the first government-funded HIV prevention campaign in 1985, gay and bisexual men (GBM) remain the population most at risk of infection in New Zealand. We review the major determinants of the elevated HIV risk for GBM, describe New Zealand’s prevention response over the first 30 years, and summarise the public health record.

HIV incidence among GBM is driven by the heightened biological efficiency of HIV transmission during unprotected anal intercourse, dense sexual partnering networks, and endemic HIV prevalence. Responses in New Zealand have emphasised evidence-based primary prevention by condom use, which were implemented in communities and supported by comprehensive public health action. New Zealand has a good international HIV prevention record among GBM, however HIV diagnosis rates are now higher than they were during the epidemic nadir of the late 1990s. Lessons from the first three decades must underpin future HIV control efforts.

HIV incidence among GBM is driven by the heightened biological efficiency of HIV transmission during unprotected anal intercourse, dense sexual partnering networks, and endemic HIV prevalence. Responses in New Zealand have emphasised evidence-based primary prevention by condom use, which were implemented in communities and supported by comprehensive public health action. New Zealand has a good international HIV prevention record among GBM, however HIV diagnosis rates are now higher than they were during the epidemic nadir of the late 1990s. Lessons from the first three decades must underpin future HIV control efforts.

Human Immunodeficiency Virus (HIV) is a dangerous and tenacious pathogen which is responsible for one of the worst pandemics in recorded human history. Globally, 37 million people are living with diagnosed HIV infection, 40 million have died from AIDS-related illnesses, and 2 million were newly infected in 2014. While it is true that anyone can be infected by HIV, the full impact has been uneven, with some populations bearing a disproportionate burden. In particular, HIV has shown itself to be extremely well adapted to sexual transmission between gay men.

New Zealand’s response to HIV in the 30 years since the first government-funded prevention campaign in August, 1985, has been effective, and we have a good international record. Among gay, bisexual and other men who have sex with men (GBM), this has been achieved by a condom-based primary prevention approach delivered through communities, supported by the creation of enabling environments, and implemented in partnership with clinical services. Advances in antiretroviral treatment have further extended HIV prevention possibilities. Until a vaccine is discovered—and this search is now also three decades long and counting—condoms, testing and antiretrovirals will inevitably remain the core parts of our armamentarium against HIV because of gay men’s unique nexus of vulnerabilities. As the last overview of prevention in this population was in 1996, we review key principles behind barrier-based HIV prevention for GBM in this country to underline the importance of existing programmes and prepare the ground for future initiatives.

Biological dimensions of HIV’s threat

Universal biological properties of HIV, regardless of its host population, help explain why the world is facing this relentless pandemic (Table 1). Ongoing HIV spread is facilitated by its silent, asymptomatic nature for as much as ten years, its transmission potential during intimate sexual behaviours, and its elevated infectiousness soon after acquisition, when it is frequently unrecognised. Subsequent to infection, a number of biological processes impacting on the immune system define HIV’s threat and distinguish it from most other viral infections. These include an
extremely high genetic variability and capacity for recombination, leading to extensive subtype diversity, and its ability to integrate permanently into the host genome. Over time, this results in profound immune system damage, culminating in death from opportunistic infections and cancers in the absence of timely diagnosis and treatment.

### Gay men’s heightened vulnerability to HIV

No group is more heavily impacted by the sexual transmission of HIV than gay and bisexual men, in whom the first cases were identified. In every region where data are available, GBM have a higher prevalence of HIV infection than the general population. This is seen across diverse settings, such as New York City, where the HIV case rate for GBM is 140 times higher than among heterosexual men, to sub-Saharan Africa, where average HIV prevalence is 17.9% for GBM compared to 5% for all adults, and in low and middle income countries where the odds of having HIV were 19.3 times higher for GBM than the general population. Current global estimates have HIV incidence declining for almost all populations, with the exception of GBM in whom incidence is either static or rising.

New Zealand GBM have also been seriously affected by this epidemic. In studies of sexual health clinic attenders, GBM are 40 times more likely to have HIV than heterosexual men and women. Community studies in Auckland suggest that approximately 6% of sampled GBM are living with HIV, one-in-five of whom are unaware of their HIV-positive status. For those newly diagnosed, over a third are identified late in the course of infection (CD4 count<350, or a median of 4 years post acquisition). Transmission of HIV within New Zealand is concentrated among GBM, who in 2014 accounted for 80% of New Zealand’s locally-transmitted epidemic, despite comprising around 2.5% of the total population. Furthermore, the number of GBM living with diagnosed HIV is growing every year and is estimated to have more than doubled.

### Table 1: Properties of HIV defining its biological threat

<table>
<thead>
<tr>
<th>Property of HIV</th>
<th>Implication</th>
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<tbody>
<tr>
<td>Infection is frequently asymptomatic for many years</td>
<td>Individuals unlikely to be aware they or their partners are infected, may unwittingly transmit virus.</td>
</tr>
<tr>
<td>Highly infectious early acute phase</td>
<td>Hyperinfectious in first 3 months when infection usually unidentified by testing.</td>
</tr>
<tr>
<td>Sexual transmission only possible by specific acts/behaviour</td>
<td>Requires mucosal exposure at certain sites with high density of receptor cells. Not spread casually so individuals can directly control exposure.</td>
</tr>
<tr>
<td>Uneven transmission probabilities</td>
<td>Anal intercourse most efficient, oral sex very inefficient. Transmission most likely during most intimate penetrative behaviour.</td>
</tr>
<tr>
<td>Extremely high levels of genetic variation and potential for recombination</td>
<td>Harder for immune system to control, major challenge for vaccine development, increased risk of developing drug resistance, and risk of superinfection with different strains.</td>
</tr>
<tr>
<td>Integrates directly into genetic material of target cells</td>
<td>Infection is permanent and ineradicable. In latent state, the virus is undetectable by immune system.</td>
</tr>
<tr>
<td>Preferentially infects coordinator cell type in immune system</td>
<td>Central component of immune system is attacked and permanently damaged.</td>
</tr>
<tr>
<td>Conceals presence so immune system does not recognise it</td>
<td>Immune system unable to eliminate HIV infection naturally.</td>
</tr>
<tr>
<td>Increases acquisition and transmission risk of other STIs</td>
<td>Synergistically enhances other STI epidemics.</td>
</tr>
<tr>
<td>Highest mortality of any viral infection other than rabies</td>
<td>If untreated HIV infection is almost invariably fatal.</td>
</tr>
</tbody>
</table>
between 1999 and 2009. In contrast to this hyperendemicity, locally-transmitted HIV in heterosexuals, people who inject drugs, and sex workers in New Zealand has remained at very low levels over more than thirty years.

Three decades is sufficient time to be confident that this disproportionate impact is not an accident of history, but a real phenomenon requiring explanation. It is now clear that the three central reasons are the high biological efficiency of HIV transmission through receptive anal intercourse, the different sexual partnering dynamics seen in GBM communities, and the endemic HIV prevalence that drives high numbers of new infections.

High efficiency of HIV transmission by anal intercourse

Contrary to widespread opinion, most sexual behaviours are inefficient, implausible or impossible modes of HIV transmission. The per-contact probability of infection for different sexual acts varies substantially. This is highest for receptive anal intercourse (RAI) without a condom, which has an 18 times higher probability of HIV transmission compared with receptive vaginal intercourse without a condom. At the other end of the spectrum, oral sex has a very low to negligible probability of HIV transmission and kissing poses no risk. The per-partnership probability for unprotected RAI—the cumulative risk from repeated acts over time—is 40%. These probabilities are also heterogeneous. Amplifying factors for anal intercourse include: sexual position (receptive intercourse being substantially riskier than insertive); the early acute phase of HIV infection (when HIV viral loads are highest and transmission probability is up to 26 times greater than during chronic infection); the presence of other sexually transmitted infections (STIs) that concentrate HIV in semen or immune cells at the site of infection; and circumcision status for the insertive partner. For practical purposes, unprotected receptive and insertive anal intercourse are therefore the only sexual acts conferring a meaningful HIV risk for GBM, and likely account for >99% of sexually-acquired HIV in this population. Furthermore, the excess HIV risk attributable to anal intercourse was highlighted by a recent study: all other things being equal, HIV incidence for GBM would be reduced by 80–98% if the relatively high per-contact HIV transmission probability of condomless RAI was mathematically modeled to be the same as that for condomless vaginal intercourse.

Although early in the epidemic the prevailing wisdom held that physical trauma and blood exposure were the main causes of HIV transmission through anal intercourse, the biological processes behind the elevated risk of RAI are now more clearly understood. Like all viruses, HIV must first come into contact with the specific target cells that it is genetically programmed to infect. For HIV, three main receptors exist (CD4+, CXCR4 and CCR5); CD4+ and one other receptor is required for infection to occur. These receptors are found primarily on helper CD4+ cells in the immune system. The largest number of immune cells (40–65% or more) occur in gut-associated lymphatic tissue (GALT) and the thin anorectal mucosal surface is therefore highly susceptible to HIV infection. High HIV viral loads are seen in the gut mucosa following infection, more than in either blood or semen. Significant damage to the mucosal immune system in the gut persists, even in the presence of long-term antiretroviral treatment (ART). Despite the transmission risks of unprotected RAI, anal intercourse itself is an important sexual activity for the majority of gay and bisexual men, just as non-reproductive penile-vaginal intercourse is a highly valued sexual behaviour for most heterosexual men and women. In New Zealand, over 90% of GBM sampled in community surveys had engaged in anal intercourse at least once in their lifetime. Rates of recent practice with casual sex partners have been rising over the last decade, from 68% in 2002 to 76% in 2011. Half (52%) reported that their first anal intercourse occurred by the age of 20; by age 30 this was 84%. Sexual role versatility is common, with 17% being exclusively receptive in anal intercourse, 30% being exclusively insertive, and 53% reporting both insertive and receptive anal intercourse with casual partners in the 6 months prior to survey. GBM’s unique ability for sexual role reversal (being receptive then insertive, which is not possible in hetero-
sexual intercourse) is significant, as it places an individual at high-risk of acquisition and then subsequently of HIV transmission, accelerating spread across the gay male population.

Sexual networks in gay and bisexual male communities

It takes at least two people to engage in anal intercourse. Consequently, understanding the acquisition and transmission of STIs like HIV requires the study of partnerships, not just individual acts. Moreover, the spread of infection beyond a few isolated cases is shaped by the aggregated and dynamic pattern of these partnerships across a community, which connects infected with susceptible individuals, and defines the potential for ongoing chains of transmission over time. It is this density of sexual connectivity that influences a given community’s overall incidence and prevalence once HIV has been introduced. Likewise, at a personal level, this density situates someone close to or further away from HIV transmission pathways, and in doing so determines the probability that the next sexual partner will have undiagnosed infection. This macro phenomenon is often referred to as a sexual network (its social equivalent popularised in the concept of ‘six degrees of separation’).

Community studies in New Zealand over thirty years indicate that the sexual network of gay and bisexual men differs markedly from that of the heterosexual population. The distribution of sexual partner numbers is right-skewed with a long tail, with a significant proportion reporting high partner numbers (around 10% of sampled GBM report more than 20 partners in the last 6 months). Rapid partner turnover, short-gap lengths between partners, and sexual mixing between individuals in this ‘core group’ can create reservoirs of infection: 19.6% of this group reported an STI in the last year, compared to 4.6% of those reporting one partner. Incursion of HIV and STIs into the core group will be even greater if condom use is inconsistent, affecting risk not only for themselves, but also for GBM with more moderate rates of partner change but who are sexually linked to them. Around half of sampled GBM report a current regular sexual partner at the time of survey (either a boyfriend/husband or friend they have sex with), and over two-thirds report a casual partner in the preceding 6 months. Although many GBM are in monogamous relationships, this overlap leads to approximately half of those in longer-term sexual relationships engaging in sexually non-exclusive behaviour (much of this being mutually agreed). From the early 2000s, internet dating, and more recently geo-location apps, have transformed the sexual marketplace for everyone, but especially for ‘invisible’ minority populations such as GBM, with 53.4% reporting an active profile at the time of survey in 2014, and 63.1% having ever acquired a sexual partner online. These apps have enlarged the pool of potential sexual contacts, and improved the efficiency of partner acquisition, both in terms of its immediacy and the ability to match sexual preferences. Furthermore, GBM surveyed on dating sites report lower testing and condom use and less favourable attitudes to safe sex. While nationally representative surveys overseas confirm that heterosexuals also report many of these sexual behaviours, GBM populations are on average far more likely to do so.

Combined factors create conditions for explosive HIV epidemics

In the absence of effective interventions, viral properties (the high HIV transmission efficiency of unprotected RAI, the high infectiousness of HIV in the early acute phase, asymptomatic infection, and permanent duration of infectivity in absence of cure) combine with behavioural properties (the frequency of anal intercourse, sexual role versatility, and dense sexual networks) to produce explosive HIV epidemics in GBM populations. As epidemics mature over time, the high underlying prevalence of HIV infection in GBM communities propels high ongoing incidence. Furthermore, in many societies, social, cultural and health system factors, such as homophobia and heterosexism, continue to hinder interventions among GBM—such as the provision of relevant safe sex advice and delivery of timely HIV and STI screening. Even when these services are provided, the sequelae of living as a minority—such as social isolation, poorer mental health and
substance use—can impact on gay men’s ability to maintain HIV risk reduction practices.

The speed and scale of HIV’s spread in GBM populations given these conditions is well-documented. Retrospective analysis of a San Francisco GBM cohort identified that 28% were infected by 1981, before AIDS was described, and incidence in 1982 alone was an extraordinary 20%.37 Of those with over 50 partners in the last 2 years, HIV prevalence was 71%.38 In Scandinavia, the estimated reproductive number of HIV among GBM was 15 secondary cases during 1981–2 prior to control efforts.39 Phylogenetic analysis of HIV diagnoses among GBM in the UK revealed that 29% of HIV infections occurred within large clusters and of these, 20% occurred within 6 months of the index case.40 Contact tracing

<table>
<thead>
<tr>
<th>Effective</th>
<th>Condoms prevent HIV transmission at both the individual and community level extremely successfully.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>Straightforward to deploy: acquire the condom, open the packet, put it on and add lubricant.</td>
</tr>
<tr>
<td>Verifiable</td>
<td>Both partners can tell if they are being used, and effectiveness does not depend on accurate communication.</td>
</tr>
<tr>
<td>Safe</td>
<td>No harmful health side effects or capacity to promote genetic resistance to HIV or STIs.</td>
</tr>
<tr>
<td>Controllable</td>
<td>Easily manageable by couples on their own without any professional assistance or follow-up.</td>
</tr>
<tr>
<td>Sustainable</td>
<td>Gay men can maintain consistent condom use for many years, up to three decades so far in New Zealand.</td>
</tr>
<tr>
<td>Inexpensive</td>
<td>Affordable for individuals and governments, and usually provided free of charge in community venues.</td>
</tr>
<tr>
<td>Marketable</td>
<td>Tangible product that can be easily visualised, promoted and distributed.</td>
</tr>
<tr>
<td>Empowering</td>
<td>Enables gay men to have the sex life they want and minimises the need to alter sexual repertoire.</td>
</tr>
<tr>
<td>Acceptable</td>
<td>Most New Zealand gay and bisexual men are using them, especially with casual partners.</td>
</tr>
<tr>
<td>Accessible</td>
<td>Condoms can be made readily available to everyone without prescription or other restrictions.</td>
</tr>
<tr>
<td>Comprehensive</td>
<td>An impermeable physical barrier to HIV that also offers substantial protection against other STIs during anal sex.</td>
</tr>
<tr>
<td>Ethical</td>
<td>Use demonstrates mutual care for sexual partners and commitment to gay community health.</td>
</tr>
<tr>
<td>Scaleable</td>
<td>Can be far more easily rolled out as a population-wide prevention programme than any other available option.</td>
</tr>
<tr>
<td>Universal</td>
<td>Effectiveness does not depend on knowing personal HIV and STI status, or require disclosure to sexual partners.</td>
</tr>
<tr>
<td>Reliable</td>
<td>Quality control is excellent and they fail extremely rarely when stored and used correctly.</td>
</tr>
<tr>
<td>Established</td>
<td>Condom use has been actively promoted to gay men in New Zealand since 1987 and remains widely supported here.</td>
</tr>
<tr>
<td>Complementary</td>
<td>Use does not in any way limit the effectiveness of clinic-based prevention programmes that rely on antiretroviral therapy.</td>
</tr>
<tr>
<td>Timely</td>
<td>Condoms are used only during anal intercourse when HIV and STI transmission risk is highest.</td>
</tr>
<tr>
<td>Convenient</td>
<td>Can easily be taken across borders and carried in pockets.</td>
</tr>
</tbody>
</table>
of a young, newly-infected gay male in Wales uncovered a sexual network of 123 individuals and 15 new undiagnosed HIV cases.41 US projections suggest that even relatively small annual incidence rates of 2.4% can result in 40% of GBM being infected by age 40.42 Similar statistics are currently being observed in nascent gay communities in Thailand,43 China,44 and the Philippines,45 illustrating that the same trajectory of HIV and STI transmission could be repeated now if the lessons of the last 30 years are forgotten.

The prevention response in New Zealand

While GBM remain disproportionately affected by HIV in New Zealand, we have forestalled the worst scenarios described above. Early, comprehensive and sustained interventions based on condom promotion have been central to New Zealand’s favourable record and are summarised below.

The early response

By the middle of 1987, the scientific evidence indicated that only anal intercourse—not other sexual activities or partner numbers, per se—was the primary cause of HIV infection.46 Evidence was also accumulating that condoms, if used correctly and consistently, worked very well to prevent the sexual transmission of HIV.46 These twin developments enabled the New Zealand AIDS Foundation (NZAF) to focus on promoting condom use for anal intercourse as its central prevention strategy from that point. This had several profound implications for control. First, it offered gay men agency over their risk of acquisition and transmission. Second, it required minimal alterations to gay men’s sexual repertoire, making the intervention acceptable and sustainable. Third, it provided a single and easily communicated target for community-led public health efforts. Fourth, it was applicable to all GBM having anal intercourse, regardless of HIV or relationship status, simplifying implementation.47

Since then, condoms have proven to be an extremely effective sexual health intervention because they respond to all the key drivers of HIV spread among gay men previously described (Table 2). As the recent Canadian consensus statement on HIV transmission notes:

“[c]ondoms are a cornerstone of HIV prevention. Latex and polyurethane condoms act as an impermeable physical barrier through which HIV cannot pass. When used correctly and no breakage occurs, condoms are 100% effective at stopping the transmission of HIV because they prevent contact between HIV-containing body fluids and the target cells of an HIV-negative individual.”48

The centrality of condom use has been reiterated in a 2015 UNFPA, WHO and UNAIDS position statement, highlighting that condoms have averted approximately 50 million new HIV infections globally since the start of the epidemic.49

Health promotion

Over the following decade, substantial effort was put into developing a health promotion-based framework for condom uptake, with the aim of removing obstacles to condom use by gay men.50 This utilised the five-sector action framework of the Ottawa Charter: the creation of supportive social environments; healthy public policy; developing personal skills; reorienting health services; and promoting community action.51 Examples included countering anti-gay prejudice, reforming the Human Rights Act 1993, delivering public safe sex campaigns, providing community-based HIV testing and condom distribution initiatives, and establishing the HERO gay community development project. The subsequent success of these initiatives demonstrated the fundamental importance of aligning legal, social, cultural, health and peer incentives towards the public health intervention of condom use by gay men. Health promotion advocacy like this has continued to the present day, with legal decisions such as NZ Police vs Dalley illustrating the importance of the law underscoring rather than undermining public health goals.52

Peer-led and community-based responses

Confronting HIV successfully also necessitated a new approach to public health.
Lacking the usual coercive levers (raising prices, regulating supply or imposing legal sanctions), the principal tool for HIV prevention has been persuading gay and bisexual men to voluntarily adopt risk-reduction behaviours. Although heterosexual allies were, and continue to be vital supporters, it was clear when HIV first appeared that calls to change behaviour as fundamental as intimate sexual practices had to be championed by gay men themselves. Personal access to community institutions and connections with community gatekeepers were required for credible public health advocacy. Peer-based prevention became the principal delivery model, mirroring the informal efforts of gay activists early on.

Similarly, sex between men had been illegal until 1986 and discrimination on the grounds of sexual orientation legal until 1993, leaving many gay men with reasons to be distrustful of government institutions. Governments themselves were often not comfortable developing the sexualised HIV prevention resources that were most effective. This led to the decision that peer-led responses should be community-based and held at ‘arms-length’ from officials in order to foster trust and encourage engagement with prevention services. Funding an independent NGO, such as NZAF, to deliver the majority of HIV-prevention services for GBM has been an important feature of peer-led, community-based initiatives, simultaneously enabling a professionalised response that retained community involvement and accountabilities.

**Increasingly comprehensive approaches**

Taking a broad synopsis of the historical record, Figure 1 encapsulates the strategic approach taken to HIV prevention in New Zealand, the skills that were used, and the health intervention disciplines that contributed. Early responses mobilised HIV awareness in gay communities, utilised scientific evidence to inform GBM about HIV and how to avoid it, and advocated for structural reforms to enable GBM to uptake health-seeking behaviours. These agendas were largely executed by a community development, a health education, and a health promotion approach respectively. Aspects of all this work continue to be necessary as new generations of GBM become sexually active, especially as mainstream media interest in HIV and safe sex has waned. Most recently, condom promotion efforts have intensified using social marketing approaches to achieve more effective scale and frequency.

This has been a response to increasing diversification of social media, and competition involving less effective alternative approaches to HIV prevention (such as expecting a sexual partner to know and disclose their HIV positive status).
The overall public health goal of these efforts over the last three decades has been to use strategy\textsuperscript{51,54} to establish a robust social movement supporting condom use for anal intercourse. This work has direct parallels to the promotion of immunisation against other communicable diseases for the general population. Shared problems include the requirement to maintain high intervention coverage as visible disease burden and public concern declines, and the need to counter opposition (eg, ‘anti-vaxers’ opposed to childhood immunisation and ‘barebackers’ opposed to condom use).

Achievements

Controlling HIV

Epidemiological analyses indicate that New Zealand’s public health record at limiting infection among GBM ranks among the best in the world. By 1997, new HIV diagnoses among GBM in New Zealand had fallen to the lowest number since the peak in 1989 (to just over 20 local infections per year), a result that was maintained until 2001.\textsuperscript{17} Sharp rises in new diagnoses in this country since 2000, four years after the provision of new antiretroviral therapies for HIV and coinciding with the emergence of internet dating, were universally recorded in GBM communities in Western Europe, the UK, US and Australia, implicating shared factors not unique to New Zealand.\textsuperscript{15} A steady state in new HIV diagnoses in New Zealand from 2005 contrasted with continuing increases in many countries.

Condom uptake

Equally, efforts to raise and then maintain condom use for anal intercourse by GBM in New Zealand rate as one of this country’s outstanding public health successes. Retrospective research suggests that condom use at first anal intercourse rose from 28% in 1985 to 83% in 2005.\textsuperscript{27} Behavioural surveillance conducted in community settings indicates that frequent condom use (“always or almost always”) with casual male sexual partners is approximately 85% in the 6 months prior to survey and has been maintained at that level since at least 2002,\textsuperscript{32} albeit with a small decline in 2014. Condom use is consistently lower among regular sexual partners at around a third of GBM, reflecting the contextual nature of safe sex, but still a significant achievement. There has even been support for condom use as a public health approach among GBM who report often not using them.\textsuperscript{55} Factors associated with condom use presented elsewhere in this issue include attitudes to safe sex and exposure to condom social marketing,\textsuperscript{59} emphasising the importance of ongoing public health promotion to maximise adherence.\textsuperscript{57}

Attitudes to HIV and safe sex

Strengthening gay community norms to support condom use has been a key objective in New Zealand since 1987. There is almost universal personal acceptance of condoms as an effective way to avoid HIV transmission, and most respondents also believe that other gay and bisexual men support condom use.\textsuperscript{58} Thus, there is strong evidence of a culture of condom use among New Zealand gay men.\textsuperscript{58} Against this is a growing minority of GBM who do not perceive HIV to be a threat because of new treatments, increasing from 20% in 2002 to 38% in 2014.\textsuperscript{32} Some GBM also continue to report difficulties using condoms, approximately a third report sometimes feeling under pressure not to use a condom, and 1 in 10 report that sex isn’t always as safe as they want it to be.\textsuperscript{32} In the absence of comprehensive condom promotion for the general public in New Zealand, social marketing from NZAF such as LYC (Love Your Condom) has aimed to increase peer expectations for condom use, improve access to free condoms and promote user-efficacy. Countervailing initiatives to maintain condom use will be needed as the visible consequences of HIV infection decline, as the efficacy of treatments to reduce HIV transmission and acquisition risk is promoted, and as internet pornography depicting unprotected sex becomes even more widespread.

Conclusion

Three decades into New Zealand’s HIV epidemic, gay and bisexual men remain the population at greatest risk of infection. As in all countries, the primary biological driver of HIV transmission among GBM is unprotected anal intercourse, spread being sustained by dense sexual networks, coupled with endemic HIV prevalence. Taken together, these factors result in a high number of GBM circulating in the sexual network with undiagnosed
infection. In response, condoms—if used consistently and correctly—are extremely effective in preventing HIV transmission, because they provide an impermeable barrier to HIV during anal intercourse and their protection does not rely on up-to-date knowledge of actual infection status. New Zealand's successful HIV prevention record over many years demonstrates how valuable condom-centred programmes are if delivered at sufficient intensity and at scale, with wide, cross-sectoral buy-in and supported by enabling environments. Condoms also offer a large number of practical advantages over other prevention options, including being the only HIV intervention that simultaneously limits STI spread.

A clear understanding of HIV prevention implementation at the community coalface must underpin strategies for future HIV control. HIV diagnoses among GBM in 2014 were the highest ever recorded in New Zealand, posing urgent questions about the need for additional interventions. New prevention options include HIV antiretrovirals taken as treatment for HIV-positive individuals, or as pre- or post-exposure prophylaxis for HIV-negative individuals, which can substantially reduce HIV transmission risks. HIV testing itself is evolving to offer more rapid and convenient access. Nonetheless, the high transmission efficiency of anal intercourse and the dense sexual networks evident among GBM have not changed, and HIV still has the same basic biological properties. Thirty years later, and in the absence of a vaccine or cure, these consistent features impose limits on the ability of testing-based interventions alone to control HIV among GBM. It is therefore essential that primary prevention barrier methods remain at the center of HIV prevention efforts for GBM, and condom use continues to be strongly supported. Our collective ability to do so will determine the success of the next phase of epidemic management.

Competing interests:
Tony Hughes organised the first government-funded HIV prevention campaign delivered by NZAF in 1985. Since then, he has held the roles of Biomedical Coordinator, Research Director and Scientific Director at NZAF. His primary focus has been on utilising scientific knowledge about the HIV epidemic in gay men to sharpen strategic approaches to prevention. Dr Peter Saxton was formerly Senior Researcher at NZAF from 1997 to 2010 undertaking HIV research, policy analysis and advocacy.

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URL:
REFERENCES:


49. UNFPA, WHO, UNAIDS.


The first 30 years of HIV in New Zealand: Review of the epidemiology

Nigel Dickson, Bible Lee, Timothy Foster, Peter Saxton

ABSTRACT

AIM: To summarise findings of the epidemiology of AIDS and HIV infection in New Zealand.

METHOD: Key results from reports of AIDS and diagnosed HIV infection are presented. Where appropriate, data on HIV diagnoses are reported for the period 2010–2014 to indicate the current pattern of diagnoses.

RESULTS: New Zealand has a well-described low prevalence epidemic of HIV infection, mostly concentrated in sub-populations of men who have sex with men (MSM), and heterosexual individuals from sub-Saharan Africa and South-East Asia. The former is largely due to transmission within New Zealand, whereas the latter mostly occurred overseas, although the difference has been less marked in recent years. The number of notified cases of AIDS peaked in the late 1980s, and dropped dramatically in the mid-1990s due to the introduction of effective antiretroviral treatments. Presently, most cases of AIDS are in people with previously undiagnosed HIV infection. In contrast, currently the annual number of diagnoses of HIV infection is higher than in the late 1990s, due to more occurring among MSM. Over the past 30 years, each sub-epidemic has demonstrated a distinct pattern, reflecting different determinants. HIV among people who inject drugs, sex workers, children and the general population has been restricted to very low levels.

CONCLUSIONS: Control of HIV in New Zealand is favourable compared to many countries, however challenges remain, especially in prevention among MSM, and more timely diagnosis for all, especially those heterosexually infected. National monitoring of the clinical outcomes of people diagnosed with HIV would provide an indication of the provision of effective care and allow international benchmarking.

What is now known as the acquired immune deficiency syndrome (AIDS) was first recognised as a clinical entity in 1981, and the first case diagnosed in New Zealand in 1983.1,2 The human immunodeficiency virus (HIV) was identified as the causative agent in 1984,3 and HIV antibody tests to detect infection became available in New Zealand in 1985.4 Understanding the patterns of the epidemic in the population is important to develop appropriate preventive control and treatment services.5 To this end, AIDS was made a notifiable condition in 1983, however, HIV was not due to concerns this might discourage testing. Coded information on new diagnoses from the laboratories undertaking confirmatory testing for HIV antibodies has been available since this began.

Epidemiological surveillance of AIDS and HIV was initially undertaken by the Department of Health, and since 1989 by the AIDS Epidemiology Group (AEG) based at the University of Otago, Dunedin. The AEG’s surveillance has been centered on case reports of AIDS and newly diagnosed HIV infection, supplemented by HIV prevalence studies in sentinel populations. The AEG has also been involved in surveys of behaviours known to drive the spread of HIV and testing patterns.

Collectively these three components are now known as Second Generation HIV Surveillance.6 While both diagnoses of AIDS and HIV infection are included in surveillance, since the introduction of effective antiretroviral treatment (ART) in the mid-1990s, the information obtained from AIDS notifications has been less valuable in understanding the epidemic of HIV infection than previously.

The findings from the AEG’s surveillance have been regularly reported in the newsletter AIDS—New Zealand, but as there has
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been no recent published review of the New Zealand epidemic, we have taken opportunity of the 30th anniversary of HIV testing in New Zealand to review the current epidemiology.

The aims of this article are therefore to (a) summarise key findings of the current epidemiology based on reports of diagnosed AIDS and HIV in New Zealand, (b) discuss how these, and findings from other sources, inform HIV care and prevention needs among particular groups in New Zealand, and (c) consider important areas for future epidemiological surveillance.

Methods

An individual with HIV infection is defined as having AIDS when he or she first develops one of a number of specific conditions uncommon in people with normal immunity. Clinicians diagnosing AIDS are required to make an unnamed coded notification to the Medical Officer of Health, which are then forwarded to the AEG; the code is based on the individual's initials, gender and date of birth. The information required includes key demographic characteristics, the AIDS-defining condition and likely means of infection.

Since antibody testing for HIV infection first became available in New Zealand in 1985, the number of people newly diagnosed with HIV on the basis of a confirmatory Western Blot (WB) antibody test has been available from the two laboratories undertaking this testing, Auckland City Hospital Virology Laboratory and the Institute of Environmental Science and Research Limited, Porirua. These laboratories have provided the age, sex and likely means of infection of these people when it was provided to them.

The information was sent initially to the Ministry of Health, and since 1989, to the AEG. As with AIDS, information is only supplied to the AEG by code and never identified by name. Since 1996, the AEG has undertaken enhanced surveillance of HIV, whereby further information is sought from the clinician who requested the test.7 The additional information includes the site of and reason for the test, the infected person's ethnic group, district of usual residence, and likely country of infection. The categorisation of the regions is based on the areas covered by the Regional Health Authorities that existed when surveillance of HIV was intensified in the 1990s, with the population of the Northern Region being mainly made up of people living in Auckland. From the beginning of 2002, the laboratories performing HIV viral load (VL) testing have provided the codes—derived in the same ways as for AIDS notifications and HIV information—of people having their first VL test in their laboratory. If it appears through linking of the code to the AEG's HIV database that a person having a VL test had not had a positive HIV antibody test in New Zealand, information is sought from the clinician who requested the VL test. This was established initially to gain information on people being cared for in New Zealand with HIV infections diagnosed overseas, without having had an antibody test in this country. However, VL testing has increasingly been used to confirm new HIV infections, so is now an important source of people being first diagnosed here.

Since 2005, information on the initial CD4 cell count has been requested on people newly diagnosed with HIV infection in New Zealand; initially, this was only among those whose diagnosis was confirmed through WB testing, but subsequently through VL testing, if the infection was first diagnosed in New Zealand. The initial CD4 count gives an indication of the stage of the disease at diagnosis, and when less than 350 cells per cubic milliliter, it is considered a late diagnosis.

To compare the recent epidemic among men who have sex with men (MSM) in New Zealand with that of other high-income countries, the annual diagnosis rate of HIV infection of MSM in selected countries were compared. These diagnosis rates were derived annually for each country from 2004–2013 using the number of diagnoses among MSM as the denominator and the number of men aged 15–64 as the numerator. Details of the method are reported in the Appendix.

Information has been collected since 1998 from paediatricians, via the New Zealand Paediatric Surveillance Unit, on babies born to women with HIV diagnoses at the time of delivery.9
Table 1: Gender, likely means of infection, age (at diagnosis), and ethnicity of people diagnosed with AIDS in 2010–2014 and <2010 and in total.

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MSM = Men who have sex with men.
We present and describe key findings on the reports of AIDS and diagnosed HIV infection. As this is a surveillance report, statistical testing is not undertaken. Where appropriate we have combined data reported over the five-year period 2010–2014 to give an indication of the current pattern of diagnoses.

Results

AIDS

Overall, there have been 1,153 people notified with AIDS to the end of 2014 (Table 1). Just over two-thirds (67.2%) of notifications were among gay, bisexual and other MSM infected through homosexual contact, with men and women infected through heterosexual contact the second largest group (20.7%). The age at diagnosis ranged from less than one to 78 years of age, with a median of 39 years; although for most of these people, infection would have occurred at a younger age, as the median time from HIV infection to the development of AIDS is around ten years in untreated young adults, and shorter in older people.\(^{10}\)

The annual number of diagnoses of AIDS, and deaths of people notified with AIDS, are shown in Figure 1. AIDS diagnoses peaked in 1989 and 1990 with 71 cases, and deaths in 1992 with 66. The dramatic drop in the number of diagnoses in the mid-1990s, which was seen in other high-income countries, is contemporaneous with the introduction of effective antiretroviral therapy (ART).

As well as reducing the number of people with HIV infection progressing to AIDS, treatments available in the mid-1990s resulted in a marked improvement of the survival of people meeting the criteria for AIDS. As an indication of this, of those diagnosed with AIDS in New Zealand in 1990, less that 10% were still alive five years later, while this was the case for over 70% of people diagnosed a decade later in 2000.

Ideally, people are diagnosed with HIV infection before developing serious infections that classify them as having AIDS. However in the period 2010–2014, 74.3% (78/105) had been diagnosed with HIV infection at same time or less than 3 months prior to developing AIDS-defining conditions. Among many of those, an earlier HIV diagnosis and prior ART could have avoided progression to AIDS, so earlier HIV diagnosis could be expected to reduce the annual number of AIDS notifications further.

HIV infection

Information obtained from the HIV testing laboratories indicates that 4,168 people have been diagnosed with HIV in New Zealand to the end of 2014 (Table 2). Of these, 3,452 were through positive WB antibody tests, and 716 through having
Table 2: Likely means of infection of people diagnosed with HIV in 2010–2014, <2010 and total. These figures include people previously diagnosed overseas.

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<td>Heterosexual contact</td>
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<td>Mother to child transmission</td>
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*MSM – Men who have sex with men

Figure 2: Number of people diagnosed with HIV in New Zealand, by year of diagnosis and means of infection. These figures include people previously diagnosed overseas.

VL tests among people not known by the AEG to have had a prior WB test. While scrutiny of codes have been used to detect duplicate reports, these have not always been provided, especially in the early years of testing, so some duplication cannot be ruled out.

The annual number of diagnoses by means of infection is shown in Figure 2. It is important to appreciate that for many, the year of diagnosis will not have been the same as when the infection occurred, so is not an indication of true annual incidence.

As with AIDS, the majority (56.0%) of those diagnosed with HIV were MSM—men infected through homosexual contact—a small number of whom were also reported to have injected drugs (Table 2); the proportion rises to 63.4% if limited to those with a reported means of infection.

The next largest group were heterosexually infected men and women, 26.4% of all diagnosed, and 30.0% of those with a reported means of infection. Notably few people have been definitely or possibly infected through injecting drug use. In 2010–2014, the proportion of diagnoses among MSM has increased to 70.7% of those with a known means of infection.
Gay, bisexual and MSM

Overall, there have been 2,335 MSM diagnosed with HIV. After an initial rise in the annual number in the late 1980s and early 1990s, the number dropped to a nadir in the late 1990s, with a subsequent rise in the early 2000s (Figure 2). While there was a steady increase in the years 2001 to 2005, since then the annual number has fluctuated. The highest ever annual number of MSM was diagnosed in 2014, and could indicate an upward trend in incidence, but it is too soon to conclude this. The overall rise since the early 2000s has been greatest among those infected in New Zealand rather than overseas (Figure 3).

Although the median age for HIV diagnosis among MSM was 37 years, the range is wide, with the youngest being 16 and oldest, 78 years. As well as appreciating that these are the ages at diagnosis not infection, it needs to be kept in mind that this will not reflect the current age profile of MSM living with HIV, which will be older in view of the success of current treatments.

The ethnic profile of MSM diagnosed in the five-years 2010–2014 (Table 3) is broadly similar to that of the male population aged 15–64 in the 2013 census. The higher proportion of an “other” ethnicity among HIV diagnoses is a reflection of people from overseas diagnosed here. The increase in
Table 3: Characteristics of men who have had sex with men (MSM) diagnosed with HIV in 2010–2014, <2010 and total. These figures include people previously diagnosed overseas.

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<td>36.2</td>
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</tr>
</tbody>
</table>

* Information on likely place of infection, ethnicity and usual residence collected since 1996
** Information on initial CD4 count collected since 2005
recent years in the proportion of Asian people likely reflects the changing ethnic make-up of Auckland, where over 50% of newly diagnosed MSM and the HIV epidemic in MSM is concentrated (Table 3).

Overall, of MSM diagnosed in 2010–2014 for whom an initial CD4 count was provided, 36.7% had an initial count of less than 350 cell per cubic mm, hence considered late diagnoses; however, when this was restricted to those who had not been previously diagnosed (many of those diagnosed overseas would have been on treatment) the proportion increased to 42.0%.

**International comparison of HIV diagnosis rates among MSM**

HIV diagnosis rates among MSM from 2004–2013 for the included countries are shown in Figure 4. The rate of diagnosis in New Zealand is lower than many of the countries examined. The US has a much higher rate of HIV diagnosis among MSM compared with all other countries, while the Scandinavian countries of Norway, Sweden and Finland have the lowest. Overall HIV diagnoses among MSM in the countries examined rose slightly from 2004–2013. In New Zealand over this period, the diagnosis rate shows moderate fluctuation as the numbers are relatively small, and the only country showing a sustained substantive drop has been Switzerland.

**Heterosexually infected men and women**

In contrast to the situation among MSM, each year more individuals are diagnosed in New Zealand with heterosexually acquired HIV who were infected overseas, rather than in this country (Figure 5). Figure 5 also shows that there was a marked rise in the annual number in this group in the period 2003–2006, with a subsequent drop over the ensuing five years. This rise and fall was due to an increase, and subsequent drop, in people coming to New Zealand from countries where heterosexually acquired HIV was relatively common, particularly sub-Saharan Africa. While the number of heterosexually acquired infections that have occurred in New Zealand remains relatively low, overall there has been a slight rise since 1996.

Similar numbers of men and women have been diagnosed with heterosexually acquired HIV infection (Table 4). While overall most infections were acquired overseas, the proportion was lower in 2010–2014 (63.1% of all men and women for whom a place of infection was reported), than in 1996–2010, when the comparable proportion was 82.4%, due mainly to a drop in overseas acquired infections rather than a rise in local ones. In addition, in the most recent five-year period, about half of the men (46.0%) and a quarter of the women (28.6%) diagnosed with heterosexually acquired HIV infection were of European ethnicity, a proportional increase from earlier years mainly due to a drop in the number of people of non-European ethnicity. In the period 2010–2014, 61.3% of the heterosexually infected men and 60.3%...
**Table 4:** Characteristics of heterosexually infected men and women diagnosed with HIV in New Zealand in 2010–2014, <2010 and in total. These figures include people previously diagnosed overseas.

<table>
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<th></th>
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</tr>
</thead>
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<td>No. %</td>
<td>No. %</td>
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<td>457 100.0</td>
<td>457 100.0</td>
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<tr>
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<td>15 3.4</td>
<td>5 5.1%</td>
</tr>
<tr>
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<td>39 39.8</td>
<td>60 61.2</td>
</tr>
<tr>
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<td>52 12.8</td>
<td>39 20.9</td>
</tr>
<tr>
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<td>334 82.0</td>
<td>58 75.1</td>
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<td>110 26.8</td>
<td>28 19.1</td>
</tr>
<tr>
<td>European</td>
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<td>110 26.8</td>
<td>28 19.1</td>
</tr>
<tr>
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<td>11 2.7</td>
<td>8 8.2</td>
</tr>
<tr>
<td>Pacific</td>
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<td>10 2.4</td>
<td>8 8.2</td>
</tr>
<tr>
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<td>70 17.1</td>
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<tr>
<td>African</td>
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<td>189 46.1</td>
<td>28 19.8</td>
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<td>60 61.2</td>
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<td>9 15.0</td>
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<tr>
<td>Midland</td>
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<td>1 1.7</td>
</tr>
<tr>
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<td>194 69.3</td>
<td>37 61.7</td>
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<td>14 20.2</td>
<td>42 15.0</td>
<td>13 21.6</td>
</tr>
<tr>
<td>Overseas</td>
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<td>67 16.3</td>
<td>24 24.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>20 18.0</td>
<td>63 15.4</td>
<td>14 14.3</td>
</tr>
<tr>
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<td>35 18.4</td>
</tr>
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<td>33 30.0</td>
<td>55 28.6</td>
<td>25 25.5</td>
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<tr>
<td>200—350</td>
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<td>32 16.7</td>
<td>16 16.3</td>
</tr>
<tr>
<td>&gt;350</td>
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<td>27 27.6</td>
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<tr>
<td>Unknown</td>
<td>31 28.0</td>
<td>58 30.2</td>
<td>30 30.6</td>
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* Information on likely place of infection, ethnicity and usual residence collected since 1996
** Information on initial CD4 count collected since 2005
Table 5: Characteristics of heterosexually acquired men and women infected in New Zealand, diagnosed in 2010–2014, <2010 and in total. These figures include people previously diagnosed overseas

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<td>No.</td>
<td>%</td>
<td>No.</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
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<td>39 100.0</td>
<td>90 100.0</td>
<td>212 100.0</td>
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<td>3 5.8</td>
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<td>21 10.2</td>
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<td>0 0.0</td>
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<td>3 1.5</td>
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* Information on ethnicity collected since 1996

Figure 6: Annual number of children diagnosed with perinatally-acquired HIV by year and place of birth. These figures include children previously diagnosed overseas.
Table 6: Information on children (under the age of 15) diagnosed with HIV in 2010–2014,<2010 and in total. These figures include children previously diagnosed overseas

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<td>No.</td>
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<td>10–14 year olds</td>
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<td>Pacific</td>
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</table>

of the heterosexually infected women for whom an initial CD4 was available were diagnosed late, higher than the proportion among MSM (36.7%).

In the five-year period 2010–2014, similar numbers of men (31) and women (39) have been diagnosed with HIV infection, reportedly heterosexually-acquired in New Zealand (Table 5). While again there was a wide range of ages at diagnosis, for both men and women the most common age group was 30–39 years. About two-thirds (67.7%) of the men were of European ethnicity, but this was the case for less than half (41.0%) of the women. It is also notable that eight—three men and five women—of the 70 individuals were of African ethnicity, and that among the 39 women, 20.5% were of Māori, and 15.4% of Pacific, ethnicity.

**Children**

There have been 74 children under the age of 15 diagnosed with HIV in New Zealand (Table 6). In the early years, many were infected through the receipt of blood products to treat coagulation disorders, but there have been no new diagnoses of cases where infection had been transmitted in this way since 1997. Overall, most children have been infected through mother-to-child, or perinatal, transmission—that is being born to an HIV-infected mother, many of whom have come from overseas.
Table 7: Births in New Zealand to known HIV-infected pregnant women in 2010–2015, 1998–2010 and in total. This information has been collected since 1998.

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<tr>
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<tr>
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<td>Midland</td>
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<td>1</td>
</tr>
<tr>
<td><strong>Infant breast fed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>42</td>
<td>97.7</td>
<td>83</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>2.3</td>
<td>1</td>
</tr>
</tbody>
</table>

Whereas most data are based on the year of diagnosis, the year of birth of perinatally-infected children gives an indication of the actual year of infection (Figure 6). While there has been no perinatally-infected children diagnosed who were born since 2007, as diagnosis can be delayed for many years, there may be children with undetected HIV infection currently living in New Zealand.

Data collected from paediatricians via the New Zealand Paediatric Surveillance Unit shows that from 1998 to 2014, there have been 128 babies born to women with HIV that had been diagnosed before or during their pregnancy (Table 7). None of these children are known to have acquired HIV, although it is too soon to be absolutely certain about this for some of those born in 2014. The data collected also show that virtually all infected pregnant women received ART and avoided breast-feeding, measures known to greatly reduce the risk.
of HIV perinatal transmission. In recent years, more deliveries have been performed vaginally than by caesarian section than previously the case, in line with current understanding that for women with a well-suppressed VL, vaginal delivery does not carry a high risk.

Number of individuals living with HIV in New Zealand

The number of individuals living with diagnosed HIV in New Zealand will be less than the total ever found to be infected because of deaths from AIDS and non-AIDS-related causes, and an unknown number going overseas. Ministry of Health data show there were 2,059 adults (1,699 men, 360 women) and 23 children receiving subsidised ARTs the end of June 2015.

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This was 192 more adults than at end of June 2014, giving an estimate at the end of 2014 of 1,963 on funded treatment.

Currently, just over 90% of people with HIV under the care of the Auckland Infectious Disease Unit are on ART. It is known that some people will opt out of specialist care, or not enter it for other reasons, which we estimate to be 5% of those diagnosed, based on UK data. So, assuming the 2,059 adults receiving subsidised therapy represent 85% of those with diagnosed HIV infection in New Zealand, there were 2,309 adults in New Zealand living with diagnosed HIV at the end of 2014. If 20% of infected people are undiagnosed—based on a 2011 Auckland study which found 21% of MSM with HIV infection had not been diagnosed—there were 2,309 adults with HIV infection in New Zealand at the end of 2014. If 20% of infected people are undiagnosed—based on a 2011 Auckland study which found 21% of MSM with HIV infection had not been diagnosed—there were 2,309 adults in New Zealand living with diagnosed HIV at the end of 2014.

Discussion

While ideally epidemiological surveillance provides timely and accurate knowledge of the actual annual incidence of HIV, it is not possible to measure this directly, as many people are asymptomatic or for other reasons not diagnosed until many years after infection. However, as it is likely that most people with HIV will eventually become symptomatic and diagnosed, the general pattern and trends in diagnosis rate are likely to indicate those of true incidence over time. While no surveillance system will capture all data, cooperation between patients, laboratories, diagnosing physicians, and the AEG, has meant that the system has a high level of completeness, even though HIV is not a notifiable condition.

Clearly, New Zealand has an HIV epidemic concentrated among MSM. While an international comparison shows that the diagnosis rate of MSM is in the middle to low range found in high-income countries with accessible information on this, care is needed in interpreting these data. As may not be the same in all countries. Nevertheless, the New Zealand diagnosis rate being lower than in many high-income countries is consistent with the findings of a study of MSM in Auckland in 2011, in which HIV prevalence was 6.5%, lower than most comparative studies in the US, Australia, UK and France.

The pattern of an increase in diagnoses in the early 2000s, followed by a plateauing, is also similar to the experience in many high-income countries. The rise is generally ascribed to a relaxation of the behaviour changes take up by many MSM when AIDS first appeared, occurring after HIV was perceived as less threatening with the availability of better treatment; although the rise could have also been contributed to by changes to sexual partner acquisition facilitated by internet dating. The subsequent leveling out of annual HIV diagnoses is consistent with the relatively stable rates of condom use since 2002 in New Zealand behavioural studies among MSM. Another likely driver of an increasing incidence in the early 2000s, is the rise in prevalence of HIV among MSM, which would be anticipated with decreasing mortality and ongoing incidence. Both factors are likely to be...
important. Evidence of the former is the resurgence of other STIs among MSM, particularly syphilis, that occurred in the early 2000s in many countries, including New Zealand. The ongoing occurrence of other STIs among MSM infected with HIV is also indirect evidence of the lack of universal condom use, although these do not necessarily always indicate HIV transmission risk, as they could have been acquired among seroconcordant men.

It is too soon to know if the rise in the number of MSM diagnosed in 2014 is an indication of rising incidence, however it seem prudent to review, and if possible strengthen, prevention strategies now, in case this is so.

The information on new diagnoses in recent year shows a clear increase the number of Asian men with HIV infection. This is likely to be a reflection of the increased size of this population, indicating that specific needs for care and prevention among this sector of the population should be considered.

The profile of men and women heterosexually infected is clearly different from the MSM. They are more likely to have been infected overseas than in New Zealand, particularly for those diagnosed before 2011. The rise in the number and proportion of HIV diagnoses of people heterosexually infected in the period 2002–2006 was a reflection of the increase in migrants to New Zealand from parts of the world where heterosexual infection was particularly prevalent, especially some areas of sub-Saharan Africa. It resulted in Africans being the second largest ethnic groups diagnosed with HIV. The peak in heterosexual diagnoses in 2006 is likely related to the requirement introduced in October 2005 that all people seeking a visa to remain in New Zealand for a year or more required an HIV test as part of an immigration medical, which applied to people already in New Zealand seeking to remain here, as well as those seeking entry. The drop after 2006 will be due to less migration from those high prevalence countries, and that if HIV is diagnosed overseas, it usually precludes entry.

There has been a slight upward trend in the number of people diagnosed with heterosexually acquired HIV that occurred in New Zealand since 1996 when this information was first collected. However, the numbers have averaged less than 16 annually over the past five years, only about a quarter of the annual number of MSM infected in New Zealand. When the respective sizes of the heterosexual and MSM populations are considered, the risk among heterosexuals is very much less than that of MSM. This lower perceived, and actual, risk is no doubt why more of those heterosexually infected are diagnosed late. While testing is less widespread among heterosexuals, and therefore the proportion undiagnosed may be higher than among MSM, there is no evidence that this number is large, or that HIV is spreading widely without being recognised. If it were, the number of pregnant women being diagnosed through antenatal testing would be very much higher than it is, as would be the number of blood donors diagnosed (all of whom are tested). Nevertheless, HIV should be considered when a person has been at risk, or has an illness consistent with HIV infection or an opportunistic infection. The information on those infected heterosexually in New Zealand shows a wide age range, and while all ethnic groups are affected, there appears to be a disproportionate number of African, Māori and Pacific women being diagnosed.

While it is tempting to attribute the drop in maternally-infected children to the progressive introduction of a universal offer of HIV testing during pregnancy in New Zealand since 2006, in fact the number of pregnant women diagnosed has been very low. In the five-year period 2010–2014, there were only nine women reported to the AEG as diagnosed through antenatal testing, less than anticipated from estimates based on the number of children infected in New Zealand prior to its introduction. Nevertheless, as the universal offer of HIV testing has successfully been introduced and accepted by the vast majority of pregnant women, it seems sensible to continue to include this in antenatal care, as the additional cost of HIV testing when added to other antenatal tests is low, and the possibility of the incidence increasing remains.

Another factor that has resulted in few children being infected is that pregnant
women with diagnosed HIV are being cared for in a way that is successfully minimising the risk of perinatal transmission. There have been over 120 babies born to women with diagnosed HIV in New Zealand since monitoring of this started in 1998, none of whom have been infected with HIV, less than the one percent rate generally reported.

The small number of people diagnosed with HIV reported to have been infected through sharing of equipment used to inject drugs is consistent with prevalence studies in this population, which have shown it to be less than one percent of people using the needle and syringe exchange scheme. This is undoubtedly due to the early enactment of legislation enabling the needle and syringe exchange scheme prior to HIV being established in this sector of the community. Although not specially sought in the information obtained about people newly diagnosed, sex workers have not been identified as a major factor driving HIV infection in New Zealand.

The actual number of people currently living with diagnosed HIV is not known. These we have estimated to be 2,381 men and 505 women, based on the number of subsidised ART as monitored by PHARMAC and reported by the Ministry of Health, which assume 85% of people diagnosed and still living in New Zealand are on treatment. While this might be underestimated, as the criteria for being on ART has in recent years become less stringent, it also takes into account that some people will have opted out of specialist care. Another assumption, that 20% of infected people are undiagnosed, is based on the 21% found an Auckland-based 2011 study of MSM, which would be expected to get lower over time, if the incidence does not change significantly and survival continues. As well as allowing estimates to be made, the data suggests that the annual costs of ART alone for each individual on treatment is around $NZ 14,000 per year, although this does not take into account possible confidential reductions in the cost of certain ART pharmaceuticals negotiated by PHARMAC. When added to the personal impact and costs of other aspects of medical care, this emphasises the need to prevent new infections wherever possible.

The appreciation that people on treatment are significantly less infectious, as they have a reduced level of virus in blood and in semen, has resulted in treatment of people with HIV being incorporated as one of the strategies of prevention, and is referred to as ‘treatment as prevention’. There have been attempts to determine the potential effectiveness of this at a national level by estimating the cascade of care—being the proportion who are first diagnosed with HIV, referred to specialist care, retained in care, on ART, and subsequently have a fully suppressed blood viral load. The initial determination of the cascade in the US was disappointing, suggesting that in 2011 only around a quarter of people with HIV were on ART without detectable circulating virus. In other countries, this was very much better, with an estimated 58%, 53% and 58% on ART with a fully suppressed viral load in the UK, the Netherlands and France, respectively.

In New Zealand, an unpublished study by the AEG that sought this information from people diagnosed over a recent eight-year period, suggests that we were nearer these European figures. However, we were unable to emulate the study, as unlike in the UK, HIV surveillance is not linked to a unique number that allows the necessary information to be collected, resulting in a significant proportion of people for whom the outcome could not be determined.

Conclusion

Ongoing HIV surveillance shows that New Zealand has a well-described, mature, low prevalence, HIV epidemic with infection concentrated among MSM, and heterosexual individuals from sub-Saharan Africa and South-East Asia. The former is largely the result of transmission occurring within New Zealand, whereas the latter infections were mostly, but not universally, acquired overseas. Over 30 years, each sub-epidemic has demonstrated a distinct pattern reflecting different determinants. The prevalence of HIV among people who inject drugs, sex workers and children has been restricted to very low levels.

The control of HIV achieved in New Zealand is favourable compared to many countries, however several challenges remain, especially in prevention among MSM and more timely diagnosis for all those infected. HIV testing of those who
have been at risk needs to continue, as an unnecessarily high proportion of HIV infection is still diagnosed late, and some not before progression to AIDS. These people are missing opportunities for timely HIV treatment for personal wellbeing and prevention of secondary transmission. Deaths from AIDS are now rare but still occur, and conversely, the number living with diagnosed HIV is increasing markedly each year, with considerable implications for care and treatment costs. People with HIV are particularly infectious soon after acquiring infection, often before being diagnosed even with regular testing, so behaviours aimed to reduce the risk of transmission need to be promoted strongly among all at risk and control cannot be based on diagnosis and treatment alone.

Current epidemiological surveillance needs to continue. The addition of national monitoring of the clinical outcomes of people diagnosed with HIV would assess the provision of appropriate care and allow international benchmarking. However, this would only be feasible if there were a way that information from diagnosed individuals could be accessed through the health system, such as by using the National Health Index number in conjunction with notification of HIV. Behavioural surveillance also needs to continue to monitor sexual and HIV testing behaviour, and should, where feasible, be linked to HIV prevalence studies to estimate rates of undiagnosed infection. Routine or regular phylogenetic analysis of newly diagnosed cases, that has not so far been routinely undertaken, could be used to identify clustering of new infections and local HIV subtype diversity. Surveillance of other sexually transmitted infections needs to be strengthened so that it can provide information on the rates among MSM, as these are an indication of HIV risk. Importantly, all monitoring systems need to be acceptable to those in the general population and those in most affected communities, and keep individual’s confidentiality paramount.

Appendix

Method used for international comparison of diagnosis rates among MSM

New Zealand, Australia, Belgium, Canada, Finland, France, Germany, Ireland, the Netherlands, Norway, Portugal, Sweden, Switzerland, the UK and the US were selected for comparison over the time period 2004–2013 having data on new diagnoses among MSM for the entire period. Publicly available data on HIV diagnoses were collected from the public health agencies of the countries selected. New Zealand’s HIV data were directly available to the AIDS Epidemiology Group, Australia’s from the Kirby Institute, Belgium’s data from the Institut Scientifique de Santé Publique, Canada’s from the Public Health Agency of Canada, Finland’s from the Terveyden ja Hyvinvoinnin Laitos, France’s data from the Institut de Veille Sanitaire, Germany’s data from the Robert Koch Institut, Ireland’s data from the Health Protection Surveillance Centre, The Netherlands’ data from Stichting HIV Monitoring, Norway’s data from the Norwegian Institute of Public Health, Portugal’s data from the Instituto Nacional de Saúde, Sweden’s data from the Folkhälsomyndigheten, Switzerland’s data from the Bundesamt für Gesundheit, the UK’s data from Public Health England and the US’s data from the Centers for Disease Control.

Whole country data were only available from 2008–2012 for the US; however, as it is a major comparable country to New Zealand, the US data are displayed, though they are not included in the statistical analyses. Additionally, 2013 data from Portugal are affected by reporting delays, so the 2013 Portuguese data were not included in the statistical analyses.

For all countries, unknown or unreported mode of transmission cases were proportionally reallocated to aid comparisons between countries (except the UK and France, who report data adjusted for unknown mode of transmission cases and, for France, reporting delays). This reallocation may lead to slight biases for certain countries; for example, most unknown Swedish cases are for overseas acquired infections that may be different to domestic infections. However, reallocation prevents countries with more complete mode of transmission information having artificially higher rates of HIV infection among MSM.

Data for all countries are presented as diagnoses per 100,000 men aged 15–65, with population data drawn from official national governmental statistical offices. LOWESS non-parametric smoothing of the data for all the countries was undertaken to produce a smooth curve representing the estimated underlying average diagnosis rate for the period 2004–2013 to give an indication of the overall trend.20

This was then used to examine trends in certain individual countries that might be exceptions to this. The weighting algorithm for the LOWESS smoothing was contained within the lowes’ function from the statistical package of R, with a bandwidth of 2/3 of the data points.21 Countries were not weighted by population.


Competing interests: Nil

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URL:

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Infrequent condom use with casual partners among New Zealand gay and bisexual men

Peter J Saxton, Nigel P Dickson, Anthony J Hughes, Adrian H Ludlam

ABSTRACT

AIMS: To identify predictors of non-condom use among gay and bisexual men (GBM) in New Zealand with casual male partners.

METHODS: We analysed anonymous self-completed data from GBM who participated in the community-based Gay Auckland Periodic Sex Survey (GAPSS) and Internet-based Gay Online Sex Survey (GOSS), undertaken in 2014. Infrequent condom use was defined as not using condoms “always” or “almost always” during anal intercourse in the prior six months.

RESULTS: Of the 1,912 GBM reporting anal intercourse with a casual partner, 27.2% reported infrequent condom use. Being recruited from Internet dating sites, Pacific ethnicity, having over 20 recent male partners, infrequent condom use with a current regular partner, or being HIV-positive were independently predictive of infrequent condom use. Conversely, being older, having a tertiary degree, using a condom at first anal intercourse, being exclusively receptive with a casual partner/s, and seeing condoms promoted through multiple channels predicted frequent condom use. Attitudes to condoms and safe sex were strongly predictive of actual condom use.

CONCLUSIONS: Social marketing should target the modifiable predictors of condom use, such as attitudes to safe sex. Interventions also need to engage successfully with GBM reporting non-modifiable traits such as HIV-positive GBM.

Gay, bisexual and other men who have sex with men (GBM) are at greatest risk of HIV infection in New Zealand, accounting for 2,329 HIV diagnoses from 1985 to the end of 2014, and roughly 80% of the locally transmitted HIV epidemic. Almost all HIV transmission between GBM occurs through anal intercourse without a condom, hence health promotion efforts have sought to maximise and sustain condom use in this population. Trends in condom uptake among GBM in New Zealand have largely been high and stable, however in 2011 this dropped slightly among casual partners, and in 2014 the highest ever annual number of locally acquired HIV infections among GBM was diagnosed.

Public health consequently needs a better understanding of current patterns in non-condom use. Although the fraction of HIV infection events attributable to casual as opposed to regular sexual partnering is unknown, GBM having casual sex are likely to change partners more frequently than those with regular partners, increasing the probability of encountering a sexual partner with undiagnosed HIV in the highly infectious early acute phase of infection. Individuals are also less likely to be aware of their casual partners’ sexual and HIV testing histories. Identifying predictors of unprotected casual anal intercourse therefore helps HIV prevention agencies, such as the New Zealand AIDS Foundation, target and place condom social marketing.

Previous New Zealand research in 1996 found that GBM on lower incomes, who were not gay-community affiliated, or who had fewer sexual partners were more likely to never use condoms with casual partners. An analysis of our own behavioural surveillance data among younger GBM aged...
under 30 between 2006–2011 found that condom use was lower among Pacific GBM and those with less education. Alternatively, condom use was higher among GBM recruited from community venues, who had tested HIV-negative, had a modest number of recent sexual partners, did not have sex with women, or who used condoms with any regular male partners.7

The aim of this study was to investigate factors predicting recent non-condom use with casual sex partners using a large and diverse sample of GBM recruited from community and Internet settings in 2014.

Methods

Data collection

We analysed data collected from the 2014 round of the Gay Auckland Periodic Sex Survey (GAPSS) and Gay Online Sex Survey (GOSS), an established behavioural surveillance system consistent with WHO/UNAIDS Guidelines.8 GAPSS participants were recruited in Auckland by trained recruitment staff during one week in February, 2014, from a gay community fair day and subsequently at all gay bars (four) and sex-on-site venues (five) in that city. Eligibility criteria were being male, aged at least 16 years, having had sex with a man in the past five years, and had not already participated in GAPSS or GOSS that year. Questionnaires were voluntary, anonymous and self-completed on site. Secure return boxes ensured privacy. Following GAPSS, the same questionnaire was used for the Internet-based nationwide GOSS over the next month that accessed participants through banners on New Zealand Internet dating sites and apps. These included NZDating.com, Manhunt, Grindr, Jack’D, Hornet and Growlr. Detailed methods are provided elsewhere.9 Ethics approval was received from the University of Auckland Human Participant Ethics Committee (#010738) and surveys were funded by the Ministry of Health.

Questionnaire

Participants were asked the number, type (casual or regular) and nature of current regular relationships (“Boyfriend/long-term lover/life partner/civil union partner/husband”, hereafter “BF”; or “fuckbuddy/friend I have sex with”, hereafter “FB”) in the previous six months. Casual partners were defined as men they had had sex with no more than three times over this period, and regular partners men they had sex with four or more times. If participants had engaged in anal intercourse with a casual and/or a current regular partner they were asked the sexual position (receptive, insertive), and for each position the frequency of condom use on a five point scale (always, almost always, about half the time, very rarely, never). The questionnaire contained socio-demographic items and items about sexual partnering, HIV and STI testing, frequency of exposure to condom social marketing, and attitudes to HIV, condoms and safe sex.

Analysis

The main outcome was “infrequent” condom use (“never”, “very rarely” or “half the time”) for any anal intercourse role; “frequent” use being at least “almost always” or “always” used a condom. The denominator is respondents reporting at least one episode of anal intercourse with a casual partner in the previous six months. Chi-squared tests explored the association of condom use with demographic characteristics, sexual partnering, health screening, social marketing exposure and attitudes. This informed the multivariate logistic regression models of factors independently associated with infrequent condom use. Due to potential collinearity between safe sex attitudes and social marketing on condom use, we developed three models: (1) containing attitudes and socio-demographic variables; (2) containing social marketing and socio-demographic variables; (3) containing both attitudes and social marketing variables. Statistical analyses and data management were carried out using Stata v.12.1 on non-missing data.

Results

The 2014 surveys attracted 3,141 respondents, of whom 1,912 had engaged in anal intercourse with a casual partner in the previous six months and reported on their condom use. Of these, just under three-quarters (72.8%) reported frequent condom use, and just over a quarter (27.2%) infrequent condom use. The latter equated to 16.7% of all GAPSS/GOSS respondents.

In univariate analyses, infrequent condom use varied significantly by
Table 1: Infrequent condom use by socio-demographic characteristics

<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>Number</th>
<th>Reported infrequent condom use (n,%)</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>1,912</td>
<td>518</td>
<td></td>
<td>27.2</td>
</tr>
<tr>
<td><strong>Recruitment site</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offline: community event</td>
<td>485</td>
<td>106</td>
<td>21.9</td>
<td>*</td>
</tr>
<tr>
<td>Offline: bars</td>
<td>51</td>
<td>6</td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td>Offline: sex-on-site venue</td>
<td>125</td>
<td>13</td>
<td>10.4</td>
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<tr>
<td>Online dating site</td>
<td>1,244</td>
<td>393</td>
<td>31.6</td>
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<tr>
<td><strong>Age group</strong></td>
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<td></td>
</tr>
<tr>
<td>16–29</td>
<td>819</td>
<td>227</td>
<td>27.7</td>
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<tr>
<td>30–44</td>
<td>553</td>
<td>141</td>
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<tr>
<td>45+</td>
<td>488</td>
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<tr>
<td><strong>Ethnicity</strong></td>
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<tr>
<td>European</td>
<td>1,370</td>
<td>371</td>
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<tr>
<td>Māori</td>
<td>173</td>
<td>66</td>
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<tr>
<td>Pacific</td>
<td>56</td>
<td>21</td>
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<tr>
<td>Asian</td>
<td>198</td>
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<tr>
<td>Other</td>
<td>72</td>
<td>11</td>
<td>15.3</td>
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<tr>
<td><strong>Highest education qualification</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than tertiary degree</td>
<td>998</td>
<td>332</td>
<td>33.3</td>
<td>*</td>
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<tr>
<td>Tertiary degree or higher</td>
<td>863</td>
<td>175</td>
<td>20.3</td>
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</tr>
<tr>
<td><strong>Free time spent with other gay men</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>76</td>
<td>18</td>
<td>23.7</td>
<td>Ns</td>
</tr>
<tr>
<td>A little</td>
<td>655</td>
<td>178</td>
<td>27.2</td>
<td></td>
</tr>
<tr>
<td>Some</td>
<td>590</td>
<td>154</td>
<td>26.1</td>
<td></td>
</tr>
<tr>
<td>A lot</td>
<td>510</td>
<td>143</td>
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<tr>
<td><strong>Sexual identity</strong></td>
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<td>Gay or homosexual</td>
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<td>432</td>
<td>28.1</td>
<td>Ns</td>
</tr>
<tr>
<td>Bisexual or other</td>
<td>365</td>
<td>83</td>
<td>22.7</td>
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</table>

*p<0.001. Ns=not statistically significant.
### Table 2: Infrequent condom use by behaviours and HIV screening

<table>
<thead>
<tr>
<th>Behaviours and screening</th>
<th>Number</th>
<th>Reported infrequent condom use (n,%)</th>
<th>(X^2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Condom used at first anal intercourse with a male</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No</td>
<td>730</td>
<td>277</td>
<td>38.0</td>
<td>*</td>
</tr>
<tr>
<td>Yes</td>
<td>1,132</td>
<td>232</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td><strong>Number of male sexual partners in last 6 months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>146</td>
<td>41</td>
<td>28.1</td>
<td>Ns</td>
</tr>
<tr>
<td>2–5</td>
<td>795</td>
<td>204</td>
<td>25.7</td>
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<tr>
<td>6–10</td>
<td>436</td>
<td>112</td>
<td>25.7</td>
<td></td>
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<tr>
<td>11–20</td>
<td>269</td>
<td>72</td>
<td>26.8</td>
<td></td>
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<tr>
<td>21–50</td>
<td>188</td>
<td>64</td>
<td>34.0</td>
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<tr>
<td>&gt;50</td>
<td>52</td>
<td>20</td>
<td>38.5</td>
<td></td>
</tr>
<tr>
<td><strong>Partnering and protective behaviours in last 6 months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual only or no current regular partner</td>
<td>986</td>
<td>253</td>
<td>25.7</td>
<td>*</td>
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<tr>
<td>Current BF and no anal intercourse with him</td>
<td>61</td>
<td>14</td>
<td>23.0</td>
<td></td>
</tr>
<tr>
<td>Current BF and frequent condom use with him</td>
<td>109</td>
<td>5</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Current BF and infrequent condom use with him</td>
<td>238</td>
<td>98</td>
<td>41.2</td>
<td></td>
</tr>
<tr>
<td>Current FB and no anal intercourse with him</td>
<td>73</td>
<td>15</td>
<td>20.6</td>
<td></td>
</tr>
<tr>
<td>Current FB and frequent condom use with him</td>
<td>226</td>
<td>6</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Current FB and infrequent condom use with him</td>
<td>171</td>
<td>116</td>
<td>67.8</td>
<td></td>
</tr>
<tr>
<td><strong>HIV testing history</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last tested HIV-negative</td>
<td>1,329</td>
<td>334</td>
<td>25.1</td>
<td>*</td>
</tr>
<tr>
<td>Diagnosed HIV-positive</td>
<td>108</td>
<td>51</td>
<td>47.2</td>
<td></td>
</tr>
<tr>
<td>Untested or no result</td>
<td>412</td>
<td>122</td>
<td>29.6</td>
<td></td>
</tr>
<tr>
<td><strong>STI diagnosed in last 12 months</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1,539</td>
<td>384</td>
<td>25.0</td>
<td>*</td>
</tr>
<tr>
<td>Yes</td>
<td>290</td>
<td>108</td>
<td>37.2</td>
<td></td>
</tr>
</tbody>
</table>

* p<0.001. Ns=not statistically significant. BF=boyfriend-type regular partner. FB=friend with benefit-type regular partner
**Table 3:** Infrequent condom use by condom social marketing exposure

<table>
<thead>
<tr>
<th>Condom social marketing exposure</th>
<th>Number</th>
<th>Reported infrequent condom use (n,%</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of seeing condom promotion in last 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very frequently</td>
<td>829</td>
<td>187</td>
<td>22.6</td>
<td>*</td>
</tr>
<tr>
<td>Often</td>
<td>515</td>
<td>139</td>
<td>27.0</td>
<td></td>
</tr>
<tr>
<td>Occasionally</td>
<td>333</td>
<td>107</td>
<td>32.1</td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>165</td>
<td>60</td>
<td>36.4</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>39</td>
<td>18</td>
<td>46.2</td>
<td></td>
</tr>
<tr>
<td>Number of places recalled seen condoms promoted in last 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>89</td>
<td>40</td>
<td>44.9</td>
<td>*</td>
</tr>
<tr>
<td>1</td>
<td>466</td>
<td>152</td>
<td>32.6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>260</td>
<td>73</td>
<td>28.1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>325</td>
<td>76</td>
<td>23.4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>267</td>
<td>69</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>287</td>
<td>52</td>
<td>18.1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>178</td>
<td>45</td>
<td>25.3</td>
<td></td>
</tr>
</tbody>
</table>

* p<0.001. † Options included “promos at gay events”, “billboards or bus-stop adverts”, “condom packs”, “promos online or on a mobile app”, “posters”, “material at saunas or cruise clubs”.
Table 4: Infrequent condom use by attitudes to condoms, HIV and safe sex

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Number</th>
<th>Reported infrequent condom use (n,%</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>“HIV/AIDS is a less serious threat than it used to be because of new treatments”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>632</td>
<td>217</td>
<td>34.3</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,244</td>
<td>291</td>
<td>23.4</td>
<td></td>
</tr>
<tr>
<td>“Condoms are OK as part of sex”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>1,796</td>
<td>449</td>
<td>25.0</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>86</td>
<td>63</td>
<td>73.3</td>
<td></td>
</tr>
<tr>
<td>“If he doesn’t want to use condoms I won’t bother using them”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>404</td>
<td>270</td>
<td>66.8</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,470</td>
<td>238</td>
<td>16.2</td>
<td></td>
</tr>
<tr>
<td>“We all have a shared responsibility to protect other gay and bisexual men by using condoms for anal sex”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>1,766</td>
<td>434</td>
<td>24.6</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>105</td>
<td>73</td>
<td>69.5</td>
<td></td>
</tr>
<tr>
<td>“I don’t like wearing condoms because they reduce sensitivity”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>793</td>
<td>345</td>
<td>43.5</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,070</td>
<td>165</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>“It’s no-one else’s business whether or not I use condoms”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>602</td>
<td>270</td>
<td>44.9</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,257</td>
<td>240</td>
<td>19.1</td>
<td></td>
</tr>
<tr>
<td>“I would sometimes rather risk HIV transmission than use a condom during anal sex”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>241</td>
<td>148</td>
<td>61.4</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,612</td>
<td>360</td>
<td>22.3</td>
<td></td>
</tr>
<tr>
<td>“The sex I have is always as safe as I want it to be”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>1,594</td>
<td>375</td>
<td>23.5</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>262</td>
<td>130</td>
<td>49.6</td>
<td></td>
</tr>
<tr>
<td>“I would never be willing to use condoms for anal sex”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>111</td>
<td>62</td>
<td>55.9</td>
<td>†</td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,743</td>
<td>445</td>
<td>25.5</td>
<td></td>
</tr>
<tr>
<td>“A man who knows he has HIV would tell me he was positive before we had sex”</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>757</td>
<td>227</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>1,092</td>
<td>281</td>
<td>25.7</td>
<td></td>
</tr>
</tbody>
</table>

*P<0.05, † p<0.001.

recruitment site, ethnicity and education status (Table 1), condom use at first intercourse, HIV testing and STI history (Table 2), condom social marketing exposure (Table 3) and attitudes to HIV, condoms and safe sex (Table 4).

Three separate models were then developed to investigate the relationship between condom social marketing exposure, attitudes to condoms, and other potential independent predictors. In the first model, six attitude items remained associated with infrequent condom use after controlling for respondent socio-demographic characteristics (Table 5; two were omitted as they obviously indicated non-condom use: “I would never be willing to use condoms for anal sex” and “I would sometimes rather risk HIV transmission than use a condom during anal sex”). The most strongly predictive was agreement that “if he doesn’t want to use condoms I won’t bother using them” (AOR 6.8, 95%CI 5.0–9.1).
In the second model, twelve non-attitude variables were entered into a multivariate logistic regression, including socio-demographic (recruitment site, age group, ethnicity, education, sexual identity), behavioural (condom use at first anal intercourse, number of partners, recent partnering history, anal intercourse modality), condom social marketing exposure (frequency recalling condom social marketing, number of different condom social marketing avenues recalled) and HIV testing variables. The model found infrequent condom use with a casual partner was independently predicted by being recruited from Internet dating sites, being of Pacific ethnicity, having 20 or more male sexual partners in the last six months, using condoms infrequently with a current BF or FB, or being diagnosed HIV-positive. Conversely, being older, having a tertiary degree, using a condom at first anal intercourse with a male, being exclusively receptive with a casual partner/s during anal intercourse, or seeing condoms promoted in multiple ways were predictive of frequent condom use with a casual partner (Table 6).

Thirdly, when attitudes were introduced into model two, each of the attitudes remained significantly independently associated with condom use (data not shown). However, the effect of some of the variables in Table 6 diminished or disappeared, suggesting that their predictive effect may be due to their correlation with unfavourable attitudes.

### Table 5: Attitudes independently associated with infrequent condom use with casual partners

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>p-value for variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Condoms are OK as part of sex”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree (ref)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disagree/strongly disagree</td>
<td>3.7 (2.0–7.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>“If he doesn’t want to use condoms I won’t bother using them”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>6.8 (5.0–9.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Disagree/strongly disagree (ref)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>“We all have a shared responsibility to protect other gay and bisexual men by using condoms for anal sex”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disagree/strongly disagree (ref)</td>
<td>4.2 (2.3–7.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>“I don’t like wearing condoms because they reduce sensitivity”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>2.6 (2.0–3.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Disagree/strongly disagree (ref)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>“It’s no-one else’s business whether or not I use condoms”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>2.0 (1.5–2.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Disagree/strongly disagree (ref)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>“The sex I have is always as safe as I want it to be”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree/strongly agree</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disagree/strongly disagree (ref)</td>
<td>3.4 (2.4–4.8)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* Two attitude statements were omitted from the model because they would obviously be correlated to condom use, including “I would never be willing to use condoms for anal sex” and “I would sometimes rather risk HIV transmission than use a condom during anal sex”.

† Socio-demographic variables included in the model were recruitment site, age group, ethnic group, education and sexual identity.
Table 6: Socio-demographic, behavioural, HIV and condom social marketing factors independently associated with infrequent condom use with casual partners

<table>
<thead>
<tr>
<th>Factor</th>
<th>Adjusted odds ratio (95% CI)</th>
<th>p-value for variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruitment site</td>
<td></td>
<td>0.003</td>
</tr>
<tr>
<td>Offline: fair day (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offline: bars and sex-on-site venues</td>
<td>0.5 (0.3–0.97)</td>
<td></td>
</tr>
<tr>
<td>Online dating site</td>
<td>1.5 (1.1–2.1)</td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16–29 (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30–44</td>
<td>0.9 (0.6–1.2)</td>
<td>0.042*</td>
</tr>
<tr>
<td>45+</td>
<td>0.7 (0.5–0.99)</td>
<td></td>
</tr>
<tr>
<td>Ethnic group</td>
<td></td>
<td>0.0285</td>
</tr>
<tr>
<td>European (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Māori</td>
<td>1.4 (0.9–2.0)</td>
<td></td>
</tr>
<tr>
<td>Pacific</td>
<td>2.2 (1.1–4.4)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>0.9 (0.6–1.5)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.5 (0.2–1.03)</td>
<td></td>
</tr>
<tr>
<td>Highest education</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Up to tertiary degree (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary degree or higher</td>
<td>0.5 (0.4–0.7)</td>
<td></td>
</tr>
<tr>
<td>Sexual identity</td>
<td></td>
<td>0.096</td>
</tr>
<tr>
<td>Gay or homosexual (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bisexual or other</td>
<td>0.8 (0.5–1.1)</td>
<td></td>
</tr>
<tr>
<td>Condom used at first anal intercourse with a male</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.4 (0.3–0.5)</td>
<td></td>
</tr>
<tr>
<td>Number of male sexual partners in previous 6 months</td>
<td></td>
<td>0.013</td>
</tr>
<tr>
<td>Up to 20 (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 20</td>
<td>1.6 (1.1–2.4)</td>
<td></td>
</tr>
<tr>
<td>Modality of anal intercourse with casual partners</td>
<td></td>
<td>0.019</td>
</tr>
<tr>
<td>Both insertive and receptive (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive only</td>
<td>0.6 (0.5–0.9)</td>
<td></td>
</tr>
<tr>
<td>Insertive only</td>
<td>0.8 (0.6–1.05)</td>
<td></td>
</tr>
<tr>
<td>Partnering and protective behaviours in last 6 months</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Casual only or no current regular partner (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current boyfriend and no anal intercourse with him or only frequent condom use</td>
<td>0.4 (0.2–0.7)</td>
<td></td>
</tr>
<tr>
<td>Current boyfriend and infrequent condom use with him</td>
<td>2.5 (1.7–3.5)</td>
<td></td>
</tr>
<tr>
<td>Current fuckbuddy and no anal intercourse with him or only frequent condom use</td>
<td>0.2 (0.1–0.3)</td>
<td></td>
</tr>
<tr>
<td>Current fuckbuddy and infrequent condom use with him</td>
<td>4.9 (3.3–7.4)</td>
<td></td>
</tr>
<tr>
<td>HIV testing history</td>
<td></td>
<td>0.001</td>
</tr>
<tr>
<td>Last tested HIV-negative (ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosed HIV-positive</td>
<td>3 (1.8–5.0)</td>
<td></td>
</tr>
<tr>
<td>Untested or no result</td>
<td>1.1 (0.8–1.5)</td>
<td></td>
</tr>
<tr>
<td>Frequency of seeing condom promotion in last 12 months</td>
<td></td>
<td>0.086*</td>
</tr>
<tr>
<td>For each decline in frequency seeing condom promotion</td>
<td>1.1 (0.98–1.3)</td>
<td></td>
</tr>
<tr>
<td>Number of places recall seen condoms promoted in last 12 months</td>
<td>1.1 (0.98–1.3)</td>
<td>0.008*</td>
</tr>
<tr>
<td>For each increase in number of places seen condoms promoted</td>
<td>0.9 (0.8–0.97)</td>
<td></td>
</tr>
</tbody>
</table>

* P-value is for variable entered as ordinal categories.
**Discussion**

In this large and diverse sample of gay, bisexual and other men who have sex with men recruited from community and Internet dating sites in New Zealand, around a quarter (27.2%) used condoms infrequently, that is never, very rarely or at most half the time in the six months prior to survey.

Being recruited from Internet dating sites, having 20 or more male sexual partners in the last 6 months, using condoms infrequently with a current regular BF or FB partner, being diagnosed HIV-positive or being of Pacific ethnicity were independently predictive of infrequent condom use with a casual partner. Conversely, being older, having a tertiary degree, using a condom at first anal intercourse with a male, being exclusively receptive with a casual partner/s during anal intercourse, or seeing condoms promoted in multiple ways was independently predictive of frequent condom use with a casual partner. Attitudes to condoms were strongly predictive of actual condom use, and their effect remained strong after taking into account both socio-demographic and behavioural factors. There appeared to be a strong connection between the extent of exposure to condom social marketing, attitudes to condoms, and actual condom use.

Strengths of this study include the broad, non-clinic based recruitment approach, the large and diverse sample, the anonymous and self-completed participation that should minimise reporting bias about sensitive behaviours, the question specificity providing information on frequency of condom use during anal intercourse with casual and with regular partner types, and the range of potential predictors in the questionnaire.

Limitations include the non-random sampling, a standard obstacle to researching this population, thus the findings may not be generalisable to all GBM. The data are based on self-report of private activities. Questionnaire space was limited so we were unable to explore the potential effect of mental health, discrimination, alcohol and recreational drug use on condom use.

A different outcome measure makes comparisons with early local research difficult. However, our findings about predictors are broadly consistent with recent research among younger GBM from the earlier GAPSS and GOSS surveys undertaken in 2006–2011, in particular the role of Internet dating sites, HIV test status and patterns of condom use across both casual and regular sexual partners. Unlike that analysis, our sample was smaller, so we did not analyse condom use predictors by sexual position; however, an advantage was our ability to explore the relationship with attitudes and social marketing in more detail.

Gay men in New Zealand appear to report higher rates of casual partner condom use than GBM in Australia, the US and the UK, where similar surveys have been conducted, although differences in sampling, measurement and reporting likewise complicate comparisons. A possible explanation is that since 1987, New Zealand has focussed on a single message: avoidance of anal intercourse without a condom, and has supported this with comprehensive health promotion and social marketing responses to reduce barriers and maximise condom uptake. This approach recognises that condoms not only reduce personal risk, but also help break chains of HIV transmission in sexual networks and thus have a collective protective effect by preventing secondary infections. Elsewhere, HIV prevention organisations have promoted more diversified non-condom-based risk reduction approaches over time, such as encouraging HIV testing and disclosure of HIV test status (“sero-sorting”), or promoting non-condom use with certain partner types, so long as rules around testing, communicating and sexual monogamy are adhered to (“negotiated safety”).

While the latter approaches have the appeal of endorsing greater variety of HIV prevention options, a risk is that multiple public health messages are more resource intensive to execute successfully over the long term, and if they communicate mixed messages or contradict each other (eg, “use condoms ... don’t use condoms...”) may inadvertently de-emphasise condom use, or imbue condom use with negative connotations (eg, “don’t you know your HIV status?”, “can’t you trust your partner?”). Further research on the diverging nature
of HIV public health responses for gay men in different countries would improve our understanding of different condom use patterns and comparative HIV epidemiology.

Despite this evidence of diversity in condom uptake between GBM, general population probability studies have shown that gay and bisexual men are more likely than heterosexual men to use condoms for sexual intercourse, at least in countries where the HIV prevention responses have been peer-led by GBM themselves. This is not necessarily true for younger GBM, such as those at secondary school, who are unlikely to have been offered relevant sex education. Therefore, the majority of gay and bisexual men continue to demonstrate protective behaviour when supported to do so, and this needs to be remembered when seeking explanations for the overrepresentation of GBM in HIV statistics.

Our results should be used to improve targeted HIV prevention with GBM communities. An important general finding is that greater exposure to condom social marketing is associated with more frequent condom use with casual partners. This argues for strategies to increase exposure of condom promotion through multiple channels that is a feature of New Zealand’s rejuvenated response to the HIV epidemic. It does, however, pose a challenge to non-Government organisations (NGOs), such as NZAF, who are endeavouring to supplement condom-based behavioural HIV prevention with increased promotion of timely HIV testing, advice about the prevention and personal benefits of early HIV treatment, and the potential benefits of HIV pre-exposure prophylaxis (PrEP) for high risk GBM under close specialist clinical monitoring, in order to reduce HIV incidence. In clinical trials, pharmaceutical-based prevention (“treatment as prevention”) has reduced HIV transmission risk by 96% in HIV sero-discordant heterosexual couples when used by the HIV-positive partner, and by up to 86% when used by GBM as pre-exposure prophylaxis by the HIV-negative partner. While promising at the individual level, these trial results have yet to translate into wide scale reductions in HIV incidence at the population level among GBM, amid concerns about behavioural risk compensation (condom rates dropping in response to pharmaceutical interventions) and implementation, including adequate scale, actual and opportunity costs, clinical capacity and clinical retention.

HIV prevention has consequently become an intensely contested marketplace. We recommend that the latter interventions could build onto, but should categorically not replace nor cannibalise, behaviour-based condom promotion. We recognise that this is a difficult task for public health NGOs in a context of modest resources, and growing pressure from some quarters for pharmaceutical interventions to replace behaviour change. In the UK, the funding allocations are already stark: just £10 million was allocated to behaviour-based prevention in high prevalence local authorities in 2014/15, a reduction from £55 million in 2001/2, whilst spending on HIV pharmaceuticals in 2014/15 was 55 times this amount.

Unsurprisingly, attitudes predicted condom use, but we highlight three observations. Firstly, the statements relate to different dimensions of using condoms—for example physical sensation (“I don’t like condoms because they reduce sensitivity”), altruism/collectivism (“we all have a shared responsibility…”), and personal resilience (“if he doesn’t want to use condoms…”). This suggests it is an oversimplification to assert that condom non-use is purely due to GBM not liking them. Secondly, and encouragingly, attitudes are modifiable, and in our data appeared to be influenced by social marketing, and therefore potentially by community norms. More nuanced prevention responses that engaged GBM more compellingly about their sexual decision-making could therefore result in increased condom use. Thirdly, although some unfavourable attitudes were only held by a minority of respondents (less than five percent), others such as “if he doesn’t want to use condoms…” were held by around a fifth of respondents and exerted a strong impact on condom use. Understanding better these more common attitudes, and successfully challenging them, could potentially shift a high proportion of the infrequent condom use that is being reported by these GBM.
Condom use with casual partners was related to behaviours with other partners, supporting previous work indicating a strong patterning or habitual factor to condom use across partnerships for many GBM. This was reinforced by the association between early adoption of condoms and current use. Both findings argue for continued promotion of condoms for anal sex between men regardless of partner type, because stopping condom use in one circumstance (for example with a regular partner) may make it more difficult to continue condom use in other scenarios (with sequential or concurrent casual partners). Respondents with higher numbers of recent sex partners were more likely to report infrequent condom use, and it is important to engage these men effectively as they will play a disproportionate role in facilitating or constraining HIV transmission clustering across GBM sexual networks.

Above and beyond these factors, GBM recruited from Internet dating sites, Pacific-identified respondents, younger respondents and those with less than a tertiary degree, were more likely to report infrequent condom use. Prevention interventions will need to ensure they engage successfully with these groups. Internet dating sites and online geo-location apps have had an especially profound impact on HIV prevention for small communities, such as gay men. Such apps expand the sexual marketplace and improve the efficiency of finding a compatible partner with shared interests. However, these same features facilitate contact between men who wish to engage in condomless sex. Furthermore, many apps do not seek meaningful partnerships with HIV prevention or sexual health agencies, unlike the cooperation historically shown by physical gay venues. Local innovative HIV prevention responses into the digital space, such as LYC (“I Love Your Condom”), have fostered closer relationships (engaging dating apps, facebook, google ads, websites), but several sites restrict the promotion of HIV prevention material, raising questions about the public health responsibilities of social media and commercial internet dating sites. Respondents with previously diagnosed HIV infection reported less frequent condom use. Although some may have been serosorting (choosing other HIV-positive casual partners), for others this poses a risk of onward HIV transmission especially as not all of these men were on antiretroviral therapy. Furthermore, the risk of acquiring and transmitting other STIs during anal intercourse is high in the absence of condoms. HIV-positive GBM have been disproportionately represented in outbreaks of STIs such as syphilis and LGV in New Zealand, and it is imperative that clearer information about these risks is communicated to HIV-positive GBM alongside improved linkage into support and screening.

Over and above this study’s findings, HIV prevention for GBM must consider a context of alarming rises in STIs. Among GBM in England for example, syphilis diagnoses increased by 46% in the past year, gonorrhoea diagnoses by 32% and chlamydia diagnoses by 26%. GBM now account for 81% of syphilis and 52% of gonorrhoea cases diagnosed in English sexual health clinics. The emergence of antimicrobial resistance in gonorrhoea is a serious concern. Reducing the incidence of condomless anal sex will help control these bacterial STIs, as well as HIV. GBM should be encouraged to screen for STIs regularly which may also identify undiagnosed HIV infections in a more timely way.

Finally, continued refinement and scale-up of condom social marketing needs to be accompanied by better information about why condom use is differentially important for GBM (elevated risks of anal intercourse, dense sexual networks, higher HIV prevalence) compared to their heterosexual peers. In addition, health promotion for GBM must continue the considerable progress made over three decades in New Zealand so that individuals are empowered to take up the advice. This includes anti-discrimination and mental health promotion at high schools, easier access to relevant information and health services, and sexual orientation diversity training for health professionals.
ARTICLE

Competing interests: Nil

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Drug misuse in sport: a New Zealand perspective

Andrew Curtis, David Gerrard, Peter Burt, Hamish Osborne

ABSTRACT

AIMS: Drug misuse in elite sport is a world-wide phenomenon. This article explores the culture of contemporary sport, provides estimates of doping prevalence, discusses dietary supplementation and highlights major factors influencing high-performance athletes and their support personnel. The aim is to stimulate discussion, informed by the World Anti-Doping Code (WADC), which is particularly relevant to doctors caring for athletes.

METHODS: Online databases were searched for relevant peer-reviewed research from 2009 to 2015. Comparative New Zealand data have been included.

RESULTS: Estimates of the prevalence of sports doping range from less than 1% to as high as 52%, dependent upon the demographics of the identified cohort. The culture of elite sport, personal stressors, competitive demands, financial reward and the influence of an ‘entourage’ of support personnel were identified as critical determinants of drug misuse.

CONCLUSIONS: The culture of elite contemporary sport is seductive to many aspiring young athletes. To combat drug misuse, effective education should embody moral, ethical and clinical dangers, recognising the importance of support at times of increased athlete vulnerability. Inadvertent doping from product contamination is a recognised risk of unsupervised dietary supplementation. Doctors responsible for the care of high-performance athletes must be cognisant of these issues and the provisions of the WADC.

The use of drugs to enhance sports performance is a global phenomenon that continues to receive wide media attention. The number, variety and use of legal and illegal drugs has increased in recent years.1 Drug misuse in elite sport is monitored internationally by the World Anti-Doping Agency (WADA), while Drug-Free Sport New Zealand (DFSNZ) is responsible for national athlete testing and education.

Recently, it has been proposed that young athletes transition incrementally from their use of ‘permitted’ to illegal substances, with the suggestion of ‘harm minimisation’ as an approach to counter this.1 Health professionals, particularly doctors, are traditionally recognised by athletes as a trusted resource for all matters of drug efficacy and safety, including the use of dietary supplements and performance-enhancing agents.2 However, many physicians lack fundamental knowledge to provide adequate advice to athletes.3

This article references the body of research on doping prevalence in sport, discussing its associated culture, common reasons, key personnel and prevention strategies to assist medical professionals in the New Zealand context.

Review methodology

the original manuscripts were downloaded. A total of 232 references were identified that related to the prevalence, prevention and culture of drug misuse in sport. Only six of these were specific to New Zealand.

Results and discussion

Definitions

For the purposes of this review, ‘doping’ is defined as a breach of the WADA rules, including use or attempted use of a prohibited substance or method. These include anabolic agents, peptide hormones, stimulants, diuretics, beta-2 agonists and recognised performance-enhancing methods, such as blood and gene doping, urine tampering or intravenous infusions unless medically indicated. The use of illicit “recreational” drugs, including narcotics and cannabinoids, is also considered a breach of the WADC. Contemporary literature uses the interchangeable terms “performance-enhancing drugs” (PEDs), “banned drugs” and “doping” with resulting confusion.\(^1\,^4\) In this review, doping infers the collective of PEDs, performance-enhancing methods and illicit drugs.

Breaches of the WADA rules are considered either intentional or inadvertent. The former implies ‘cheating’, whereas the latter may result from supplement contamination or ignorance.\(^1\) Acts of doping in sport focus primarily on an intent to enhance performance, while ‘inadvertent doping’, not generally considered as purposeful, is deemed a consequence of either unknown product contamination or ‘recreational’ drug use. However, the WADC applies strict personal liability to drug misuse, making no such discrimination when considering violations. As a result, any athlete found ‘positive’ may be sanctioned in accordance with options from a reprimand, to the rarely used lifetime ban from sport. For the purposes of this review, the authors use ‘doping’ to refer to deliberate, banned drug-use and ‘inadvertent doping’ for product contamination or ignorance of the rules.

Prevalence

A true prevalence of doping in sport is difficult to determine given the limitations of data collection, the intrusiveness of the questions and the obvious sensitivity of the responses. International drug testing results, collated by WADA, demonstrate an approximate prevalence of 2% positive tests per year. However, the true prevalence is thought to be closer to 10%\(^5\) with a recent review of the literature yielding an estimation of 14–39%.\(^4\)

In 2013/14, DFSNZ carried out 925 drug tests on elite athletes, with 4 violations, a doping prevalence of 0.004%, which compares to 0.007% in 2012/13 and 0.005% in 2011/12.\(^6\) However, these tests do not include gym users or athletes not subjected to anti-doping regulations. Another paper reported 5 of 32 New Zealand body builders admitting the use of androgenic anabolic steroids (AAS) at some stage in their career.\(^6\) Australian-based studies of doping amongst elite athletes reported an 8% response, compared with 52% in male gym users,\(^7,^9\) while 25% of a Canadian cohort of junior provincial athletes reported PED use in the previous year,\(^9\) and up to 12% of an American high school student cohort reported AAS use.\(^10,^11\) From these estimates, 10% of athletes seen by a health professional are possibly using a PED, and 1 in 3 are at risk of inadvertent doping from supplement use.

Drug-User Profile

Competitive athletes who intentionally dope are categorised as “…villains, mavericks and professionals.”\(^1\) “Villains” cheat deliberately, while “mavericks” display an ignorant disregard for the rules. “Professionals” however—purported to be the largest group—progress from diet and lifestyle changes, to supplementation, and finally to banned substance use. It is argued that these athletes are not ‘cheaters’, but products of the intensely competitive, commercialised world of elite sport, whereby they are driven to train with greater intensity for longer periods.

At a recreational level, so-called ‘gym users’ plus ‘power and strength sportspeople’ are more likely to use AAS or growth hormone derivatives.\(^12,^13\) This systematic review of anabolic steroid use listed appearance, aggression or enhanced performance as the most relevant reasons for doping.\(^13\) These dopers were characterised as being male, under 30 years of age, mistrusting of medical
professionals and with comorbidities including depression and a history of illicit drug use.\textsuperscript{12,13} Furthermore, female AAS-users have a much higher risk of dependency than male counterparts.\textsuperscript{14} Therefore, recreational sportspeople with the characteristics described should prompt medical professionals to be wary of their potential for drug misuse.

**Times when athletes are at an increased doping risk**

The culture of doping is as varied as the sports, sub-cultures, ability, ages and personalities of the users.\textsuperscript{1,2,15-19} Notwithstanding, some individual characteristics and specific determinants have emerged that could assist doctors who regularly manage athletes. As a group, athletes have been identified as being more likely to use a PED if offered the chance.\textsuperscript{20,21} Qualitative research involving a cohort of 147 UK athletes identified reliability, rule abiding and role modelling as ‘protective behaviours’, while rule breaking, bad temperament and a win-at-all-costs attitude were risk factors for doping.\textsuperscript{22} An athlete’s ‘doping risk’ was also reported to increase during critical events, such as selection/de-selection,\textsuperscript{23,24} during recovery from injury and when negotiating crucial sponsorship deals.\textsuperscript{25} These transitions were considered to be times of psychosocial challenge with an enhanced risk of doping. At such times, social support, individual coping mechanisms\textsuperscript{2,25} and the influence of medical advice was deemed critical.\textsuperscript{3}

**Entourage—influence and knowledge**

A complex of individuals, identified as the ‘athlete entourage’, contributes to the environment of every elite athlete. Doctors, coaches, trainers, family, friends, teammates and physiotherapists are acknowledged sources of knowledge, leadership and support.\textsuperscript{2} Yet a study of the anti-doping knowledge of 292 Australian support personnel revealed that 40% had no specific training, despite providing advice to athletes.\textsuperscript{26} This study also revealed that 32% of these support personnel ignored the unethical behaviour of colleagues, despite a WADC obligation to report doping offences irrespective of confidentiality.\textsuperscript{7} The importance of the coach in the social network is also emphasised, and for 292 New Zealand athletes interviewed, coaching style was a determinant in an increased athlete doping risk.\textsuperscript{19} This influence was also reflected by studies of elite Scottish,\textsuperscript{27} German,\textsuperscript{16} and Greek\textsuperscript{28} athletes.

**Culture of sport**

While the culture of sport has been identified as shaping an athlete’s attitudes and intentions to dope, the public and the media consider doping as simply another form of ‘cheating’.\textsuperscript{13,20} Athletes caught cheating are commonly portrayed as ‘bad’, with the role of their entourage often ignored,\textsuperscript{28} despite compelling evidence that they are complicit.\textsuperscript{17} Athletes are frequently ‘villainised’ when caught using drugs in a recreational setting. Multiple Olympic gold medallist Michael Phelps was publicly chastised for his one-time use of cannabis,\textsuperscript{29,33} yet Barack Obama as a Presidential candidate was praised for honesty in declaring his youthful, cannabis and cocaine use.\textsuperscript{31}

Elite athletes are more likely to dope if they believe that other athletes are doping.\textsuperscript{21,32,33} For example, eight elite and neo-elite cyclists, interviewed prior to turning professional, viewed doping as cheating, yet once they became professional they regarded doping as an inevitable progression in performance enhancement. They also claimed elite sport as being deleterious to health, rationalising that PEDs conferred a protective influence.\textsuperscript{32,34} Boundaries can be blurred between ‘legitimate’ performance enhancement, including physiological testing, nutritional supplementation or biomechanical computer-modelling and frank doping to compensate for media pressures, sponsorship or public expectation.\textsuperscript{31,36} Times of increased vulnerability demand concerted education and awareness from all stakeholders, particularly doctors.

**Dietary supplements**

Dietary supplementation in sport is common, with the internet, team mates, coaches and athletic trainers providing the most common sources of information.\textsuperscript{37} An unpublished survey of elite New Zealand athletes reported a 93% usage of three supplements in the prior 6 months.\textsuperscript{38} Findings comparable to data from a similar Canadian study.\textsuperscript{37} Inadvertent doping is a potential
consequence of supplementation, with products frequently not subjected to strict manufacturing and quality control. Fifteen percent of internet-sourced supplements have been reported with steroid contamination as well as potent psychoactive substances, including DMBA (1,3-dimethylbutylamine) and its analogues. Dietary supplement users are also shown to be at greater risk of doping than non-users, reflected in studies of elite UK athletes, Australian and Greek high school students, amateur Australian cyclists, and Croatian rugby players. A more permissive attitude towards doping has mirrored increasing supplement use, with recovery from injury or training, improved performance, increased muscle size and body image as common reasons. Sources of supplements and reasons for their use are matters for doctors to explore with athletes in their care.

Body image and moral disengagement

‘To look good,’ is an oft-cited reason for recreational athletes, especially serious gym users, to use AAS and supplements. Both AAS and supplement use are reportedly associated with an increased alcohol and illicit drug consumption, low self-esteem or a negative body image, and participation in sports where musclebulk is important. Product source is important, with 50–75% of PEDs being reportedly purchased online. One study used laboratory testing of 57 AAS or growth hormone derivatives purchased online and reported 42% being either contaminated with bacteria, containing no active anabolic ingredient or raising other safety issues. The same study reported that testing 634 nutritional supplements found many to contain some trace of AAS. The potential co-morbidities and risks for PEDs or supplements purchased online is important information for all medical professionals, but particularly doctors, to be aware of.

Athletes frequently rationalise doping on spurious grounds that ignore health and safety. A strategy known as ‘moral disengagement’ negates the immoral actions of cheating through established mechanisms of “…displacement or diffusion of responsibility, advantageous comparison, distortion of consequences, moral justification and euphemistic labelling”. These phenomena are documented in body builders, weightlifters, cyclists, and in 1,188 Australian adolescents were predictive of doping attitudes, regardless of social demographics or athletic status. In order to counter forms of moral disengagement, medical professionals must recognise the process and develop appropriate counter arguments.

Conclusions

Despite the importance of sport in our society, there is a dearth of New Zealand research relating to sports doping. International figures suggest that doping is more common than figures would suggest and that deterrence through punitive measures alone is ineffective.

An understanding of drug misuse in sport deserves a wider, empathetic view that embodies the culture of sport and the influence of the athlete entourage of support personnel. The most common reasons given for PED use are to improve looks, increase performance, to cope with the demands of training, or to recover from injury. More recent research also suggests impressionable young athletes may see doping as a natural progression of performance enhancement and be willing to risk sanctions and personal health in the pursuit of success. Regardless, athletes taking supplements or PEDs bought online risk their health through possible contamination. Effective educational strategies encourage themes of health, morality and refusal skills, while acknowledging that there are periods of increased athlete vulnerability. Medical professionals in particular need to be increasingly wary of these times of increased risk.

Doctors treating competitive or recreational athletes carry a burden of responsibility in their knowledge of dietary supplementation and prohibited substances that reflects patient health and the spirit of sport embodied in the World Anti-Doping Code.
Competing interests:
Dr. Gerrard reports he is currently the Chair of the World Anti-Doping Agency (WADA) Therapeutic Use Exemption Committee and a member of the WADA Health Medicine and Research Committee, both voluntary positions.

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Context-


‘Real-time’ burden of community and healthcare-related infections in medical and rehabilitation patients in a public hospital in Auckland, New Zealand

Kerry Read, Hasan Bhally

ABSTRACT

AIMS: To determine the prevalence and spectrum of infections on admission, or acquired during hospitalisation (HAI) at Waitakere Hospital, Auckland.

METHODS: A questionnaire was completed on two separate days for all adult in-patients admitted to medical and rehabilitation wards for greater than 24 hours. Information obtained included patient characteristics, the presence and type of infection on admission or acquired during hospitalisation, as well as information on indwelling devices.

RESULTS: Infection was the admitting diagnosis in 81 (41%) of 195 patients reviewed, with lower respiratory tract infection (LRTI) diagnosed in 50%, urine infections in 22% and cellulitis 18%. Only 40% LRTIs were supported by radiology or microbiological criteria. Twenty-five HAIs occurred in 21 patients (cumulative and point prevalence of 10.7% and 5.0% respectively). Urinary tract infection (UTI) was the most common HAI in 13 patients (62%), including 4 catheter-related infections. Patients with HAI were older and appeared to have had longer hospital stays, and higher urinary catheter usage.

CONCLUSIONS: This study highlights the ongoing high burden of infections contributing to hospitalisation of adult patients in a developed country. The prevalence of HAI, patient characteristics and risk factors are comparable to previous studies in similar settings.

Infection, either on admission to hospital or acquired during inpatient stay (hospital-acquired infection, HAI), continues to be a common diagnosis requiring healthcare provision. Baker et al recently reported that in New Zealand, infection-related admissions to hospital were rising. In New Zealand, it is estimated that about 10% of inpatients will develop an HAI sometime during their hospital admission. HAIs result in additional costs largely related to longer lengths of stay, as well as extra costs for diagnostic tests and treatment. Graves et al, in 2003, estimated that the annual cost to New Zealand hospitals from HAIs in medical and surgical patients is between $50 and $85 million.

The main purpose of our study was to determine the prevalence and spectrum of infections at the time of hospital admission or those acquired during hospitalisation. The study population were adult medical patients admitted to general medical or rehabilitation wards at Waitakere Hospital. This 135-bed hospital provides acute general medical and rehabilitation services to a population of approximately 250,000 in West Auckland. There are 92 general medical and 45 rehabilitation beds.

Methods

A survey of all adult patients was performed on two separate days, in late
winter (29 August) and late spring (19 November), 2013. All 6 medical and 3 rehabilitation teams were instructed to complete a study questionnaire incorporating questions on patient demographics, co-morbidities, the reason for admission and presence of infection on admission, information about indwelling devices, and details about any HAI present either at the time of evaluation, or occurring at any stage during the current hospitalisation.

HAI was diagnosed if an infection occurred on or after the third calendar day of hospitalisation (where admission day is considered first calendar day), as per standard CDC/NHSN definition. http://www.cdc.gov/nhsn/PDFs/pscManual/2PSC_IdentiﬁyingHAI_NHSNcurrent.pdf

Patients admitted for less than 24 hours were excluded from the study. Admission to a rehabilitation ward was considered a continuum of the current hospitalisation if patients were transferred from another inpatient service.

The diagnosis of infection were based on clinical criteria by the respective medical teams and microbiologic and/or radiologic confirmation was not required (except in bloodstream infections, urinary tract infections and C. difﬁcile). These responses were used to calculate outcome measures-point prevalence and cumulative prevalence.

Point prevalence was defined as presence of an active HAI at the time of performing the survey.

Cumulative prevalence was defined as HAI diagnosed at any time during the current hospital stay (including patients in point prevalence analysis).

Denominator for both measures was the total number of inpatients present on the respective survey days.

Infection was categorised as lower respiratory tract (LRTI) (including acute bronchitis, COPD exacerbation, clinically-suspected pneumonia with or without the presence of new infiltrate on chest x-ray, exacerbation of bronchiectasis, etc); urinary tract (UTI) (uncomplicated cystitis to urosepsis with (a) pyuria, with or without fever or urinary symptoms, and growth of at least $10^5$ CFU/ml of up to two different bacteria, or (b) pure growth of single bacterial species >$10^5$ CFU/ml, regardless of symptoms, treated by clinician as UTI, or (c) Mixed culture of >$10^5$ CFU/ml and pyuria in a symptomatic patient treated as UTI); skin and soft tissue (SSTI) (cellulitis, abscess, infected ulcers); Influenza-like illness (ILI) (acute onset fever with headache, myalgia’s, sore throat, coryza); gastrointestinal (including C. difﬁcile, gastroenteritis); and others.

This study was registered and approved by the Awhina Knowledge and Research Centre of the Waitemata District Health Board.

Statistical analysis was performed using Microsoft Analyse-it software.

**Results**

A total of 271 patients were in hospital during the two study days, including 49 new admissions. Hospital occupancy was 99% on both days. One hundred and ninety-five patients (98 in August, 97 in November), consisting of 127 medical and 68 rehabilitation-ward patients were included. Seventy-six patients had been in hospital less than 24 hours and were excluded. Data from both periods were combined. The mean patient age was 73.5 years (range 17–98 years), and females predominated (65%). Common co-morbidities included ischaemic heart disease (n=63), diabetes (n=50) and chronic lung disease (n=32). Fifteen patients had advanced dementia. Ethnicity data revealed that 72% of respondents were New Zealand Europeans, 12% Pacific peoples, 3.6% Māori and 3.6% Asian. Data were missing for 8.7% of participants. Patients were predominantly admitted from the community (75%) or long-term care facilities (20%).

The length of stay before the study day assessment was available only for the August cohort. This was a mean of 5.5 days (range 2–29 days) for medical patients and 12.5 days (range 2–30 days) for rehabilitation patients.

No significant differences in demographic characteristics were observed between the August and November cohorts.

Infection as admitting diagnosis

Overall, 85 episodes of infection were documented in 81 (41%) patients at the time of admission; 71 as the primary reason for admission, and 10 as secondary...
Figure 1: Spectrum of 85 infections seen on hospital admission

![Figure 1: Spectrum of 85 infections seen on hospital admission](Image)

LRTI: lower respiratory tract infection, UTI: urinary tract infection

Table 1: Characteristics and spectrum of hospital acquired infections in 21 patients

<table>
<thead>
<tr>
<th>No.</th>
<th>Age (Yr.)</th>
<th>Reason for admission</th>
<th>HAI type</th>
<th>Location at acquisition</th>
<th>Duration of stay before HAI (days)</th>
<th>Indwelling device</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>91</td>
<td>Rehab. post hip arthroplasty</td>
<td>UTI</td>
<td>Rehab.</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>93</td>
<td>Reduced mobility</td>
<td>UTI</td>
<td>Rehab</td>
<td>10</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>81</td>
<td>Stroke, UTI</td>
<td>LRTI-HA</td>
<td>Gen Med</td>
<td>2</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
<td>Pneumonia</td>
<td>UTI</td>
<td>Gen Med</td>
<td>10</td>
<td>IDC</td>
</tr>
<tr>
<td>5</td>
<td>94</td>
<td>Mechanical fall</td>
<td>UTI</td>
<td>Rehab</td>
<td>17</td>
<td>IDC, IVL</td>
</tr>
<tr>
<td>6</td>
<td>83</td>
<td>UTI, pneumonia, cellulitis</td>
<td>C. difficile</td>
<td>Gen Med</td>
<td>40</td>
<td>IDC, IVL</td>
</tr>
<tr>
<td>7</td>
<td>81</td>
<td>UTI</td>
<td>LRTI-HA</td>
<td>Gen Med</td>
<td>4</td>
<td>IVL</td>
</tr>
<tr>
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<td>98</td>
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<td>LRTI-HA</td>
<td>Rehab</td>
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</tr>
<tr>
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<td>70</td>
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<td>Wound</td>
<td>Rehab</td>
<td>48</td>
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<td>11</td>
<td>85</td>
<td>Collapse</td>
<td>Wound PPM UTI</td>
<td>Gen Med</td>
<td>20</td>
<td>IVL</td>
</tr>
<tr>
<td>12</td>
<td>88</td>
<td>COPD exacerbation</td>
<td>UTI</td>
<td>Gen Med</td>
<td>11</td>
<td>IDC</td>
</tr>
<tr>
<td>13</td>
<td>84</td>
<td>Cellulitis</td>
<td>UTI</td>
<td>Gen Med</td>
<td>25</td>
<td>IDC</td>
</tr>
<tr>
<td>14</td>
<td>81</td>
<td>Rehab post hip arthroplasty</td>
<td>LRTI-HA</td>
<td>Rehab</td>
<td>6</td>
<td>IVL</td>
</tr>
<tr>
<td>15</td>
<td>87</td>
<td>Pneumonia</td>
<td>Wound—pressure sore</td>
<td>Rehab</td>
<td>31</td>
<td>IVL</td>
</tr>
<tr>
<td>16</td>
<td>79</td>
<td>Rehab post hip fracture</td>
<td>UTI</td>
<td>Rehab</td>
<td>1</td>
<td>IVL</td>
</tr>
<tr>
<td>17</td>
<td>N/A</td>
<td>N/A</td>
<td>UTI</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>85</td>
<td>Collapse</td>
<td>UTI</td>
<td>Rehab</td>
<td>8</td>
<td>None</td>
</tr>
<tr>
<td>19</td>
<td>90</td>
<td>Fall</td>
<td>UTI</td>
<td>Gen med</td>
<td>6</td>
<td>IVL</td>
</tr>
<tr>
<td>20</td>
<td>88</td>
<td>Mobility issues</td>
<td>UTI</td>
<td>Rehab</td>
<td>14</td>
<td>None</td>
</tr>
<tr>
<td>21</td>
<td>86</td>
<td>Fall</td>
<td>UTI, LRTI-HA</td>
<td>Rehab</td>
<td>21</td>
<td>None</td>
</tr>
</tbody>
</table>

diagnosis. Lower respiratory tract infections were the most prevalent form of infection (Figure 1). Other common infections on admission included urinary tract infections and cellulitis. Influenza-like illness were only seen in August.

Notably, of the 35 patients with primary admitting diagnosis of LRTI, only 14 had a definite indication for antibiotic use ie, chest x-ray with consolidation (11) or positive sputum culture/urinary antigen without consolidation (3).

Hospital-acquired infections

Twenty-one patients developed 25 episodes of HAI, identified between admission and study dates (cumulative HAI prevalence of 10.7%). Ten patients had an HAI present on the study days (point prevalence 5%). Information on demographics and device use was unavailable for one patient. Table 1 shows the individual characteristics of patients and spectrum of HAIs. The mean age of patients was 85 years and total length of stay 33 days. The mean duration of stay prior to diagnosis of HAI was 14.5 days (range 1–48 days).

Urinary tract infections were the most common HAI in 13 patients (62%), and included two cases of urosepsis. Other HAIs included six hospital acquired LRTIs, three wound infections and one case of C. difficile colitis. Approximately 60% of HAI events with positive cultures yielded E. coli or Klebsiella sp. (including ESBL-producing Enterobacteriaceae).

An indwelling device was present in 89 patients (45.6%); 75 had peripheral intravenous lines and 12 had urinary catheters. Eight of 12 urinary catheters were long-term and present on admission. Twelve of 66 patients (18%) in the rehabilitation ward had indwelling devices compared to 76 of 127 medical patients (60%). Table 2 shows selected characteristics of patients diagnosed with an HAI compared to the non-HAI group. We offer this table for descriptive purposes only, as we cannot draw conclusions on any differences between these groups without control of confounding or mediating factors. Patients with HAI were older and more likely present in rehabilitation ward at the time of diagnosis. Average length of stay was much longer in HAI group, but the study was not designed to assess whether this was a risk factor for the HAI or a consequence of the HAI. A high proportion of patients (43% and 46%) had either an indwelling peripheral vascular catheter or urinary catheter present prior to diagnosis of HAI. In contrast, only 16 (8%) had invasive procedures performed (19% in HAI and 6.8% in non-HAI group). There were no immediate post-surgical patients in the study cohort. None of the 4 HAI’s were directly related to the procedure performed. No difference was found in terms of presence of indwelling devices or invasive procedures in the HAI vs non-HAI group.

### Table 2: Selected baseline clinical characteristics and overall duration of hospital stay in patients with and without hospital-acquired infections.

<table>
<thead>
<tr>
<th></th>
<th>HAI n=21</th>
<th>Non-HAI n=174</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age (years)</td>
<td>85.6</td>
<td>75.2</td>
</tr>
<tr>
<td>Male sex</td>
<td>28%</td>
<td>40%</td>
</tr>
<tr>
<td>Average length of total stay (days)</td>
<td>32.9</td>
<td>15.1</td>
</tr>
<tr>
<td>Location in rehabilitation ward at time of HAI</td>
<td>71%</td>
<td>29%</td>
</tr>
<tr>
<td>% with indwelling devices prior to HAI diagnosis (n=89)</td>
<td>43% (n=9)</td>
<td>46% (n=80)</td>
</tr>
<tr>
<td>% with invasive procedures prior to HAI diagnosis (n=16)</td>
<td>19% (n=4)</td>
<td>6.8% (n=12)</td>
</tr>
</tbody>
</table>

Discussion

Infections are a common reason for admission to hospital. In addition, hospital acquired infections can complicate inpatient stay. Our study shows that in adult patients hospitalised for more than 24 hours, clinically diagnosed infections were present in 41% at the time of admission either as a primary or
Hospital-acquired infections are common. It is estimated that about 10% of patients admitted to a hospital in New Zealand, or any developed country, will acquire a healthcare-related infection. In our study, HAIs occurred with a cumulative prevalence of 10.7% and point prevalence of 5%. The HAI point-prevalence rate of 5% is comparable with other studies, including a recent Centers for Disease Control and Prevention (CDC) study of acute care hospitals in the US, which showed that on any given day, about 4% patients had at least one healthcare-related infection. Eurosurveillance data from acute care hospitals in Europe between 2011 and 2012, showed that on any given day 5.7% of patients (ie, one in 18 patients) had at least one HAI. In our study population, UTIs were the most common HAIs and were often catheter-associated. Two-thirds of those with catheter-related UTIs had long-term urinary catheters and in these patients hospital onset infections would not be easily preventable. In this study, the mean duration of hospital stay in patients with HAI was 33 days, compared to the non-HAI patients (15.1 days), and the duration of stay prior to HAI diagnosis (14.5 days). Since this study was not specifically designed to assess the contribution of HAI to length of hospital stay, we are unable to draw any conclusions from this observation.

HAIs are costly, both financially for the healthcare facility and for the patient in terms of loss of income and effects on quality of life. A study by Burns et al in 2010 looked at the cost of HAIs, and in particular the cost of blood stream infections occurring in adult patients admitted to Auckland City Hospital. They showed that the cost of hospital-associated blood stream infections (HA-BSIs) in a combined group of medical and surgical patients (excluding those on renal replacement therapy) was in excess of $20,000 per case. The main factor contributing to the additional cost was the longer length of stay.

Our study was performed by utilising the services of training doctors who, after an initial information session with the study investigators about data collection, completed the survey questions for their respective team patients in a real time. This approach minimised recall or interpretation bias. However, several limitations need mention. Firstly, we assessed the burden of infection in adult patients only admitted to a medium-sized Auckland hospital where no acute surgical services are present. Results may therefore not be generalised to other centres. Secondly, our exclusion of patients with less than 24-hour stay may have underestimated infections diagnosed on admission. Thirdly, we used clinician-based diagnosis criteria for respiratory tract infections to reflect ‘real-world’ practice, since the majority of these patients are prescribed antibiotics. This possibly over-estimated the true prevalence of infections. Fourthly, our assessment of cumulative HAI prevalence was based on hospital stay till the study day, which would not capture patients with HAI during the remaining period of hospitalisation. Despite these limitations, we highlight the continuing high burden of infectious diseases in adult patients admitted to hospital with consequent pressure on bed numbers, as well as antibiotic usage. In addition, our cumulative rate of hospital-acquired infections of approximately 10% has major implications in terms of costs to both healthcare institutions and patients. Risk factors for HAIs are well known and include devices such as intravenous lines, indwelling catheters, broad-spectrum antibiotics (predisposing to \textit{C. difficile}) etc. Some factors are modifiable and best practice recommends avoiding unnecessary devices, removal of ‘idle’ catheters, strict adherence of hand hygiene, and rationalisation of antibiotic use to reduce the risk of these infections.

In conclusion, this study shows that infections continue to be a significant source of morbidity in hospitalised adult patients in New Zealand, both at the time of admission and during hospitalisation.


Late-life self-harm in the Waikato region
WA de Beer, J Murtagh, G Cheung

ABSTRACT
AIMS: Late-life suicide is a growing public health concern in New Zealand. Given that suicide attempt is one of the strongest predictors of future suicide, the aim of this study was to examine the characteristics of older people (ages≥65) who presented to the Waikato Hospital Emergency Department following an episode of self-harm between 1 July, 2010, and 30 June, 2013.

METHODS: Existing hospital databases and clinical recording systems for medical and psychiatric records were used to identify the sample. Data was collected retrospectively.

RESULTS: Of the 52 cases of elderly self-harm, 63.5% were classified as suicide attempt; 19.2% were self-injurious behaviour with no suicide intent; and 17.3% were self-injurious behaviour where the suicide intent was unknown. Overdose was the most common method (65.4%). 61.5% of the cases reported perceived physical illness as a stressor; while 50% were diagnosed with depression. 13.7% had repeated self-harm in the following 12 months.

CONCLUSIONS: This study has highlighted the role of physical illness and depression in older people presenting with self-harm. Routine screening of depression in older people with chronic medical conditions and assertive treatment of depression in primary care should be considered as strategies to reduce self-harm and suicide in older people.

Suicide is a major cause of death, both internationally and in New Zealand.1 In 2004–06, suicide was the fourth leading cause of death for Māori males and the second leading cause of death for non-Māori males in New Zealand.2 The Ministry of Health has developed the New Zealand Health Strategy in an effort to reduce the rate of suicide and suicide attempts.3

Late-life suicide has become a growing public health concern among New Zealand’s ageing population. The suicide rate for older people (65 years and over) was 7.3 per 100,000 people, which is lower than the age-standardised rate of 10.6 per 100,000 people.4 However, the rates for the 65+ age group ranged widely, from 5.7 (age 65–69) to 22.2 (age 80–84) per 100,000 males, and from 1.3 (age 70–74) to 10.5 (age 85+) per 100,000 females. The absolute number of suicide and suicide attempts among older people are likely to rise as the proportion of older people in the population increases.5 Chronic medical conditions have been identified as a significant risk factor for suicide and suicide attempts in older people.6,7 With advances in health care, the number of older people living with chronic medical conditions, and therefore at risk of suicide and suicide attempts, will also increase.

A history of previous suicide attempt is one of the strongest predictors of future completed suicide, particularly in older people.6 Older people who previously attempted suicide had a higher mortality rate (from both natural medical causes and completed suicide) than the general population, and they used more lethal means.8,9,10,11 A Medline literature review on attempted suicide between 1985 and 1994 showed that 9 to 18% of older people who had made a suicide attempt would make further attempt(s) within 12 months.12 Of the 101 suicide attempters in another study, two people completed suicide within one month, while six people made further non-fatal attempts within 12 months.9 A recent retrospective study conducted in New Zealand found that almost a quarter...
(24.4%) of older people who committed suicide had a past history of suicide attempt; this association was highest (51.6%) in females aged between 65–79 years old. A French study also showed that older women were more likely to be involved in repeated suicide attempts. Mood disorder was commonly associated with late-life suicide attempt, with over two-thirds of older people who attempted suicide receiving a diagnosis of depression.

The literature on late-life suicide and suicide attempts is, however, limited in New Zealand. One Christchurch case-control study examined 53 adults aged 55 and older who died by suicide or made medically serious suicide attempts, and the risk of serious suicidal behaviour was found to be increased among people with current mood disorders, a history of psychiatric hospital admissions within the previous year, and limited social networks.

As elderly emergency department presentations with self-harm have yet to be examined in New Zealand, this study offers an opportunity to: (i) identify the incidence of self-harm presentations to the emergency department; (ii) characterise the nature of self-harm behaviour; and (iii) identify demographic and clinical factors that are associated with self-harm behaviour in the Waikato region over a 3-year period. The hope was that a better understanding of self-harm behaviour in older people would inform clinicians, public health practitioners, hospital administrators and policy makers on suicide prevention, risk assessment and management.

**Methods**

This was a retrospective, descriptive study. Ethics approval was obtained from the New Zealand Ministry of Health, Health & Disability Ethics Committee (Reference: 14/ST1).

The study population was older people (age ≥65 years) who presented to the Waikato Hospital Emergency Department (ED) following an episode of self-harm during the period of 1 July, 2010, to 30 June, 2013. Of the 20 district health boards in New Zealand, the Waikato District Health Board is the fifth largest, with a total population of 359,310 and 53,022 people (14.8%) aged 65 years and older. Two databases were accessed to identify episodes of self-harm:

1. The Consultation-Liaison (CL) psychiatry service referral database was used to identify older people who had been referred for psychiatric assessment by the ED following self-harm.
2. The existing electronic coding reports used by the ED and hospital medical records department allowed the identification of older people who presented with self-harm, but were not reviewed by the CL service eg, after-hours admission (who were either assessed by on-call staff or the Crisis Assessment Team), those who were admitted directly to the high dependency unit or medical wards for acute medical intervention. The ICD-10 codes X60-X84 for “self-harm”, “suicide attempt” and “deliberate self-harm” were used to identify this group.

Each self-harm presentation was classified using the Colombia Classification Algorithm of Suicide Assessment (C-CASA). The three suicidal behaviour categories used in this study were: (i) suicide attempt; (ii) self-injurious behaviour with no suicide intent; and (iii) self-injurious behaviour where the suicide intent was unknown.

The following four categories of data were extracted from the medical and psychiatric records of the subjects identified by the CL psychiatric service and ED databases.

2. Assessment and diagnosis: Past and current psychiatric diagnosis (depression, bipolar disorder, schizophrenia), antidepressant prescription at the time of self-harm, co-existent physical illnesses (dementia, malignancy, terminal illnesses and pain), non-psychiatric admission in the past 12 months, past history of self-harm.
3. Information about the self-harm: Location of self-harm, date of self-harm, method, acute stressors (death of first-degree relative, perceived disability and/or suffering from physical illness, terminal illness
### Table 1: Socio-demographic factors and information about the self-harm

<table>
<thead>
<tr>
<th></th>
<th>Male (N=23) n (%)</th>
<th>Female (N=29) n (%)</th>
<th>Total (N=52) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age groups (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65–79</td>
<td>17 (73.9)</td>
<td>26 (89.7)</td>
<td>43 (82.7)</td>
</tr>
<tr>
<td>≥80</td>
<td>6 (26.1)</td>
<td>3 (10.3)</td>
<td>9 (17.3)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>20 (87.0)</td>
<td>24 (82.8)</td>
<td>44 (84.6)</td>
</tr>
<tr>
<td>Māori</td>
<td>2 (8.7)</td>
<td>1 (3.4)</td>
<td>3 (5.8)</td>
</tr>
<tr>
<td>Asian</td>
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<td>1 (3.4)</td>
<td>1 (1.9)</td>
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<td>1 (4.3)</td>
<td>3 (10.3)</td>
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</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Married/de facto*</td>
<td>11 (47.8)</td>
<td>16 (55.2)</td>
<td>27 (51.9)</td>
</tr>
<tr>
<td>Other</td>
<td>11 (47.8)</td>
<td>10 (34.5)</td>
<td>21 (40.4)</td>
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<td>1 (4.3)</td>
<td>3 (10.3)</td>
<td>4 (7.7)</td>
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<tr>
<td><strong>Lived alone</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>17 (73.9)</td>
<td>16 (55.2)</td>
<td>33 (63.5)</td>
</tr>
<tr>
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<td>3 (13.0)</td>
<td>9 (31.0)</td>
<td>12 (23.1)</td>
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<td>7 (13.5)</td>
</tr>
<tr>
<td><strong>Self-harm location</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>13 (56.5)</td>
<td>14 (48.3)</td>
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<td>Other</td>
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<td>1 (1.9)</td>
</tr>
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<td>Unknown</td>
<td>9 (39.1)</td>
<td>15 (51.7)</td>
<td>24 (46.2)</td>
</tr>
<tr>
<td><strong>Self-harm method</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overdose</td>
<td>14 (60.9)</td>
<td>20 (69.0)</td>
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</tr>
<tr>
<td>Laceration</td>
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<td>3 (10.3)</td>
<td>8 (15.4)</td>
</tr>
<tr>
<td>Multiple means</td>
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<td>5 (17.2)</td>
<td>7 (13.5)</td>
</tr>
<tr>
<td>Others (vehicle, CO poisoning, chemical ingestion)</td>
<td>2 (8.7)</td>
<td>1 (3.4)</td>
<td>3 (5.8)</td>
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<tr>
<td><strong>C-CASA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicide attempt</td>
<td>16 (69.6)</td>
<td>17 (58.6)</td>
<td>33 (63.5)</td>
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<tr>
<td>Self-injuries behavior with no suicide intent</td>
<td>6 (26.1)</td>
<td>4 (13.8)</td>
<td>10 (19.2)</td>
</tr>
<tr>
<td>Self-injuries behavior with unknown suicide intent</td>
<td>1 (4.3)</td>
<td>8 (27.6)</td>
<td>9 (17.3)</td>
</tr>
</tbody>
</table>

* 2013 census: 62.1% older people (65+) were in partnership (spouse/de facto/partnered)\(^a\)

^a 2013 census: 28.8% older people (65+) were in a one-person household\(^b\)
### Table 2: History of psychiatric & physical conditions and follow-up in 12 months

<table>
<thead>
<tr>
<th></th>
<th>Male (N=23) n (%)</th>
<th>Female (N=29) n (%)</th>
<th>Total (N=52) n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Already under mental health service</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 (30.4)</td>
<td>13 (44.8)</td>
<td>20 (38.5)</td>
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<tr>
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<td>16 (69.6)</td>
<td>16 (55.2)</td>
<td>32 (61.5)</td>
</tr>
<tr>
<td><strong>Depression</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 (43.5)</td>
<td>16 (55.2)</td>
<td>26 (50.0)</td>
</tr>
<tr>
<td>No</td>
<td>8 (34.8)</td>
<td>11 (37.9)</td>
<td>19 (36.5)</td>
</tr>
<tr>
<td><strong>Schizophrenia/Schizoaffective disorder/Psychosis NOS</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>7 (30.4)</td>
<td>0 (0)</td>
<td>7 (13.5)</td>
</tr>
<tr>
<td>No</td>
<td>16 (69.6)</td>
<td>0 (0)</td>
<td>16 (82.7)</td>
</tr>
<tr>
<td><strong>Bipolar disorder</strong></td>
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<td></td>
<td></td>
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<tr>
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<td>2 (3.8)</td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>27 (93.2)</td>
<td>27 (51.9)</td>
</tr>
<tr>
<td><strong>Dementia</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (17.4)</td>
<td>2 (6.9)</td>
<td>6 (11.5)</td>
</tr>
<tr>
<td>No</td>
<td>17 (73.9)</td>
<td>24 (82.8)</td>
<td>41 (78.8)</td>
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<td>2 (8.6)</td>
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<tr>
<td><strong>Malignancy</strong></td>
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<td></td>
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<tr>
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<td>3 (5.8)</td>
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<td>No</td>
<td>23 (100.0)</td>
<td>26 (89.7)</td>
<td>49 (94.2)</td>
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<td><strong>Terminal illness</strong></td>
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<td></td>
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<tr>
<td>No</td>
<td>23 (100.0)</td>
<td>27 (93.1)</td>
<td>50 (96.2)</td>
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<td>2 (6.9)</td>
<td>2 (3.8)</td>
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<tr>
<td><strong>Non-psychiatric hospital admission in past 12 months</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17 (73.9)</td>
<td>13 (44.8)</td>
<td>30 (57.7)</td>
</tr>
<tr>
<td>No</td>
<td>6 (26.1)</td>
<td>16 (55.2)</td>
<td>22 (42.3)</td>
</tr>
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<td><strong>Past history of self-harm</strong></td>
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<td></td>
<td></td>
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<td>6 (26.1)</td>
<td>7 (24.1)</td>
<td>13 (25.0)</td>
</tr>
<tr>
<td>No</td>
<td>17 (73.9)</td>
<td>21 (72.4)</td>
<td>38 (73.1)</td>
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<td>0 (0)</td>
<td>1 (3.4)</td>
<td>1 (1.9)</td>
</tr>
<tr>
<td><strong>Repeated self-harm in 12 months</strong></td>
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<td></td>
<td></td>
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<td>4 (17.4)</td>
<td>3 (10.3)</td>
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<tr>
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<td>19 (82.6)</td>
<td>25 (86.2)</td>
<td>44 (86.3)</td>
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<td>1 (1.9)</td>
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<td><strong>Follow up by mental health service</strong></td>
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<td>Yes</td>
<td>18 (79.3)</td>
<td>22 (75.9)</td>
<td>40 (76.9)</td>
</tr>
<tr>
<td>No</td>
<td>5 (21.7)</td>
<td>7 (24.1)</td>
<td>12 (23.1)</td>
</tr>
</tbody>
</table>

*NOS=not otherwise specified*
in first-degree relative or carer, family discord, changed relationship/death of friend, relationship separation, financial trouble, employment change, legal difficulties).

4. Longitudinal data 12 months after an index self-harm episode: Repeated self-harm attempt, suicide, deaths.

**Results**

There were a total of 52 self-harm presentations in the 3-year period. Twenty-three (44%) were male (mean age=76 years, SD=7.9 years) and 29 (54%) were female (mean age=70 years, SD=6.5 years). The other demographic data and information about the self-harm are shown in Table 1.

Overdose (n=34, 65.4%) was the most common method of self-harm, followed by lacerations (n=8, 15.4%) and multiple means (n=7, 13.5%). Five cases that used multiple means involved an overdose of medication with alcohol; one case involved an overdose of medication with poisons; and another was an overdose of medication with carbon monoxide poisoning. Of the ten cases of self-injurious behaviour with no suicide intent, four cases took an accidental overdose.

Histories of psychiatric and physical conditions are shown in Table 2. Depression was the most common psychiatric diagnosis, 50% of the cases had a diagnosis of depression at the time of the self-harm or were given a diagnosis when assessed following the self-harm incident. A further seven cases (13.5%) were experiencing depressive symptoms, but did not meet the criteria for a diagnosis of depression. A total of 27 cases (51.9%) were taking antidepressant medication at the time of self-harm.

The most common background stressor for self-harm was perceived physical illness, which was found in 32 (61.5%) cases. Examples of physical illnesses included chronic obstructive pulmonary disease, arthritis and macular degeneration. Pain was also a common finding at the time of self-harm, with 22 (42.3%) cases identifying pain as a factor (in particular, pain from arthritis and chronic back pain). Over half (57.7%) of the cases had at least one non-psychiatric hospital admission in the 12 months prior to the self-harm.

The other stressors that were reported by older people: family discord (59.4%), changed relationship/death of friend (50.0%), death of first-degree relative (48.5%), financial trouble (37.0%), terminal illness in first-degree relative or carer (22.9%), relationship separation (20.5%) and legal difficulties (12.1%).

Twenty cases (38.5%) were under the care of Mental Health & Addiction Services at the time of self-harm. 50% of the cases had a diagnosis of depression and 14% were experiencing depressive symptoms. Their background stressors of self-harm were similar to the entire sample: perceived illness (60.0%), family discord (40.0%), changed relationship/death of friend (35.0%), death of first-degree relative (25.0%), terminal illness in first-degree relative or carer (15.0%), relationship separation (15.0%) and financial trouble (10.0%).

Seven cases (13.7%) repeated self-harm in the 12 months following the index self-harm episode (Table 2). There was no suicide in the 12 months follow-up period, but five deaths (cause of deaths unknown in two cases) occurred in this period.

**Discussion**

The main findings of this descriptive study are consistent with that reported in the international literature on self-harm/suicide attempt in older people: (i) physical illness is a significant background stressor; (ii) depression is the most commonly diagnosed psychiatric disorder; and (iii) the rate of repeated self-harm is high, suggesting this is a very high-risk group.

Fifty-two cases of older people attempted self-harm in the 3-year period. Using the 2013 census data on the population in the Waikato region, this represents a 12-month rate of 0.0327% (male=0.0312%; female=0.0339%). This rate is slightly higher than the 2011 New Zealand national figures on intentional self-harm hospitalisations published by the Ministry of Health (rates ranged from 0.0198% to 0.0304% for the five 5-year age bands aged 65 and older). Our study used self-harm emergency department presentations, rather than hospitalisations, as the sampling frame. The higher rate found is likely to be explained by the fact that not every self-harm presentation to an emer-
gency department would result in hospital admission. Older females had a slightly higher rate of self-harm than males in our study. Conwell et al suggested that males were more successful at completing suicide than females, which may have reduced the number of older males that present to the ED. Older Māori were under-represented in our sample at only 5.8%. The 2013 census data recorded 4,690 Māori people aged 65 years and older living in the Waikato region (ie, 11.6% of the region's total population). Cheung et al also found an under-representation of older Māori in the number of completed suicides in New Zealand. The under-representation of older Māori in suicide and self-harm statistics could suggest Māori family and cultural practices may protect against elderly suicidal behaviour, but further research is required to explore this relationship.

Overdose at home was found to be the preferred method of self-harm in our study and was consistent with other international studies. This might be explained by the high numbers of prescription medications issued to older people (ie, ease of access). Overdose on prescribed medications offered a less traumatic and painful self-harm attempt. In this study, zopiclone and opiates were the most common medications used in overdose. This was in keeping with current literature, which has identified these medications are frequently prescribed for older people.

After 12 months, 90.4% of cases were alive in this study. We were not able to determine the cause of death in two cases, and the possibility of suicide cannot be excluded. The 12 month repeated self-harm rate of 13.7% found in our study falls within the range of 9 to 18% reported in a previous literature review. The New Zealand Mental Health Survey found community-dwelling older people (age ≥65) had a 12 month suicide attempt prevalence of 0.1%. Therefore, our 12 month repeat self-harm rate is over a hundred times higher than the general rate in the community. Older people with a history of self-harm represent a very high-risk group for repeated self-harm behaviour.

It has widely been reported in the literature that mood disorders, in particular depression, are strongly associated with suicide and suicide attempt, regardless of age. In our study, 50% of cases fulfilled criteria for a diagnosis of depression at the time of self-harm, with a further 14% displaying symptoms of depression without a definitive diagnosis. Despite this high prevalence of mental illness, only 39% of cases were receiving care from the mental health services at the time of self-harm, highlighting potential detection/screening difficulties for this population group in the primary care sector. Suicide prevention and risk assessment at primary care level may provide an opportunity to engage and assess this population, thereby improving clinical management of high-risk individuals.

We found perceived disability and/or suffering due to physical illness was commonly identified as a background stressor of self-harm. A previous case-control study found that older people (age ≥65) who had attempted suicide had a higher rate of medical illnesses as measured by the Cumulative Illness Rating Scale. Other studies have also shown an association of physical illness and suicide attempt. For example, Allebeck and Bolund found an increase in suicide attempt rate and a diagnosis of cancer in men aged 60–69 (SMR=2.3, 95% CI=1.4–3.5) and aged 80–89 (SMR=2.7, 95% CI=1.6–4.5), but not in other groups (men aged 70–79; women aged 60–89).

In a 2005 study, the diagnosis of malignancy (along with stroke, diabetes mellitus, arthritis and bone fracture) was associated with an increased risk of attempted suicide in older people, but this association was not found in an earlier Japanese study. Another 2006 study investigated the life-time history of suicide attempts and coronary artery disease in people aged 65 years and older who reported a significant association between suicide attempts and coronary artery disease, even after depression was taken into account.

Other studies have suggested that the association between physical illness and suicide is seldom direct, but is largely mediated through mood and other mental health factors. Compared to the international literature on physical illness and its relationship to suicidal ideation or suicide, the literature on physical illness and self-harm attempts in older people is limited.

Several limitations to the study design have reduced the strength of the current
Firstly, although this study reported all self-harm cases in a 3-year period, the sample size was small and the sample was drawn from one location. Our findings may therefore not be generalisable to other parts of New Zealand. However, the proportion of older people in our region is similar to that of the proportion in the New Zealand population. Secondly, incomplete medical records saw a proportion of the data set missing (reported as “unknown” in the tables). In addition, some of the records lacked comprehensiveness and specificity. Thirdly, the diagnoses of depression, dementia, bipolar disorder and other psychotic disorders were based on the mental health clinicians’ clinical impressions, and not on standardised diagnostic classifications (eg, DSM, ICD). Further prospective studies, with a larger sample size and including other locations in New Zealand, will be useful to examine the causal relationships with the variables we have identified in this study.

Despite these limitations, this study has highlighted the importance of perceived physical illness and depression in older people presenting with self-harm, and this group of older people represents a very high-risk group of repeated self-harm, and possibly suicide. Along with the international literature on late-life suicide behaviour, our findings can be used to inform a number of intervention points to address self-harm and suicide in older people. These include:

i. Routine screening of depression and suicide risk in older people with chronic medical conditions in primary care and hospital specialist services.

ii. Assertive treatment of depression in primary care.

iii. Better integration between mental health services, geriatric medicine, primary care and hospital specialist services for older people with physical illnesses and depression, particularly those with suicide risk.

iv. Limiting the amount of prescription medication to at-risk older people.

v. Active follow-up and treatment for older people following an episode of self-harm, including the use of evidence-based psychological treatment for late-life depression (eg, cognitive behavioral therapy, interpersonal psychotherapy and problem solving therapy) to assist older people to adjust and adapt to their physical illnesses.

In coming decades, the elderly population in New Zealand will continue to increase. More work is needed to address depression-related morbidity and mortality in this vulnerable group. Improving our current understanding of late-life suicidal behaviour is required for the development of age-specific clinical services and suicide prevention strategies. Furthermore, identifying the factors associated with late-life suicidal behaviour can improve the identification of at risk older people and their clinical management.

**Competing interests:** Nil

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**URL:**
REFERENCES:


Prescriber compliance with renal function monitoring in patients taking dabigatran (Pradaxa)

Katie Thorne, Stephen Dee, Sisira Jayathissa

ABSTRACT

AIM: To assess whether patients prescribed dabigatran had their renal function monitored in accordance with published guidelines.

METHODS: We recruited patients from Hutt Hospital and two large primary care practices if they were prescribed dabigatran between July 2011 and April 2012. We assessed patients prescribed dabigatran for more than a year to ascertain whether renal function was monitored at least annually, in keeping with guidelines.

RESULTS: All patients had baseline renal function testing. At baseline, 42 (60%) had an eGFR (estimated Glomerular Filtration Rate) over 60mL/min/1.73m² and 28 (40%) had eGFR between 30-60mL/min/1.73m². Median follow up was 46 months. Whilst taking dabigatran, 44 of the 70 patients (63%) had at least annual renal function.

CONCLUSIONS: Over one-third of patients taking dabigatran for over a year did not have their renal function monitored in keeping with current guidelines, potentially leading to an increased risk of bleeding. We suggest there is a need for an automated reminder to prompt annual renal function testing.

Dabigatran is predominantly excreted via the kidneys; up to 80%. Renal impairment has been shown through pharmacokinetic modeling to lead to a prolonged half-life and increased plasma concentrations of dabigatran and consequently an increased risk of bleeding. Dabigatran has been licensed for use in patients with non-valvular atrial fibrillation and deep vein thrombosis prophylaxis in New Zealand since July 2011. Since 2014, it was also licensed for treatment of venous thromboembolism (VTE).

The national Medsafe data sheet, as well as Best Practice Advisory Committee (BPAC) guidelines, recommend that patients taking dabigatran should have their renal function checked prior to starting dabigatran and monitored at least annually. Dabigatran should not be prescribed for patients with a creatinine clearance of less than 30mL/min. It is also recommended that any patient with a clinical scenario which may cause an acute kidney injury, such as severe dehydration, has their renal function checked.

Renal function is known to deteriorate with advancing age, through both physiological and structural changes, as well as increasing frequency of medical conditions such as diabetes, hypertension and atherosclerosis. These patients are more vulnerable to acute changes in renal function, leading to higher plasma levels of dabigatran and increased bleeding risk. It is therefore essential to closely monitor renal function in at-risk older patients and discontinue their dabigatran if there is deterioration in renal function.

Harper et al detailed a series of cases of bleeding secondary to dabigatran amongst patients in New Zealand. They cited the risk factors of renal impairment and advanced age, as well as low body weight, as being significant risk factors for increased risk of bleeding whilst taking dabigatran.

We encountered two patients who had normal renal function at the time of being started on dabigatran, but subsequently presented with deterioration in renal function and bleeding. One of these patients...
died due to irreversible gastro-intestinal bleeding, and the other patient survived, but required admission to intensive care and a prolonged hospital admission.

We could not identify any studies examining adherence to guidelines for renal function monitoring in patients prescribed dabigatran. We therefore conducted a study of the previously studied cohort of patients from the Hutt Valley region to examine whether renal function had been monitored at least annually, according to published guidelines.

**Methods**

We recruited patients from Hutt Hospital and the two largest general practices in Lower Hutt city. They were identified by healthcare staff in the hospital and through Primary Healthcare databases. All patients must have taken at least one dose of dabigatran between July 2011 and April 2012. For the current study, we excluded patients if they had not taken dabigatran for at least a year. Registered nurses at patients’ Primary Healthcare Organisations (PHO) were contacted by phone to review notes and medication lists to determine the period of time that the patient was prescribed dabigatran and confirm the dose. It was therefore not necessary to contact individual patients.

We assessed renal function monitoring by reviewing Aotea (private laboratory provider for the greater Wellington region) and Hutt Hospital laboratory results, which are the two laboratories used in this local population. We checked results of the blood tests taken prior to starting dabigatran and during the period of time the patient took dabigatran. ‘Baseline’ renal function was assessed using blood tests taken in the month prior to starting dabigatran. Renal impairment was determined using serum creatinine and patients’ age using the estimated glomerular filtration rate (eGFR), (calculated by the Modification of Diet in Renal Disease formula).

Data was entered onto Microsoft Excel spreadsheet. We present descriptive statistics pertaining to the study questions. Central Regional Ethics Committee granted ethical approval for this study.

**Results**

In the original cohort, we identified 102 patients and recruited 92 patients. A further 22 patients were excluded from analysis for the current study, as they did not take dabigatran for at least 1 year and so appropriate annual renal monitoring could not be assessed. Therefore, the current study population consisted of 70 patients. The indication for dabigatran was atrial fibrillation for 68 patients, atrial flutter for 1 patient and another took it for recurrent VTE.

Baseline demographics for the 70 patients who took dabigatran for more than a year are listed in Table 1. Median total follow-up

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**Table 1: Baseline patient characteristics**

<table>
<thead>
<tr>
<th>Patient characteristic</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>&lt;64</td>
<td>13 (19%)</td>
</tr>
<tr>
<td>65–74</td>
<td>22 (31%)</td>
</tr>
<tr>
<td>75–80</td>
<td>11 (16%)</td>
</tr>
<tr>
<td>&gt;80</td>
<td>24 (34%)</td>
</tr>
<tr>
<td>Gender (Female)</td>
<td>38 (54%)</td>
</tr>
<tr>
<td>Baseline eGFR (mL/min/1.73m²)</td>
<td></td>
</tr>
<tr>
<td>&gt;60</td>
<td>42 (60%)</td>
</tr>
<tr>
<td>30–60</td>
<td>28 (40%)</td>
</tr>
<tr>
<td>&lt;30</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>50–100</td>
<td>61 (88%)</td>
</tr>
<tr>
<td>&gt;100</td>
<td>8 (11%)</td>
</tr>
<tr>
<td>Dose 110mg BD</td>
<td>41 (59%)</td>
</tr>
<tr>
<td>AF clinic input</td>
<td>27 (39%)</td>
</tr>
</tbody>
</table>
time from starting dabigatran therapy to the current study was 46 months. The majority of patients included were over the age of 65 years; median age 77 years (ranging from 34 to 93 years old) and 38 (54%) patients were women. 13 (19%) were under the age of 65, 22 (31%) were aged 65–74, 11 (16%) were 75–80 and the remaining 24 (34%) were over 80 years old. 27 (39%) patients were seen at least once in the Hutt Hospital Atrial Fibrillation clinic, after being started on dabigatran.

Forty-one patients took the 110mg, twice daily dose of dabigatran, and 29 took 150mg twice a day. The reasons for using the lower dose were: age over 75 for 15 patients; renal impairment with eGFR below 60mL/min for 13 patients; and both age and renal impairment for 5 patients. The rationale for using the lower dose in the remaining 8 patients is unclear as they were under the age of 75 years and all had an eGFR over 60mL/min/1.73m². Prior to starting dabigatran, 28 (40%) had an eGFR under 60mL/min/1.73m² and none had an eGFR under 30mL/min/1.73m².

At the start of treatment, 42 patients had a baseline eGFR of over 60mL/min/1.73m². Whilst taking Dabigatran, 44 (63%) had their renal function monitored at least annually. Just over half (57%) of the patients in the group who had at least annual renal function testing had a baseline eGFR above 60mL/min/1.73m². In the group of 26 patients who did not have renal function checked at least once a year, 17 had a baseline eGFR over 60mL/min/1.73m², and 9 of them had a baseline eGFR between 30 and 60mL/min/1.73m² (Table 2). Ten (37%) patients who did not have renal function monitoring at least once a year were seen at least once in the specialist Atrial Fibrillation clinic at the hospital after being started on dabigatran.

### Discussion

Our study showed that over a third of patients included did not have renal function testing in keeping with published guidelines. None of the patients had an eGFR of less than 30mL/min/1.73m² on baseline testing. However, half of the study population were aged over 75 years, and it is recognised that renal function is more likely to deteriorate in elderly patients. More than a third of the patients in the group who did not have at least annual renal function monitoring were seen in a hospital Atrial Fibrillation clinic at least once after being started on dabigatran therapy. This would suggest that there is a need for increased vigilance for those working in both secondary and primary care centres. Increasing involvement of specialist reviews may not increase adherence with recommended renal function monitoring.

It appears that prescribers of dabigatran are aware of the need for assessing renal function monitoring prior to starting therapy, since all patients had a baseline

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**Table 2: Demographics for groups monitored less than annually and at least annually**

<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>Monitored less than annually (26)</th>
<th>Monitored at least annually (44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;64</td>
<td>7 (27%)</td>
<td>6 (13%)</td>
</tr>
<tr>
<td>65-74</td>
<td>8 (31%)</td>
<td>14 (32%)</td>
</tr>
<tr>
<td>75-80</td>
<td>1 (4%)</td>
<td>10 (23%)</td>
</tr>
<tr>
<td>&gt;80</td>
<td>10 (38%)</td>
<td>14 (32%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>12 (46%)</td>
<td>26 (59%)</td>
</tr>
<tr>
<td>Baseline eGFR (mL/min/1.73m²)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;60</td>
<td>17 (65%)</td>
<td>25 (57%)</td>
</tr>
<tr>
<td>30-60</td>
<td>9 (35%)</td>
<td>19 (43%)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>0 (0%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>50-100</td>
<td>22 (85%)</td>
<td>40 (91%)</td>
</tr>
<tr>
<td>&gt;100</td>
<td>4 (15%)</td>
<td>3 (7%)</td>
</tr>
<tr>
<td>Dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110mg BD</td>
<td>17 (65%)</td>
<td>24 (55%)</td>
</tr>
<tr>
<td>AF clinic</td>
<td>9 (35%)</td>
<td>16 (36%)</td>
</tr>
</tbody>
</table>
blood test to assess renal function prior to starting dabigatran. However, our study suggests that there is not adequate knowledge of, or adherence to, the guidelines around need for ongoing renal function monitoring. Other possible contributing factors for infrequent renal function monitoring could include busy workload, repeat prescriptions or scripts being issued by locum doctors, lack of a prompt in electronic prescribing systems as well as patient factors such as not getting the blood tests completed.

Although now somewhat controversial, dabigatran was publicised at its introduction as having “No need for regular blood tests to see if blood-thinning level is in the right range”. This view has been subsequently challenged. It may have led to a perception that regular blood tests are not required and so less patient and physician recognition of the need for regular blood tests to check renal function monitoring.

An intervention which may improve frequency of renal function monitoring for patients taking dabigatran would be an electronic alert every 6 or 12 months, similar to those used already for tests such as cervical smear screening.

The numbers included in this study were too small to look at any adverse outcomes to assess whether patients who did not have renal function closely monitored were more likely to have adverse events. It is, however, well recognised that patients who are taking dabigatran and develop worsening renal impairment are at an increased risk of bleeding.

Limitations of this study include the small number of patients, due to a large proportion excluded because they were prescribed dabigatran for less than a year. Patient recruitment for the original study was also somewhat opportunistic and it is possible some patients were missed, though this is felt less likely since several patients were identified by both primary and secondary care services, requiring duplicate entries to be removed. It is also a sample of patients who were initiated on dabigatran shortly after it became licensed for use in New Zealand, therefore prescribers may have been less familiar with the drug and required monitoring. Alternatively however, it could be argued that there was a large educational campaign to help support prescribers and so there should have been adequate knowledge about dabigatran and its use, including the need for ongoing renal function monitoring. Estimated glomerular filtration rate and not creatinine clearance was recorded in this study due to not having access to the patients’ weight for necessary calculations. We did not differentiate between blood tests that were completed as part of routine care and those which were due to a clinical scenario, where renal function change may be seen. There was also limited information gathered regarding patients’ other medications and medical conditions. The results from this study may not be directly applicable to others, given that it was conducted in a small centre in New Zealand. This population does, however, represent a real world group of mostly older patients, many of whom have renal impairment and raised important issues that are relevant to many clinicians.

Conclusions

Over one-third of patients included in this study who took dabigatran for over a year did not have their renal function monitored at least annually. We believe there is a need for increased education and promotion of awareness around not only assessing renal function when initiating dabigatran, but also continuing to monitor appropriately. There may also be a role for an electronic prompt to be implemented in primary care. We have already been in contact with Primary Health Care Organisations in the Hutt Valley region to introduce these measures, and if successful hope to expand to other regions.

In addition, it is a reminder to all healthcare practitioners to remain vigilant and check patients’ renal function if they encounter any circumstances in which deterioration in renal function could occur. If worsening renal function is identified, dabigatran dose should be appropriately reviewed regarding whether dose reduction or alternative medication should be prescribed.

We hope our study will help further educate and act as a reminder of the need for regular renal function monitoring, as
well as to support development of appropriate safety systems into prescribing dabigatran. Larger national and international data-based studies may help to add further information on safety of prescribing dabigatran and adverse events in those patients who do not receive appropriate renal function monitoring.

**Competing interests:** Nil

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**REFERENCES:**
What makes a child a ‘competent’ child?

Amanda van Rooyen, Tineke Water, Shayne Rasmussen, Kate Diesfeld

ABSTRACT

Competence is a vital component of the informed consent process. The perceived level of a child's competence may influence their degree of participation in health decisions that affect them. It is the responsibility of the health professional to gauge a child's level of competence. Child competence, however, is not a static attribute that is linked to age. Rather, it is dynamic, changing in nature and dependent on a child's previous experiences, personal attributes, network of relationships around them and cultural and environmental context. Consequently, there is no single verified assessment tool to assist in the recognition of competence for New Zealand children. Adding to this complexity are the unclear interpretations of New Zealand health legislation and policy regarding whether or not a child can legally consent or refuse healthcare advice and treatment without the consent of a legal guardian. Under the Care of Children Act 2004 and the Code of Health and Disability Services Consumers' Rights 1996, the Health and Disability Commissioner states “a child may consent themselves [to health treatment] if and when the child achieves sufficient understanding and maturity to understand fully what is proposed”. This paper poses the question: What is ‘competency’ and how is this decided? For the purpose of this article, ‘child’ pertains to those under the age of 16 years.

The threshold for child competence to consent to health care treatment in New Zealand remains ambiguous. Although not clearly stated, New Zealand law infers that children under the age of 16 years may give or withhold consent to healthcare treatment, so long as they are competent to do so.1,2 Currently, it is the role of the healthcare professional to decide whether or not a child has adequate competence, which according to the Health and Disability Commissioner, is the time at which a child achieves sufficient understanding and maturity to fully comprehend the proposed treatment.1 Upholding a child's decision through the informed consent process is one way of ensuring children's rights to participation and autonomy are respected. However, competence is not only a legal concept, it is also the degree to which health professionals allow children to participate in matters that are important to them.

The process of informed consent, as explained by the Ministry of Health,3 obligates health professionals to acknowledge and respect a health consumer's right to autonomy. The main principles underlying informed consent are effective communication of full information, based on the voluntary choice of a competent person.3 To make competent decisions, children require age appropriate information that supports their health literacy and the opportunity to participate.4 Children’s competence is defined by Alderson5 as “more than a skill, it is a way of relating and can be understood more clearly when each child’s inner qualities are seen within a network of relationships and cultural influences”. Recognising competent children not only supports ethical arguments regarding respect for children's rights and their personhood; it has other more tangible benefits to both the child and healthcare services. These include improved treatment adherence, clinical effectiveness, disease prevention and delivery of health services.5-9 Secondary benefits include children learning to advocate and take responsibility for their own health, and the enhancement of their personal development and participation in society.5,9,10

The multiple benefits of involving and respecting competent children in decision
making may be evident, however the act of identifying competent children is complex and fraught with difficulties. First and foremost, competence is a dynamic state rather than a fixed attribute that a child either does or does not possess.

There are multiple internal and external factors that influence the state of a child’s competence. Some internal factors include prior experiences of illness, level of independence, ethnicity and temperament. External factors include the environment in which competence is assessed and the manner and form in which information is imparted. Changes in social and cultural contexts, media representation, and family and health professional support can also have an impact on a child’s level of competence.

Culture may dictate the manner by which health professionals impart information and conduct the informed consent process. The interface between different cultural worldviews of health professionals, children, and the children’s family may bring about opportunities for misunderstandings. On a practical basis, Brook (2000) acknowledges that competence is difficult to define, assess and measure.

Recommendations for improving New Zealand children’s participation in society and health decisions were given by the UN Committee on the Rights of the Child (CRC) in 1997, however the UNCRC Monitoring Group determined that the level of children’s participation has not progressed. The UNCRC Monitoring Group has representatives from non-governmental organisations and representatives from two Independent Crown entities, the Office of the Children’s Commissioner and the Human Rights Commission. The report ‘Kids Missing Out’, released by UNICEF in December, 2013, was a stocktake of New Zealand’s progress on implementing United Nations Convention on the Rights of the Child (UNCRC). It stated:

*Initiatives to allow children to have a say in matters that affect them have not always been sustained, there are very few processes for eliciting children’s views on legislative and policy development, and children’s ability to participate in judicial and administrative proceedings is variable.*

Child participation is also recognised by the Human Rights Commission in the National Plan of Action for the Promotion and Protection of Human Rights (NPA), which was due to be completed in June 2015. Taking into account the opinions of children in the Children’s Symposium 2003, the NPA acknowledged that children need to be listened to, have their opinions given due weight and have their participation rights under UNCRC implemented.

The NPA suggested the creation of a program to improve children’s participation in governmental and non-governmental sectors, including educational resources to assist organisations to involve children in decision making.

What is ‘competency’?

Children’s competence is not a fixed state but is dynamic; their ability to understand
develops and modifies with their experiences and changes in their social contexts. In addition, children's competency may be recognised, denied, encouraged or inhibited. Whether children's choices are honoured may be dependent upon the supporting adults' willingness to supportively, generously and courageously respect children's decisions. Figure 1, described by Alderson (1992) and illustrated by Orr (1999), aptly depicts the myriad of internal and external variants that may influence a child's competency. Although it fails to include facets specific to the health care environment, such as life experience, nature of information and its delivery, and opportunity to participate, it provides a concise description of intrinsic and extrinsic factors that may affect a child's level of competency.

Age has been shown to be an inaccurate marker of the level of children's competence. Whereas children's experiences, both in general life adversities and in illness, have been found to more greatly influence their capacity to give informed consent. The ability of children to develop health literacy and demonstrate competence is impacted by additional factors such as the use of technical language and the pace at which information is imparted. It is the responsibility of health professionals to impart information in a way that supports children developing health literacy. This influences a child's ability to process and understand their conditions and options. In addition, the environment in which the information is given may also have an effect, for example the unfamiliar hospital ward environment versus the community setting. The time a child has to digest and understand the information is another relevant factor (and may be a barrier to obtaining meaningful consent in an acute setting).

Different cultural constructions of childhood, the family, and healthcare settings may influence the manner and form of information imparted, as well as the manner by which it is interpreted. For example, the Anglo-European emphasis on individual autonomy may conflict with the Māori value of wholeness and collectivity. Many Māori tamariki (children) may not only belong to mātua (parents) but to kaumātua and kuia (grandparents) and típuna (ancestors); they are a part of a whānau, hapū (extended family) and iwi (tribe), and they belong to the whenua (land). Consequently, when a child is faced with a health decision, so may be the whānau and hapū, rather than the simple dyad of parent and child, which is frequently the focus of Anglo-European approaches. A Māori child's competence may be influenced if they are approached on individual terms rather than receiving support in a more collective manner. The collective approach may also be applicable to many Pacific children. Pacific families come from 22 different countries, all varying in their use of the English language, and their involvement in church and other supporting groups. Many Māori and Pacific children are part of a large extended family and community; their wellbeing is contingent on their integration and on the community's overall wellbeing. However, it is important to also acknowledge that diversity exists within the collectivism approach for many contemporary Māori and Pacific Island families. The Charter on the Rights of Tamariki Children and Rangatahi Young People in Healthcare Services in Aotearoa New Zealand supports the rights as set out by UNCRC and that children's health status based on tino rangatiratanga and te Tiriti o Waitangi are a vital ingredient for the provision of health services to Māori children. A child's culture and local ecosystem need to be taken into consideration by health professionals who are attempting to understand a child's experiences, capabilities and perspectives. Kawa whakaruruhau (cultural safety) is an important aspect of these considerations, which require an understanding and acceptance of cultural differences.

Why is it important to recognise competent children?
It has been observed that respecting children's involvement in health care decision-making contributes to the improvement in their health status. Doyle, Lennox, and Bell presented this view in their systematic review, which positively associated patients' experiences with
Involvement in healthcare decisions and respect for patients’ preferences were two of four relational aspects used to measure patients’ experiences. A positive association was then found between patients’ experiences and adherence to recommended medication and treatments, preventative care, healthcare resource use and technical quality-of-care delivery. Coyne and Gallagher utilised similar definitions for children’s experiences in healthcare settings. They identified that children who were involved in the decision making process had mostly positive experiences and that the process helped them prepare for what to expect, reduced their anxieties, and provided reassurance. Consequently, the recognition of children’s capacities and their involvement in decision making is an integral part of their healthcare experience, and in turn patient safety and clinical effectiveness.

Children’s views of their healthcare experiences provide vital information. There is a dearth of research regarding their views of health services and existing research is often from adult proxy decision-makers. In particular, the views of younger children were rarely sought, despite growing evidence of their competence to provide valuable contributions to healthcare service improvement. Health professionals may gain a true representation of children’s needs by directly seeking their feedback.

Listening to children and respecting their opinions can contribute to a child’s personal development. This support can lead to children making better decisions which can lead to improved health outcomes. It may prepare them to participate in society and strengthen their accountability. Allowing children to have an active role in their healthcare decisions teaches them in an incremental process rather than having instantaneous responsibility at the age of sixteen. Treatment is more likely to be effective if children are allowed to take part in the decision making and for their contributions to be respected; alternatively, children who feel coerced into medical treatment tend to recover more slowly.

What is known about New Zealand health law and policy with regard to child competency?

Children’s competence to consent in New Zealand is regulated by the Code of Health and Disability Services Consumers’ Rights 1996 (the Code) and the Care of Children Act 2004. It is also influenced by foreign case law, most notably the Gillick case, and also the UNCRC, which introduced the notion of diminishing parental responsibility with the evolving capacity of the child. The Ministry of Health discussed this notion as the ‘maturity approach’, which may be contrasted with the ‘status approach’ in which the age of the child is determinative.

The 1985 landmark English case of Gillick vs West Norfolk and Wisbech AHA was significant because it marked the emergence of the ‘competent child’ discourse. It recognised that children can be independent, autonomous, and competent decision makers with regards to their health care. It challenged the ideology of parenting being a right, or a dominant and controlling process in a child’s life, to being a responsibility and duty. This case is a clear rejection of the ‘status based’ approach, where a set age limit dictates the competency of a person. The House of Lords ruled that parental rights to decide whether or not their child receives medical treatment cease when the child reaches sufficient maturity and has the understanding and intelligence to make an informed decision.

The Ministry of Health, Medical Council of New Zealand and Health and Disability Commissioner all indicated their growing support for the maturity based approach, which supports the applicability of the Gillick case to the New Zealand context.

Unfortunately, there has been little guidance as to what Gillick competence actually is, and when or how it can be applied in New Zealand. This leaves a grey and ill-defined area for New Zealand courts, and an ethically challenging set of principles for health professionals.
United Nations Convention on the Rights of the Child

The seminal document UNCRC, ratified by New Zealand in 1993, obligates health professionals to ensure children's voices are heard and given due weight in accordance with their level of maturity. However, the notion of 'the child's best interests' described in Article 3 of UNCRC overrides children's rights of self-determination, freedom of expression (Article 13), and respect for their views (Article 12). The Code of Health and Disability Services Consumers' Rights 1996

New Zealand is unique in that the Code presumes all consumers of healthcare to be competent. Right 7(2) states, “Every consumer must be presumed competent to make an informed choice and give informed consent, unless there are reasonable grounds for believing that the consumer is not competent”. Right 7(7) addresses refusal of consent by stating, “Every consumer has the right to refuse services and to withdraw consent to services”. ‘Consumer’ has been defined as a health or disability services consumer and does not exclude children. Although not directly supporting the maturity-based approach, the presumption of competence rejects the status-based approach.

Care of Children Act 2004

In contrast to the Code, the Care of Children Act 2004 (s36) refers to age—a status-based approach. The Act is less clear regarding people under 16 years of age compared to those over 16 years of age. This is despite there being a large number of submissions on the Care of Children Bill recommending clarification on the issue and proposing adoption of the rule of ‘evolving capacities’ in line with the Gillick case. The abstruseness and inconsistencies in these governing documents leaves health professionals with little clarity about how to effectively assess competence and build it into the fabric of interactions with children. In 2006, Professor Skegg reported on the status of consent by competent children in New Zealand:

Given the indecisive and conflicting High Court decisions, the matter is not entirely free from doubt. Nevertheless, the better view is that minors’ common law capacity to consent to medical treatment has not been extinguished by the New Zealand legislation, and that the consent of those under the age of 16 will sometimes be effective in law, be it for the purpose of the criminal law, the law of torts, or the Code of Rights.

Thus, New Zealand awaits further detailed legal guidance.

The Medical Council of New Zealand

The Medical Council of New Zealand (MCNZ) supports the assessment of a child’s competency to give informed consent. The MCNZ’s guidance, contained in Information, Choice of Treatment and Informed Consent 2011, described a competent child as an individual who “is able to understand the nature, purpose and possible consequences of the proposed investigation or treatment, as well as the consequences of non-treatment”. However, at present there is a paucity of research evidencing how health professionals put this advice into practice and conduct their assessment of child competence to consent. The MCNZ recognised the lack of direction on the subject from the Care of Children Act 2004. It stated:

It is not clear whether parental consent is always necessary for medical treatment or procedures for persons under 16 years. Section 36 [of COCA] does not automatically prohibit persons under 16 years from consenting to medical, surgical or dental procedures. In the absence of clear legislative direction it is likely that the principles laid out in Gillick, namely that parental consent is not always necessary for medical procedures or treatment for persons under 16 years, will be followed by New Zealand courts.

Deciding competency

Currently, no solitary assessment tool is applied to assess children’s competence in New Zealand. Rather, it is a judgment made by health professionals based on legal guidance from the Ministry of Health and the Medical Council of New Zealand. The context in which the healthcare decision
is to be made, for example the acuteness of the child’s illness, the complexity of the information and the available time for a decision to be made, might also influence a healthcare professionals assessment of a child’s level of competency.¹

A number of screening tools and frameworks have been developed in an attempt to standardise the assessment of competence. One of the more recent screening tools was developed in 1998 by Billick et al.,³⁶ who conducted the Competency Questionnaire-Child Psychiatric (CQ-ChP) test which evaluated 25 inpatient children for competency, and utilised the Wechsler Intelligence Scale for Children-Revised Edition (WISC-R). The main aim of this test was to identify an age at which competency was achieved. The mean age of competency was found to be 10.1 years with participants showing a year 6/7 (10 to 11 years old) reading level.³⁶ However, the authors concluded it was not possible to correlate competency with an age.³⁶ In 2001, the CQ-ChP test was revised as the Competency Questionnaire-Pediatric Outpatient Modified Version (CQ-Peds), which consisted of 19 items and emphasised the developmental aspect of competence in children.³⁷ Again, an age at which competency was achieved could not be determined.³⁷

The document, Consent in Child and Youth Health: Information for Practitioners by the Ministry of Health, 1998,³ indicated the provisions for a child to be deemed competent. It stated:  

*Regardless of age, to be deemed competent an individual must be able to understand that they have a choice (freedom from coercion), why they are being offered the ‘treatment’, what is involved in what they are being offered, and what the probable benefits, risks, side effects, failure rates and alternatives are.*

Although it pre-dates the Care of Children Act 2004, it is consistent with instructions from the MCNZ that state the importance of understanding the nature and purpose of the treatment and its consequences.³⁵ Lord Scarman and Lord Fraser, from the Gillick case, stated the need for sufficient understanding and intelligence.³⁵ Hence, healthcare professionals are required to make case-by-case judgements on the level of perceived competence a child possesses, which in turn may affect the child’s level of involvement in healthcare decisions.

**Conclusion**

Competence is not a rigid dichotomy between competent or incompetent, but rather a dynamic continuum. The evolving nature of competence makes it difficult to state a simple set of rules or attributes a child requires in order to be deemed competent. The importance of recognising competent children and giving their views due weight may be clear, however the act of identifying who is competent and who is not is complex. The inconsistent alignment of New Zealand health legislation and policies further obscures this process. However, the UNCRC and the Charter challenge us to seek greater participation and decision power sharing with children.

This article highlights the need for further action from both academic and governmental agencies to address the issues faced in determining the competence of children to make health decisions. An exploration of the key attributes of child competence is required to assist health professionals in the identification of competent children, which should inform more clear and practical policies on the subject. This paper provides the basis for further research by the authors to include a definition of child competence relevant to the New Zealand health context, a tool to assist health professionals to identify competence attributes in children and professional development programs for health professionals to support the participation of children in health care.
Competing interests: Nil

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Maxillofacial fractures at Waikato Hospital, New Zealand: 2004 to 2013
Blake K Moore, Ryan B Smit, Angus N Colquhoun, W Murray Thomson

ABSTRACT
Injury to the maxillofacial region continues to place a burden on hospital care in New Zealand, with maxillofacial fractures often being associated with both a significant social cost and personal morbidity. This article describes the characteristics, aetiology and treatment patterns in a tertiary maxillofacial centre in New Zealand during a 10-year period. Over the observation period, a total of 1,975 cases were treated, with a male-to-female ratio of 4:1. The highest incidence was in the 20–29-year-age group. Interpersonal violence (IPV) was the most common aetiology, observed in 54.5% overall, and more common among males than females (58% and 38% respectively; P<0.001). Falls were the most common cause of injury among older females (those aged 50+). Comparison to an earlier analysis shows that IPV-related maxillofacial trauma has increased significantly at this tertiary centre, increasing from 36.2% of cases in 1989–2000, to 54.5% in 2004–2013. There remains an urgent need for appropriate health promotion to reduce interpersonal violence, as well as an increase in the staffing numbers of maxillofacial units in New Zealand.

Maxillofacial injury continues to place a burden on the New Zealand hospital sector. Road traffic accidents (RTA) and interpersonal violence (IPV) have been highlighted as the most common causes.\(^1\)\(^2\) Maxillofacial fractures are often associated with a significant social cost and personal morbidity.\(^2\)

For some time in New Zealand, RTA-related maxillofacial trauma has reduced and, in some areas, has been less common than falls and sporting injuries.\(^1\)\(^4\)\(^5\) This is mainly due to changes in transport policy, including revised drink-driving laws, reduced road speed, modern vehicle safety measures (such as the wider availability of airbags), and improved road conditions.\(^5\)

IPV continues to be the leading cause of maxillofacial injury in New Zealand,\(^1\)\(^4\)\(^6\) primarily involving young men and with alcohol as a frequent contributor.\(^1\)\(^2\)\(^7\)\(^8\) Reports from the Canterbury, Otago, and Waikato regions showed that IPV accounted for between 32% and 44% of all facial fractures.\(^1\)\(^3\)\(^4\) Anecdotal reports from the Waikato region suggest that RTA have continued to decrease, while a greater proportion of facial fractures are due to IPV.

A previous analysis of facial fractures in the Waikato region found that IPV-related injury steadily increased from 31% to 41% in the first 9 years of their observation period.\(^1\)

International research in Western countries (such as the UK, France and Finland) also supports a downward trend in RTA-related fractures, with IPV now being the leading cause.\(^6\)\(^9\)\(^10\) In Denmark, the incidence of IPV-related fractures doubled during the 1960–1987 period.\(^11\) However, road traffic accidents remain the leading cause of facial fractures in developing countries such as Brazil,\(^12\)\(^13\) India and Iran,\(^14\)\(^15\) and also in some developed nations, such as Japan, Greece, and the Netherlands.\(^16\)\(^18\)

The multifactorial nature of facial fractures means that both their incidence and aetiology vary not only among countries,\(^19\) but also within them. The aim of this study was to describe the characteristics, nature and treatment of maxillofacial fractures presenting to a tertiary referral centre in New Zealand during a 10-year period, and to determine whether trends observed in an earlier such analysis have continued.
ARTICLE

Method

The Department of Maxillofacial and Oral Surgery at Waikato Hospital provides a tertiary service to a regional population of over 846,600 in the upper central North Island. The catchment areas of service include the regions of Waikato, Taupo, Gisborne, Bay of Plenty, the Coromandel Peninsula and Thames.

Clinical data collected from all patients with maxillofacial fractures attending the Department of Maxillofacial and Oral Surgery at Waikato Hospital from January, 2004, to December, 2013, were retrospectively analysed using information that had been recorded prospectively using a paradox database. Patients who had sustained facial fractures were included, but those with isolated soft tissue injuries were omitted. Details recorded included sex, age, cause of injury, classification of injury, date of injury, and the treatment provided. Regrettably, information on ethnicity and alcohol involvement was not collected in the database. Statistical analysis was undertaken using SPSS (Statistical Package for the Social Sciences; SPSS Inc, Chicago, Illinois, US; version 20). As far as possible, the analytical and reporting approaches were kept similar to those used in an earlier analysis of a case series of Waikato maxillofacial fractures, in order to enable direct comparisons to be made.1

Following the computation of descriptive statistics, bivariate associations were tested for statistical significance using the Chi-squared test. Census numbers for 1991, 1996, 2001, 2006 and 2013 were used as estimates for the number of people at risk in each of these years for the Waikato DHB catchment population. A linear regression model was fitted to give an estimated population for each of the years from 1991

Table 1: Number of maxillofacial fracture cases for the periods 2004–06, 2007–09 and 2010–13, by sociodemographic characteristics and fracture aetiology (brackets contain column percentages unless otherwise indicated)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>467 (84.3)</td>
<td>424 (82.2)</td>
<td>714 (79.1)</td>
<td>1,605 (81.3)</td>
</tr>
<tr>
<td>Female</td>
<td>87 (15.7)</td>
<td>92 (17.8)</td>
<td>189 (20.9)</td>
<td>368 (18.7)</td>
</tr>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
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<tr>
<td>1–19</td>
<td>147 (26.5)</td>
<td>142 (27.6)</td>
<td>222 (24.6)</td>
<td>511 (25.9)</td>
</tr>
<tr>
<td>20–29</td>
<td>240 (43.3)</td>
<td>193 (37.5)</td>
<td>323 (35.8)</td>
<td>756 (38.4)</td>
</tr>
<tr>
<td>30–39</td>
<td>72 (13.0)</td>
<td>73 (14.2)</td>
<td>128 (14.2)</td>
<td>273 (13.9)</td>
</tr>
<tr>
<td>40–49</td>
<td>49 (8.8)</td>
<td>52 (10.1)</td>
<td>112 (12.4)</td>
<td>213 (10.8)</td>
</tr>
<tr>
<td>50+</td>
<td>46 (8.3)</td>
<td>54 (10.5)</td>
<td>118 (13.1)</td>
<td>218 (11.1)</td>
</tr>
<tr>
<td>18–25</td>
<td>254 (45.8)</td>
<td>198 (38.5)</td>
<td>336 (37.2)</td>
<td>788 (40.0)</td>
</tr>
<tr>
<td>Aetiology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPVc</td>
<td>296 (53.4)</td>
<td>293 (56.6)</td>
<td>487 (53.9)</td>
<td>1,076 (54.5)</td>
</tr>
<tr>
<td>RTAe</td>
<td>96 (17.3)</td>
<td>69 (13.3)</td>
<td>121 (13.4)</td>
<td>286 (14.5)</td>
</tr>
<tr>
<td>Falls</td>
<td>49 (8.8)</td>
<td>58 (11.2)</td>
<td>123 (13.6)</td>
<td>230 (11.6)</td>
</tr>
<tr>
<td>Sport</td>
<td>73 (13.2)</td>
<td>65 (12.5)</td>
<td>97 (10.7)</td>
<td>235 (11.9)</td>
</tr>
<tr>
<td>Other</td>
<td>39 (7.0)</td>
<td>30 (5.8)</td>
<td>62 (6.9)</td>
<td>131 (6.6)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (0.2)</td>
<td>3 (0.6)</td>
<td>13 (1.4)</td>
<td>17 (0.9)</td>
</tr>
<tr>
<td>All combinede</td>
<td>554 (28.1)</td>
<td>518 (26.2)</td>
<td>903 (45.7)</td>
<td>1,975 (100.0)</td>
</tr>
</tbody>
</table>

a Age data missing for 4 patients; b Sex data missing for 2 patients; c Interpersonal violence; d Road traffic accident; e Row percent
Table 2: Rates of fractures by period and aetiology quantified per 100,000 person-years at risk (brackets contain 95% confidence intervals)

<table>
<thead>
<tr>
<th>Aetiology</th>
<th>Period</th>
<th></th>
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<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IPV</td>
<td>20.7 (CI 18.5–23.2)</td>
<td>20.1 (CI 17.3–22.6)</td>
<td>24.5 (CI 22.4–26.8)</td>
<td></td>
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<tr>
<td>RTA</td>
<td>6.7 (CI 5.5–8.2)</td>
<td>4.7 (CI 3.7–6.0)</td>
<td>6.1 (CI 5.1–7.3)</td>
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</tr>
<tr>
<td>Falls</td>
<td>3.4 (CI 2.6–4.5)</td>
<td>4.0 (CI 3.1–5.2)</td>
<td>6.2 (CI 5.2–7.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sport</td>
<td>5.1 (CI 4.1–6.4)</td>
<td>4.5 (CI 3.5–5.7)</td>
<td>4.9 (CI 4.0–6.0)</td>
<td></td>
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<tr>
<td>Total</td>
<td>38.8 (CI 35.7–42.1)</td>
<td>35.6 (CI 32.6–38.7)</td>
<td>45.5 (CI 42.6–48.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of cases</td>
<td>554</td>
<td>518</td>
<td>903</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Table 3: Percentage of primary reported cause by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Aetiology</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPV</td>
<td>87.2</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>RTA</td>
<td>77.2</td>
<td>22.8</td>
<td></td>
</tr>
<tr>
<td>Falls</td>
<td>60.4</td>
<td>39.6</td>
<td></td>
</tr>
<tr>
<td>Sport</td>
<td>87.2</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>Other/Unknown</td>
<td>69.2</td>
<td>30.8</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Type of maxillofacial fracture cases, by fracture aetiology and treatment (brackets contain column percentages unless otherwise indicated)

<table>
<thead>
<tr>
<th>Type of maxillofacial fracture*</th>
<th>Mandible</th>
<th>Le Fort I</th>
<th>Orbit</th>
<th>Zygoma</th>
<th>Frontal</th>
<th>Alveolar</th>
<th>Skull</th>
<th>Row totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aetiology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPV*b</td>
<td>614 (61.7)</td>
<td>51 (35.9)</td>
<td>208 (46.3)</td>
<td>230 (49.7)</td>
<td>7 (21.2)</td>
<td>12 (29.3)</td>
<td>58 (43.3)</td>
<td>1,180 (52.3)</td>
</tr>
<tr>
<td>RTA*c</td>
<td>110 (11.0)</td>
<td>50 (35.2)</td>
<td>93 (20.7)</td>
<td>88 (19.0)</td>
<td>15 (45.5)</td>
<td>4 (9.7)</td>
<td>29 (21.6)</td>
<td>389 (17.2)</td>
</tr>
<tr>
<td>Falls</td>
<td>86 (8.6)</td>
<td>23 (16.2)</td>
<td>66 (14.7)</td>
<td>59 (12.7)</td>
<td>2 (6.1)</td>
<td>12 (29.3)</td>
<td>17 (12.7)</td>
<td>265 (11.7)</td>
</tr>
<tr>
<td>Sport</td>
<td>129 (13.0)</td>
<td>7 (4.9)</td>
<td>41 (9.1)</td>
<td>55 (11.9)</td>
<td>5 (15.1)</td>
<td>4 (9.7)</td>
<td>13 (9.7)</td>
<td>254 (11.3)</td>
</tr>
<tr>
<td>Other</td>
<td>48 (4.8)</td>
<td>9 (6.4)</td>
<td>37 (8.3)</td>
<td>29 (6.3)</td>
<td>4 (12.1)</td>
<td>9 (22.0)</td>
<td>16 (11.9)</td>
<td>152 (6.7)</td>
</tr>
<tr>
<td>Unknown</td>
<td>9 (0.9)</td>
<td>2 (1.4)</td>
<td>4 (0.9)</td>
<td>2 (0.4)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (0.8)</td>
<td>18 (0.8)</td>
</tr>
<tr>
<td>Total for fracture type*d</td>
<td>996 (44.1)</td>
<td>142 (6.3)</td>
<td>449 (19.9)</td>
<td>463 (20.5)</td>
<td>33 (1.5)</td>
<td>41 (1.8)</td>
<td>134 (5.9)</td>
<td>2,258 (100.0)</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservative</td>
<td>245 (24.6)</td>
<td>51 (36.4)</td>
<td>212 (47.2)</td>
<td>186 (40.4)</td>
<td>9 (27.3)</td>
<td>31 (75.6)</td>
<td>68 (50.7)</td>
<td>802 (35.6)</td>
</tr>
<tr>
<td>Surgical fixation</td>
<td>736 (74.0)</td>
<td>82 (58.6)</td>
<td>223 (49.7)</td>
<td>218 (47.4)</td>
<td>22 (66.7)</td>
<td>5 (12.2)</td>
<td>54 (40.3)</td>
<td>1,340 (59.5)</td>
</tr>
<tr>
<td>Other</td>
<td>14 (1.4)</td>
<td>7 (5.0)</td>
<td>14 (3.1)</td>
<td>56 (12.2)</td>
<td>2 (6.1)</td>
<td>5 (12.2)</td>
<td>12 (9.0)</td>
<td>110 (4.9)</td>
</tr>
</tbody>
</table>

*a6 patients had missing treatment data; totals do not sum to 1975 because some individuals experienced more than one type of injury;  
*bInterpersonal violence;  
*cRoad traffic accident;  
*dRow percent
to 2013 for that catchment. This enabled rates to be calculated and compared to those reported by Buchanan et al (2005) by estimating the population at risk. We used STATA (StataCorp LP, Texas, US) to calculate the rate ratios and their exact 95% confidence intervals.

**Results**

Table 1 lists fracture demographic characteristics and aetiological data. A total of 1,975 patients presented with maxillofacial fractures. The male-to-female ratio observed was approximately 4:1. Those in the 20–29-year-old age group commonly presented with facial fractures (38.4% of all cases). IPV was the most common fracture aetiology (54.5%), followed by RTA (14.5%), and sport (11.9%). Falls were the most common cause in the oldest female age group (50+ years), while IPV was the most common among all other ages.

Table 2 shows that the rate of facial fractures increased from 38.8 per 100,000 person-years at risk to 45.5 per 100,000 person-years at risk. Rates for IPV increased over time from 20.7 per 100,000 person-years at risk (95% CI = 18.5–23.2) to 24.5 per 100,000 person-years at risk (95% CI = 22.4–26.8). Facial fractures due to RTA, sport and falls remained similar.

Table 3 shows the percentage of primary reported cause by gender. Males accounted for 77.2% of RTA-related fractures and 87.2% of all fractures related to IPV and sport. The highest prevalence for primary reported cause in females was falls (39.6%).

A total of 2,258 fractures were recorded among the 1,975 individuals (Table 4). Mandibular fractures were the most common, with 996 individuals presenting. Most of these were at a single site (54.5%). The zygomatic complex was the next most common fracture (463) followed by orbital fractures (449). The rate of orbital fractures rose from 8.4 to 11.6 per 100,000 person-years at risk. Other fracture types were less common. Most patients (87%) presented with only one type of fracture; 8.8% had two

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Period</th>
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<tbody>
<tr>
<td>IPV</td>
<td>296 (53.5)</td>
</tr>
<tr>
<td>RTA</td>
<td>96 (17.3)</td>
</tr>
<tr>
<td>Falls</td>
<td>49 (8.8)</td>
</tr>
<tr>
<td>Sport</td>
<td>73 (13.2)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Other</td>
<td>39 (7.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fracture Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible</td>
</tr>
<tr>
<td>Maxilla</td>
</tr>
<tr>
<td>Orbit</td>
</tr>
<tr>
<td>Zygoma</td>
</tr>
<tr>
<td>Dentoalveolar</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating</td>
</tr>
<tr>
<td>Conservative</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>
types of fracture (such as of the orbital floor and zygoma); and 4.2% presented with three.

Table 5 presents data on how cases were treated over the study period. Over half (58.2%) of all facial fractures were surgically fixated and over one-third (36.8%) were treated conservatively. The number of cases requiring surgical fixation increased from 2004–2006 to 2007–2009 (p<0.001) but no overall trend was observed.

Discussion

This study was a retrospective clinical audit of patients who presented, over a 10-year period, with facial fractures to a tertiary trauma hospital Oral and Maxillofacial Surgery (OMS) unit. Fractures were most common in young men.

We observed an increase in the rate of IPV-related fractures, orbital fractures, fractures due to falls, and the total rate of facial fractures. The rate of RTA-related cases fell slightly, while sports-related fractures were similar.

Missing age, sex, and treatment data were noted as part of imperfect data entry into the database. Fortunately, these were low in number and unlikely to have affected the findings. Having missing data remains a risk with such analyses of routinely-collected data: treating clinicians have many responsibilities and distractions, and these are likely to compromise data entry on occasion. Another limitation of this study was that information on ethnicity, or alcohol consumption prior to injury, was not available. The original purpose of the database was to provide hospital management with an indication of the departmental workload. Despite this, sporadic data were collected on ethnicity and alcohol, but this information was not of sufficient quality to be included in this analysis. However, many previous studies have reported alcohol consumption to be a strong contributing factor to facial fractures caused by IPV and RTA, especially in the 15–39 age group.\(^1\,4,5,7,8\) Previously, Māori have been found to be over-represented in facial fracture presentations at this particular tertiary hospital.\(^1\) There is no reason to suspect that any change in pattern has occurred since the earlier study.

Important trends were identified and can be directly compared with findings from the previous study at this unit.\(^1\) Although the Department of Maxillofacial and Oral Surgery at Waikato Hospital services a substantial and diverse population catchment, the findings cannot be generalised to all of New Zealand. Males aged 20–39 most frequently presented with facial fractures; this is a pattern which has been observed previously at this OMS unit and others around New Zealand.\(^1,2,4,5,7\) The rate of IPV-related maxillofacial trauma also increased at this tertiary centre, up from 12.7 (CI 11.9–13.5) per 100,000 person-years at risk in 1989–2000 to 24.5 (CI 22.4–26.8) by 2004–2013. Currently, it is almost twice the rate of the 1989–2000 period (p<0.0001) and this is of significant concern.\(^1\)

The decrease in the number of RTA-related fractures observed is in keeping with observations from other OMS units around New Zealand.\(^1,2,5,8\) Interestingly, despite this, we did not observe an overall decrease in high-velocity injury fracture patterns, such as Le Fort fractures, because there was an increase in Le Fort 1 fractures caused by IPV. Although facial fracture rates due to falls were similar to the previous study, they continued to be common in the female 50+ age group.\(^1,8\) It is clear that falls continue to be a significant cause of maxillofacial trauma in older adults, and this is likely to grow as New Zealand’s older-adult population increases.

Unexpectedly, the rate of orbital fractures observed was 5.1 times higher (p<0.0001) than that seen in the previous study at this unit.\(^1\) This was due to a large rise in orbital fractures caused by IPV, RTA, and falls since the 1989–2000 period.\(^1\) Similar proportions of orbital fracture cases have been reported in other New Zealand studies.\(^3,4\) The increase in the orbital fracture rate is likely due to increased detection and referral from secondary centres.

Initially, the proportion of cases conservatively managed was similar to figures reported by other units, but it decreased towards the end of the study period.\(^4,4,7,8\) The proportion of cases requiring surgery in New Zealand does vary due to differences in the local populations and in the available service-mix. The proportion of fractures requiring internal fixation did increase from previously (about 60%, up from 49%) and is higher than that seen in the 1989–2000 period (p<0.001) but no overall trend was observed.
another New Zealand hospital during a similar period. This probably has a multifactorial origin, reflecting an increase in proportion of displaced fractures, changes in surgical staff, and a rise in serious interpersonal violence in the Waikato region. Facial fractures due to interpersonal violence have continued to rise, while those caused by road traffic accidents have continued to decline. However, the ever-increasing number of facial fractures places pressure on staffing levels, ward beds, theatre availability, and hospital funding. It is apparent that the level of interpersonal violence has worsened since the previous study, and remains an important public health issue in the Waikato region. Programmes such as the Violence Intervention Programme (VIP) and ‘It’s not OK’, which have been running across New Zealand during the study period, appear to have had no impact on reducing IPV-related maxillofacial fractures in the Waikato region. With such a clear impact on current and future hospital resources and staffing, public health intervention is required. This should target contributory factors, such as alcohol consumption and drug use, but also the main culprits, namely young males.

Further studies are needed to investigate the role of alcohol and drugs (especially methamphetamine) in this population presenting with facial fractures.

**Conclusion**

The rate of IPV related maxillofacial fractures presenting to this tertiary centre has continued to increase throughout the study period and is now at almost double the rate since the 1998-2000 period. It continues to be the dominant cause of injury, while RTA-related fractures are decreasing. The ever-increasing rate of facial fractures presenting to Waikato Hospital places significant demands on scarce clinical resources, such as operating theatre time and staffing numbers. An increase in theatre access for maxillofacial doctors and additional staff in oral and maxillofacial surgery departments is essential to deal adequately with this problem. IPV is an escalating cause of facial fractures that requires urgent and interventional public health prevention strategies.

**Competing interests:** Nil

**Acknowledgements:**

The authors thank Mr Steve Evans, Mr Brian Whitley and Mr Simon Lou, Consultant Oral and Maxillofacial Surgeons, Waikato Hospital, who contributed to the surgical treatment of the patients, and Dr Dalice Sim, University of Otago, Wellington School of Medicine, for assisting with the statistical analysis of data.

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REFERENCES:


A bug in the ointment: topical antimicrobial usage and resistance in New Zealand

Deborah A Williamson, Stephen R Ritchie, Emma Best, Arlo Upton, Alison Leversha, Alesha Smith, Mark G Thomas

ABSTRACT
New Zealand has unenviably high rates of bacterial resistance to topical antimicrobials. In this Viewpoint, we review the history and usage of topical antimicrobials in New Zealand, and suggest some strategies to mitigate further increases in antimicrobial resistance to topical agents.

Background
Antimicrobial resistance has been described as a “crisis for the health and wealth of nations”. One of the key strategies to mitigate this public health crisis is to ensure that existing antimicrobials are used responsibly and judiciously. In general, New Zealand has relatively low rates of antimicrobial resistance threats deemed as ‘critical’ or ‘urgent’ by the Centers for Disease Control and Prevention. However, this may reflect relatively low levels of consumption of many antimicrobials in previous decades, rather than our relatively high levels of antimicrobial consumption in more recent years. In particular, high usage of topical antimicrobial agents over the past three decades in New Zealand has resulted in an ill-fated series of national population-level experiments, which clearly illustrate the relationships between antimicrobial consumption and resistance. Throughout the 1990s, the topical antimicrobial agent mupirocin (Bactroban©) was available to purchase ‘over-the-counter’ (OTC), which led to very high levels of use, and subsequent high rates of resistance, such that by 2000, approximately 14% of S. aureus isolates displayed high-level resistance to mupi- rocin. From April, 2000, regulatory changes meant that mupirocin could be obtained by ‘prescription only’, with a subsequent decrease in usage, and a fall in the prevalence of high-level mupirocin resistance in S. aureus from 14.2% in 2000, to 8.3% in 2014. Interestingly, the authors of a 2003 study describing mupirocin resistance in New Zealand concluded that: “In cautioning against the use of mupirocin, we do not advocate using fusidic acid topically as an alternative. Resistance to this topical agent is reported, and unlike mupirocin, it is available in oral and intravenous formulations that are used for treatment of multiresistant S. aureus infections”.

Similarly, an Australian commentary in 2006 on fusidic acid use stated: “Ensuring that the use of topical fusidic acid is either abolished or restricted will be vital if we are to prevent the loss of this potentially useful agent”, and “Common sense would suggest that antibiotics used topically should be ones that are not used systemically”.

Despite these unambiguous warnings, regulatory changes and the promulgation of guidelines promoting the use of topical fusidic acid ointment and cream contributed to a significant increase in topical fusidic acid dispensing in New Zealand throughout the 2000s (Figure 1), with an associated increase in the prevalence of resistance in S. aureus from 17% in 1999, to 28% in 2013.
present, topical fusidic acid is available by prescription only, although it is fully subsidised by the New Zealand Ministry of Health, unlike mupirocin, which is only partially subsidised.

The evidence for and against topical antimicrobial use

Theoretically, the use of topical antimicrobials is an attractive option to treat minor skin ailments. Topical application allows delivery of high concentrations of antimicrobial at the site of infection, while minimising systemic absorption. In practice however, topical antibiotic use has long been recognised as a very efficient method of rapidly promoting the emergence and proliferation of antibiotic resistant microbes. Furthermore, evidence-based prescribing supports the use of topical antimicrobial agents for only a few specific indications, including nasal eradication of S. aureus, treatment of acne, and treatment of mild impetigo.

Despite concerns about efficacy and the promotion of even higher rates of resistance, fusidic acid remains the recommended agent in New Zealand for the empiric treatment of impetigo. Importantly, rates of resistance to fusidic acid in S. aureus remain comparatively lower in countries that have not adopted the widespread use of topical fusidic acid. In general, Streptococcus pyogenes, the other pathogen commonly associated with impetigo, is less susceptible to fusidic acid than S. aureus.

One of the largest randomised control trials (RCTs) assessing the efficacy of topical fusidic acid vs placebo in the treatment of mild impetigo, conducted in the Netherlands between 1999 and 2000, found that cure rates after one week of treatment with topical fusidic acid were significantly higher than with placebo (55% vs 13%, odds ratio [OR] 12.6, 95% confidence interval [CI], 5.0–31.5). However, this difference reduced over time, with 92% of treated patients displaying cure at 28 days, vs 88% of patients in the placebo arm. It also must be noted that no fusidic acid resistance was detected in S. aureus isolates from this study population, meaning that these study findings are not directly applicable to the New Zealand setting, where contemporary fusidic acid resistance rates are high. In addition, another RCT conducted in the UK, Germany and Sweden in 1994, found no statistically significant difference in cure rates between topical fusidic acid and hydrogen peroxide in the treatment of localised impetigo (82% vs 72%, respectively). Again, caution should be exercised when extrapolating these results to the New Zealand setting.
**Figure 2:** Community dispensing rates per 1,000 population for topical fusidic acid in the New Zealand community setting stratified by age group, January, 2006–August, 2013.

**Figure 3:** Community dispensing rates per 1,000 population for topical fusidic acid in the New Zealand community setting stratified by ethnicity, January, 2006–August, 2013.
Zealand setting, as rates of fusidic acid resistance in these countries are markedly lower than New Zealand. However, despite the limited application of overseas findings to the New Zealand setting, such studies have been used as the basis for guidelines that actively recommend topical fusidic acid in the empiric treatment of impetigo. Importantly, there are no published studies comparing the use of topical fusidic acid vs placebo, or vs antiseptic treatment for impetigo in high prevalence resistance settings, such as New Zealand. In particular, it is not yet known whether topical hydrogen peroxide is a feasible alternative for New Zealand children compared to topical fusidic acid.

Demographics of topical fusidic acid use in New Zealand

In addition to therapeutic usage, data suggest that, in some settings, topical antimicrobials may also be used prophylactically, particularly in elderly patients. For example, a study from the US assessing national usage of topical antimicrobials found that 40% of all topical antimicrobial usage was in the over-50 age group, with benign or malignant skin neoplasms being the most common diagnosis associated with topical antimicrobial usage. These authors hypothesised that in such instances, topical antimicrobials were being used as post-operative wound 'prophylaxis' following minor surgery, a practice that is not supported by available evidence.

Information on the demographics and geographic variation of antimicrobial usage in a population is essential in understanding how and why antimicrobials are utilised, and identifying potential areas for reduction in usage. Information on all community prescriptions in New Zealand are maintained in a central data warehouse, the 'Pharmaceutical Collection'. Data from this collection between January, 2006, and August, 2013, demonstrates that the highest rates of topical fusidic acid dispensing were in the under-5 year age group, followed by the 75 year and over age group (Figure 2). When stratified by ethnicity, the highest rates of dispensing were in Māori and Pacific Peoples (Figure 3), and when stratified by geographic region, the highest rates of dispensing were in the Northern region of New Zealand (Figure 4). These dispensing patterns are consistent with recent work showing the high rates of skin infections in Pacific and Māori

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**Figure 4:** Community dispensing rates per 1,000 population for topical fusidic acid in the New Zealand community setting stratified by geographic region, January, 2006–August, 2013. (Northern = Northland DHB, Waitemata DHB, Auckland DHB, Counties Manukau DHB; MidCentral = Waikato DHB, Lakes DHB, Bay of Plenty DHB, Tairawhiti DHB, Taranaki DHB; Central = Hawkes Bay DHB, MidCentral DHB, Whanganui DHB, Capital and Coast DHB, Hutt DHB, Wairarapa DHB; Southern = Nelson Marlborough DHB, West Coast DHB, Canterbury DHB, South Canterbury DHB, Southern DHB).
children, and further emphasise the considerable burden of skin disease in these groups. In addition, the high rates of dispensing in the Northern region reflect the higher incidence of skin disease in this region, which has the highest population of Māori and Pacific Peoples in New Zealand. Furthermore, the relatively high rates of topical fusidic acid usage in the over-75 year age group are concerning, particularly given the limited evidence-based indications for prescribing topical antimicrobials in older age groups. To date however, there are no available data on the clinical indications for topical antimicrobial prescribing in elderly patients in New Zealand. Such information is critical for determining whether current usage of topical antimicrobials is clinically indicated, and identifying strategies to reduce inappropriate prescribing.

Collateral damage caused by high levels of fusidic acid usage in New Zealand

Recent data suggest that, as might be expected, the high usage of topical fusidic acid in New Zealand is driving the increase in fusidic acid resistant *S. aureus* clones. Of specific concern is the emergence of a fusidic acid-resistant community-associated methicillin-resistant *S. aureus* (MRSA) clone, known in New Zealand as the ‘AK3’ clone. This clone has rapidly become the most common type of MRSA causing illness in New Zealand. Genomic data indicates that the gene conferring fusidic acid resistance (*fusC*) and the gene conferring methicillin resistance (*mecA*) are located together on the same mobile genetic element. In simple terms, this means that large-scale use of topical fusidic acid has favoured the proliferation of the AK3 MRSA clone, and has provided a ‘helping hand’ in allowing this clone to become established in New Zealand. In addition, a recent national study of antimicrobial resistance in New Zealand found that 36% of all fusidic acid-resistant methicillin-susceptible *S. aureus* (MSSA) strains were also resistant to mupirocin, highlighting the potential for treatment with one antimicrobial to select for multi-resistant bacterial clones. In this context, it is important for practitioners to be aware of the wider ecological implications (or ‘collateral damage’) that can occur when prescribing what may be regarded as a benign treatment.

Collective action requires collective responsibility

It is clear from available data that the rate of fusidic acid resistance in New Zealand is one of the highest in the developed world, and that high levels of usage have contributed to proliferation of the AK3 MRSA clone. It is also important to note that a considerable proportion of topical antimicrobial usage in New Zealand may be considered ‘appropriate’, particularly given the high burden of childhood skin infections in our setting. However, in the face of high bacterial resistance, we question the value of continuing to recommend topical fusidic acid as empiric therapy in New Zealand, and suggest a multipronged approach aimed specifically at reducing rates of resistance:

1. Consistent, evidence-based, national guidelines around the appropriate use of topical antimicrobials.
2. Reduce the volume of agent dispensed to patients (eg, a 5g tube instead of a 15g tube).
3. Regulatory measures around the use of topical fusidic acid, such as moving to ‘specialist-only’ prescribing in the elderly.
4. Improved education to primary care practitioners about evidence-based prescribing of topical antimicrobials, particularly in elderly patients.
5. Clear messaging to the public about the importance of not sharing topical antimicrobials amongst a household, and discarding any remaining topical agent once the treatment course has been completed.
6. Robust clinical trials, conducted in a setting with a high prevalence of resistance to topical agents, assessing the clinical utility of antiseptic agents in the treatment of localised impetigo.

A key first step would be identification and gathering of relevant stakeholders, and formation of a clear ‘road-map’ to address this significant problem. These stakeholders should include prescribers, the Ministry of Health, PHARMAC and patient representatives. New Zealand has already
had considerable success in reducing rates of topical antimicrobial resistance encountered in *S. aureus* isolates. This is highlighted by the reversal in mupirocin resistance in New Zealand over the past 15 years, which was, in part, due to both educational and regulatory measures. A similar concerted approach, involving prescribers, policy makers, and patients, is urgently required to tackle our unenviably high rates of fusidic acid resistance, and confront our over prescription of topical antimicrobial agents.

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Successful conservative management of campylobacter cholecystitis occurring post chemotherapy and rituximab: a rare disease entity

Ajay Gupta, Louise Teo

ABSTRACT

Campylobacter jejuni is commonly associated with gastroenteritis, but extremely few reports worldwide link it acute cholecystitis. These infectious complications can assume menacing proportions in the immunocompromised and need careful management. We present a report of such a case from Australia, successfully managed conservatively, without surgery.

Case

A 65-year-old gentleman having non-Hodgkin’s lymphoma Stage 4 was started on Rituximab, cyclophosphamide, vincristine and prednisolone (RCHOP). On Day 11 of his second cycle of chemotherapy, he presented to the emergency department with a three-day history of severe right upper-abdominal pain, vomiting, high-grade fever and diarrhea. The diarrhea was florid—16–18 episodes in a day, occasionally bloody, but mostly watery and associated with tenesmus. He had cooked chicken stew approximately 36 hours prior to the onset of symptoms. On examination, he was dehydrated. He had a temperature of 39 °C, associated with mild chills, and right upper-quadrant tenderness with positive Murphy's sign.

He was initially started on piperacillin-tazobactam 4.5g and metronidazole 500mg intravenously every 8 hours for presumed febrile neutropenia. The patient had received peg-filgrastim, post chemotherapy and had an elevated neutrophil count of 14.72x10⁹/L. Abdominal ultrasound reported features of acute cholecystitis, with gall bladder wall thickening and enlargement, mobile gallstones and small amounts of pericholecystic fluid. The region was tender to probe pressure (sonographic Murphy’s sign positive). Hepatic steatosis was also present. The common bile duct was not dilated, nor the biliary tree. There was no biliary sludge. The stool microscopic examination revealed pus cells and red blood cells, suggesting infectious colitis. A surgical consult was taken, but owing to his weak general condition, the patient...
was deemed unfit for any surgical intervention by the surgeons and was managed conservatively.

He was managed conservatively with intravenous fluids and small amounts of clear fluid orally for the first 72 hours, followed by institution of a low-fat, semi-solid diet and oral rehydration therapy.

On the fifth day, the stool culture was reported positive for *Campylobacter jejuni*. Parenteral antibiotics were stopped and oral ciprofloxacin 750mg twice daily was started. Following this, his condition improved, and his clinical symptoms resolved over the next one week. His right upper-quadrant pain also subsided, coinciding with the resolution of his diarrhea.

The patient was discharged home on ciprofloxacin for a total of two weeks of oral therapy. An ultrasound, repeated 10 days later, demonstrated complete resolution of the acute cholecystitis.

*Campylobacters* are common commensals in the gastrointestinal tract of animals, especially poultry. *Campylobacter jejuni* is known to cause gastroenteritis, colitis, septicemia, peritonitis, pancreatitis and gastrointestinal hemorrhage besides many extra-intestinal complications. However, association with acute cholecystitis is exceedingly rare.

There have been 16 reported cases (15 published and 1 unpublished poster report) worldwide (none from Australia/Oceania) that have linked *Campylobacter* infection with cholecystitis. The clinical presentation included abdominal pain in all, fever in nine, vomiting in eight, jaundice in two, septic shock with hypotension in two and mortality in one case with advanced hepatocellular carcinoma. Diarrhea and pre-existing gall stones, as seen in our case, were described in six and seven cases, respectively.

Three of the cases were treated conservatively only with antibiotics, while the rest were managed with cholecystectomy. For *Campylobacter* infections, ciprofloxacin or macrolides are antibiotics of choice. Most notably, in one of the cases, the clinical condition of the patient continued to deteriorate after cholecystectomy and resolved only upon institution of specific targeted antibiotic treatment against *C. jejuni*.

We do believe that successful conservative management is possible in patients deemed unfit for surgery owing to poor general condition. Another alternative is percutaneous cholecystostomy.

Per cutaneous cholecystostomy is usually indicated in patients who fail an initial trial of antibiotic therapy. However, gallbladder drainage by percutaneous cholecystostomy in conjunction with antibiotics may be used as initial treatment for very ill patients (ie, intensive care unit). The procedure is not without risk and in one retrospective review that included 1,918 patients, 30-day mortality after percutaneous cholecystostomy was 15.4%, but only 4.5% for cholecystectomy, the difference being likely due to patient selection bias. Minor complications of percutaneous drainage include bleeding, catheter blockage and dislodgement (10–15%), and failure to resolve the acute cholecystitis (10%). However, our patient responded promptly to change of therapy to ciprofloxacin, thus obviating the need for such a procedure.

Mobile gall stones were present in our case, but the liver function tests were normal. There was no biliary sludge or bile duct dilatation on ultrasound. There was an extremely strong temporal relationship between both the onset and the resolution of cholecystitis and gastroenteritis. As mentioned above, there was rapid and simultaneous resolution of cholecystitis, along with the gastroenteritis upon institution of *C. jejuni* specific antimicrobial therapy with ciprofloxacin. Diarrhea and pre-existing gall stones, as seen in our case, have been described in *Campylobacter* cholecystitis, as detailed in the review of literature above. Also, at least in one reported case, the diagnosis of *Campylobacter* infection was based on initial stool culture rather than bile cultures post cholecystectomy. All these facts, taken together, strongly argue for both conditions having a common etiology in the form of *Campylobacter jejuni*.

In patients with lymphoma, use of Rituximab—a monoclonal antibody against CD 20 positive B cells, adds to the immunosuppression and may have contributed to the severe manifestations seen in our case.
Studies suggest strong association between fatal outcome and prescription of a third-generation cephalosporin for patients with *Campylobacter* (except *C.fetus*) bacteremia, especially in the immunocompromised. Thus, it would be prudent to provide anti-*Campylobacter* anti-microbial coverage presumptively in such situations, rather than wait for confirmatory investigations so as to avoid serious complications especially in the immunocompromised, in whom there is greater likelihood of being deemed unfit for surgical interventions.

**Competing interests:** Nil

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**REFERENCES:**


Over five years on, we still don’t need a pilot bowel cancer screening programme: Please just get on with it!

Guy Hingston

Dear Sir,

It is now over five years since I wrote to you stating that, “The only pilot we need is someone with the courage and funding to roll out a national ... programme to save over 500 Kiwi lives each year!” The then quoted Level 1A prospective randomised evidence confirming a 50% reduction in left-sided bowel cancer deaths from flexible sigmoidoscopic screening has been ignored by most in New Zealand, even though similar results have now come out of Norway.

I have just completed a short contract for two DHBs to help take 200 people off their colonoscopy waiting list, and I write with concern, noting that only one of these people had decided to purchase a Faecal Occult Blood Test (FOBT) kit from a pharmacy. She returned a positive test and we subsequently removed a large pre-malignant polyp, thus probably preventing her succumbing prematurely to bowel cancer. Is it acceptable that the Ministry of Health actively excludes the use of FOBT around New Zealand as a referral reason for colonoscopy? Is it ethical that they knowingly allow the premature death of hundreds of New Zealanders each year to bowel cancer? What would happen if every family who lost a loved one to bowel cancer challenged the Ministry of Health for not acting to detect early bowel cancer?

Bowel cancer screening has been proven since it was first published 22 years ago, so do we really need to reinvent the wheel here? And why are we debating the cost of expensive pharmaceuticals for metastatic bowel cancer? We’ve known for five years that we can halve the number of left-sided metastatic bowel cancer deaths by flexible sigmoidoscopic screening, which in turn would halve the pharmaceutical bills!

It’s a sad fact that New Zealand has the worst bowel cancer statistics of any ‘developed’ country, and it’s obviously because we haven’t ‘developed’ a bowel cancer screening program. We need to end this discrimination by region. Should all New Zealanders between the age of 50–75 now shift to live in the Waitemata area, so they are not further discriminated against by where they live? And why is a positive FOBT the most common reason for a colonoscopy in Australia, and the least common reason in New Zealand?

I am hoping to turn 50 next year, and am feeling guilty about planning to have my first screening colonoscopy, noting that many of my colleagues have also had a screening procedure at this age. I would suggest that as a profession, it is not appropriate for us to screen ourselves for this disease, and not try and help establish a national screening programme similar to our own personal practice. With sadness, I accept that we live in a society where “The rich stay healthy. The sick stay poor.”

If we, as a nation, viewed over 500 unnecessary premature annual deaths as a war, then history would demonstrate that New Zealand would send our most
talented youths into battle to fight this on our behalf. I suggest that we now view our fight against this occult disease as a battle, and train appropriate warriors to fight on our nation’s behalf. Instead of posing with All Blacks in their dressing room, I suggest that our Prime Minister should try and recruit retiring professional rugby players (with a courageous heart, proven trainability and world beating hand-eye coordination skills) and get them into the screening flexible sigmoidoscopy work force. If Richie McCaw can take one year to learn to fly a helicopter, then how long would it take him to learn the art of screening flexible sigmoidoscopy? We should invite him and his sporting colleagues, both men and women, to join us at the coalface to prevent the unnecessary premature death of too many in our national clan.

Top sports coaches and team members depart when their national team cannot deliver winning results. Therefore, is it time for those who partook in the 1998 Working Party on Population Screening for Colorectal Cancer, and subsequent review, who still work with the Ministry of Health to now hand on the baton? We can only see further because we stand on the shoulders of giants, but I do not accept that colonoscopy resources are our limiting factor—the real limiting factor is the lack of leadership to promote and fund bowel cancer screening.

Sir, could you please convey to Prime Minister John Key that we are many years overdue for a new innovative bowel cancer screening strategy. He needs to take his head out of the sand and act responsibly now to prevent the continuing unnecessary premature demise of over 500 New Zealanders each year.

Competing interests:
Mr Hingston is an experienced colonoscopist who derives income from performing colonoscopy.

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LETTER


LETTER

Modelling of tobacco endgame interventions: a response
Richard Edwards, Tony Blakely, Frederieke van der Deen

We are writing in response to the letter published in the Journal by Associate Professor Laugesen and Professor Grace on the impact of tobacco tax, denicotinisation of cigarettes and e-cigarettes on smoking prevalence in New Zealand.¹ We have several points to make about this letter and the findings it presents about the estimated impact of these interventions on achieving the endgame target of a smoking prevalence below 5% by 2025.

Firstly, the letter lacks context. There is no mention of the previous modelling work on forecasting trends and on tobacco tax interventions in New Zealand,²⁻⁶ nor any comparisons with the findings from this work. Previous US work on modelling the potential impact of denicotinisation is also not referenced.⁷ The New Zealand tax modelling work carried out by BODE³ in particular includes a sophisticated simulation study to estimate future smoking prevalence trends before and after tax increases, and through to health gains, costs and inequality impacts.²,⁴,⁶ This work includes price elasticities at the heart of the modelling (as is the international norm), and allows for changing demographic structure, competing mortality risks, and so on.

Secondly, detail on the methods and model assumptions is limited. Providing information on methods is a fundamental principle for communication in scientific journals, and perhaps even more crucial when (complex) simulation modelling techniques are applied. We understand that the length of letters is inevitably constrained, making it difficult to include all necessary methodological information. This means that letters may not be the appropriate mechanism for communicating the findings of complex modelling studies. However, if this approach is used, the authors could link the letter to an online report that explains the methods and assumptions fully (an action that would still be good to do, given the importance of the tobacco endgame for New Zealand).

Thirdly, based on the information that is provided about the methods, we have several concerns about the approach used and assumptions made. For example, it appears that Laugesen and Grace assume that all of the change in smoking prevalence from 2010 to 2014 was due to the annual tobacco tax increases. There are three main concerns about this assumption. First, other policies were in place or introduced over this time period (eg, point-of-sale display ban, smokefree prisons and extension of smokefree areas in many jurisdictions). These policies plus further denormalisation of smoking, resulting from the adoption of the Smokefree 2025 may account for some of the observed decline in prevalence from 2010-14. Second, the modelled effect of tax should be that over and above business-as-usual trends in smoking prevalence. A third problem is overreliance on two points in time (2010 and 2014). If the 2010 estimate was by chance high, and the 2014 by chance low, then impact of tax will be overestimated. In addition, Laugesen and Grace seem to have simply extrapolated a change in tobacco consumption into an equivalent reduction in smoking prevalence. However, reductions in tobacco consumption are made up of a combination of falls in prevalence and reduced consumption among continuing smokers. Hence, tobacco tax consumption elasticities (how much consumption reduces with price increases) are substantially greater than prevalence elasticities (ie, how much prevalence reduces due to a price increase).
Estimates for falls in tobacco prevalence by way of annual tax increases of 10% or larger in previous New Zealand modeling work were lower than those reported by Laugesen and Grace, presumably reflecting more realistic assumptions about impact. For example, Laugesen and Grace estimate an annual 15% increase in tax will result in a prevalence of 5.1% by 2025, whereas Cobiac et al estimate 8.2% prevalence for the same scenario. Further work by the BODE group is underway to examine how price elasticities may change with very high tobacco prices, and the estimates may subsequently be amended.

However, at this point in time, the published projections are the best (we believe) that can be done for New Zealand.

Similarly, the estimates of the population-level impact of e-cigarettes may be optimistic for several reasons. Firstly, their assumed annual quit rate through e-cigarettes in New Zealand (if they were made more widely available) seems to assume that all US and UK ex-smokers who are currently regular users of e-cigarettes gave up during the last year, gave up using e-cigarettes and, importantly, would not have given up otherwise. This assumes, unrealistically, that an equal number of new ex-smokers as the total current number of ex-smoker, e-cigarette users will quit using e-cigarettes every year subsequently. Furthermore, it assumes none of this group of ex-smokers only started using e-cigarettes subsequent to quitting (and hence did not quit through e-cigarette use). Finally, it assumes that all of these ex-smokers who quit using e-cigarettes only quit because of their use of e-cigarettes—ie, none would have quit anyway using other means (NRT, Quitline support etc) if e-cigarettes had not been available. An example of the importance of taking the latter into account is a recent estimate of the impact of e-cigarettes on prevalence (authored by a supporter of e-cigarettes in tobacco control) which used the marginal effect of quitting using e-cigarettes over and above quit rates from unassisted quit attempts.

The estimates of the impact of e-cigarettes also ignore potential (but unproven) negative impacts of e-cigarettes on reducing smoking prevalence, such as through gateway effects for youth or reduced quitting among dual-using smokers. The latter could occur if the ability to use e-cigarettes where smoking is not allowed, or the perception that cutting down smoking with the help of e-cigarettes is sufficient, resulted in reduced motivation to quit. These effects are plausible. For example, in the UK, whilst 41% of dual-users report using e-cigarettes to quit, another 43% report using e-cigarettes to cut down, but not stop completely, and 25% report using them “because I want to continue smoking tobacco, and need something to deal with situations where I cannot smoke (eg, workplaces, bars or restaurants).”

The uncertainty about the net population impact of e-cigarettes on smoking prevalence is illustrated by the finding in some, but not all, longitudinal population-based studies that e-cigarette users do not have higher quit rates than non-users, and the lack of evidence of a substantial increase in the rate of decline in smoking prevalence or change in quit rates among smokers in jurisdictions where e-cigarette use is very common like the UK.

There are also uncertainties about the population-level impact of denicotinisation—such as how interventions studied in experimental settings (eg, controlled trials using denicotinised cigarettes) may impact on smoking prevalence in real life.

Given this degree of uncertainty, the lack of any sensitivity analyses, discussion of alternative scenarios or at least some information on the degree of uncertainty in the predicted prevalences is concerning, and contrasts with previous modelling work.

Finally, we note that the Smokefree 2025 goal was derived from a recommendation of the Māori Affairs Select Committee. Given the much higher smoking prevalence among Māori in New Zealand, there are concerns that the Smokefree 2025 goal may be achieved for the overall population, whilst Māori smoking prevalence remains well above 5%. We suggest, therefore, that all modelling work should present estimates by ethnicity, as is the case in other recent New Zealand modelling studies.

We believe that work like Laugesen and Grace’s modelling the potential impact...
LETTER

of endgame interventions is important and can help inform the development of evidence-based strategies for achieving Smokefree 2025. We are sure that the authors are strongly committed to enhancing constructive discussion around achieving that goal.

However, we are concerned that the estimates presented provide unjustifiably optimistic and misleadingly definitive estimates of intervention effects, and hence skew debates about how best to achieve the Smokefree 2025 goal.

Competing interests: Nil

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Safety and efficacy of digoxin

Recent observational studies have suggested increased mortality associated with digoxin in those with heart failure and atrial fibrillation. These observational findings are in contrast with the results of the digoxin in heart failure (DIG) trial.

This meta-analysis reviews data from recent observational and controlled trials. All studies published from 1960 onwards that examined comparative outcomes with digoxin and control (placebo or no treatment) were reviewed. The primary outcome was all cause mortality. Fifty-two studies contributed to the systematic review, including 621,845 patients who received treatment with digoxin or control.

The researchers noted that prescription bias may have contributed to the observational trial findings, ie clinicians prescribing digoxin to patients at the highest risk. The conclusion of this meta-analysis is that digoxin should continue to be considered as a treatment option to achieve heart rate control in those with atrial fibrillation and also to avoid hospital admission in patients with heart failure. An editorial review commends the findings and observes that trials are best, ignore the rest.

BMJ 2105;351:h4451 and BMJ 2015;351:h4662

Perioperative bridging anticoagulation in patients with atrial fibrillation

It is uncertain whether bridging anticoagulation is necessary for patients with atrial fibrillation who need an interruption in warfarin treatment for an elective operation or other elective invasive procedure.

This report concerns a randomised, double-blind, placebo-controlled trial in which, after perioperative interruption of warfarin therapy, patients were randomly assigned to receive bridging anticoagulation therapy with low-molecular-weight heparin or matched placebo administered subcutaneously twice daily for 3 days before and then 5 to 10 days after the procedure.

1,884 patients were randomised. The incidence of arterial thromboembolism was 0.4% in the no-bridging group and 0.3% in the bridging group and the incidence of major bleeding was 1.3% in the no-bridging group and 3.2% in the bridging group. The researchers conclude that forgoing bridging anticoagulation was non-inferior for the prevention of arterial thromboembolism and decreased the risk of major bleeding.

N Engl J Med 2015;373:823-33

Compliance of males with stage 1 testicular germ cell tumours on an active surveillance protocol

Testicular germ cell tumours (TGCT) are the commonest solid tumour in young men. Stage 1 TGCT (ie, confined to the testis) requires orchidectomy, followed by management options that include chemotherapy, radiation treatment, retroperitoneal lymph node dissection or active surveillance. Surveillance avoids the morbidity of the other treatments and all treatments have an excellent outcome. Successful surveillance requires patient compliance with rigorous follow-up.

This study examines the rate of compliance in follow-up of 57 men in the surveillance programme. At median follow-up of 24 months, 81% had adequate compliance with the follow-up regimen, 12% were lost to follow up, and 16% relapsed; none between protocol visits.

Methods to increase compliance are needed. The authors suggest that nurse-led or internet schemes might be helpful.

Internal Medicine Journal; 2015;45:1081-84

URL:
Post mortem examinations a public service

This subject has been well treated by Dr Wilson, of the Mayo Clinic. Probably in no department is there more scope for general education than in this important one. In New Zealand today, if any of our valuable stock die, or an epidemic effects our sheep or horses, post mortem examinations are made and the result communicated to the owners. Surely our own children are as valuable an asset as our cattle?

In this, as in other serious diseases, the medical profession will make no headway until it convinces the public of the value of expert bacteriological or pathological findings. In cancer, up to the present, we have unfortunately no bacteriology, but through the pathologist alone can reliable statistics, reliable diagnosis in early cases, and the true story in neglected cases be accurately unfolded.

The opinion of a pathologist should at once be available on the nature of any growth removed at the time of operation, and in the case of death, both relatives and practitioners should welcome a post mortem examination, for the invaluable information that both may obtain.

The fact that the public do not recognise the value of post mortem examinations, and consequently refuse permission when one is requested, is largely the fault of the profession. A concise and straightforward report by a skilled pathologist should be handed in writing to the next-of-kin after any such examination. It is not right that the physician alone should gain knowledge by such examination. It is of great importance that a man should know what really caused the death of his child. Moreover, no greater stimulus is possible to a sound clinical work than the verification by post

Hamlet’s Soliloquy. A Fancy Morgue Sketch. The Coroner: To be or not to be? — that is the question.

(Observer, 24 August 1912).
mortem findings. The medical profession is, or ought to be, the guardian of the public health. Anything that tends towards the greater efficiency of the profession should be welcomed by the public if it is mindful of its dearest asset—good health. The pathologist is, or ought to be, the auditor of medical accuracy.

In conclusion, I make the following suggestion: That the Council of the NZ Branch of the British Medical Association make arrangements for convening a cancer conference, to which be invited the heads of the Health Department, Veterinary Department, chairman and members of Charitable Aid Boards, and all members of the profession and public interested in the subject. Valuable information, both to the profession and to the public, should thus be obtained, and uniform methods of dealing with the disease established throughout the Dominion. Similar conferences have frequently been held on the subject of tuberculosis with excellent results, and I believe that the cancer problem should not present the same difficulties today that the consumption problem did ten years ago, provided that the full forces of education and scientific investigation are brought to bear on the subject in an organised manner throughout the Dominion.

NZMJ DECEMBER 1915
Hidden Hospital
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Aims: In 2009, only 63% of patients in the adult emergency department (ED) at Auckland City Hospital were admitted, discharged or transferred from ED within 6 hours of arrival. A major contributor to patients exceeding 6 hours in ED was the inability for patients to access hospital beds (access block). The aims of this work were to:

• Reduce waiting time for admittance from ED to an inpatient ward bed
• Reduce access block by reducing waiting time for patients throughout their hospital stay

Methods: Improvement specialists from manufacturing, banking and management consulting with experience applying Lean Six Sigma and leading change formed a Performance Improvement Team (PIT) at Auckland DHB. The PIT’s key initiatives included: training 23 healthcare staff in Lean Six Sigma Green Belt Training to lead their own projects; applying Lean Six Sigma principles to medical rosters to evenly distribute patients per doctor and align shift times with patient presentation patterns; and delivering a communications programme to engage clinicians in identifying and eliminating causes of waiting. Finally, the PIT facilitated over 300 ward staff to improve efficiency of tasks away from the bedside so that nurses could spend more time with patients.

Results: From 2009 to 2014 there was a 21% increase in adult acute elective and arranged presentations from 69,225 to 83,279. During this period the average wait time to be admitted from ED to an inpatient ward bed reduced from 8 hours (2008 & 2009) to under 1½ hours (March 2011 through June 2015). Direct care time of nurses with patients increased from 34% to over 60% on 10 wards. This equates to 2 more hours per nurse per 8 hour shift.

Conclusion: Access block at Auckland City Hospital has been reduced through improvement initiatives facilitated by experienced improvement practitioners working alongside healthcare workers to apply Lean Six Sigma and lead change.

Improving early childhood outcomes
(Auckland, New Zealand)

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Background and aims: Participation in high quality early childhood education (ECE) is associated with improved cognitive outcomes at school and the development of characteristics that support learning.1 Children who do not participate in ECE, or who attend regularly for less than one year, are disproportionately from socio-economically vulnerable areas. In response to the New Zealand government’s target of 98% participation in ECE by 2016, Ko Awatea and the Early Learning Taskforce led the Early Learning project to increase ECE enrolment and attendance rates in such areas of South Auckland.

Method: The project was structured as a collaborative with seven ECE centres participating, using the Breakthrough Series Collaborative Model for Achieving Improvement (BTS). The BTS included three learning sessions interspersed with action periods. Participants were trained in improvement methodology at the learning sessions and used plan, do, study, act cycles to develop and test changes according to local context during the action periods.

Participants collected weekly data on the number of licenced places occupied with an enrolled child, booked and attended hours, and the percentage of available capacity used. Data was entered into an Excel spreadsheet and collated weekly by Ko Awatea.

Results: The aggregated median enrolment rate rose from 76% in January 2014 to 89% in June 2014. Average attendance rose from 12.5 hours each week per child in January 2014 to 18.6 hours each week per child in June 2014.

Conclusion: Using BTS and Model for Improvement methodology enabled participating ECE centres to increase enrolment and attendance rates within existing resources. Staff in ECE centres developed the capability to develop and test changes for improvement and to understand their effectiveness.
Care integration and coordination: Learning from a Qatari pilot

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1 Hamad Medical Corporation, Qatar; 2 Primary Health Care Corporation, Qatar; 3 Supreme Council of Health, Qatar

Background and aims: There is increasing pressure on the health system in Qatar, which is creating a strong driver for integrated and coordinated care. As part of Qatar’s National Continuing Care Design Strategy, a pilot was launched to assess care coordination and integration across the healthcare system.

Methods: Lean Six-Sigma was used as the project management and improvement methodology in a 6-month pilot as it offers a structured rigorous data driven approach. The pilot was based on the following key components:

• Patient and healthcare provider engagement through focus groups, workshops and surveys.

• Healthcare provider partnership between primary and secondary care providers in Al Wakra municipality.

• Concurrent patient assessment of 220 inpatients to determine if they were placed at the most appropriate level of care for their clinical condition and if not, identify the reasons for that and recommend a more appropriate level of care. Case managers used the Managing Care Appropriately for Patients (MCAP) tool to conduct the assessments.

• Care coordination working with primary and secondary teams to facilitate patient transitions to a lower level of care, if appropriate.

• Cross-organisation pathways to support efficient and seamless care integration for patients transitioning between providers.

Results: Surveys revealed that 85% of patients did not have a formal care coordinator and expressed the need for better care coordination and integration of services across providers.

Three main results emerged:

• Inpatient assessments revealed that 46 patients (21%) had clinical needs that could have been more appropriately delivered at lower levels of care. The top 3 reasons for this were:
  • lack of a defined care continuum
  • limited capacity or absence of an alternate care setting
  • limited home and community services

Workshops revealed that the implementation of cross-organisational pathways was hindered by absence of system-wide care coordination and system navigation functions and a technology infrastructure to support patient referral and transition between providers.

Conclusion: In order for care coordination and integration initiatives to be successful in Qatar, a strategic framework and mandate for system-wide implementation are needed. Approached in this manner, there is a potential to rebalance demand across the healthcare system and provide patient-centric care.

Values-based health: Improving care towards the end of life

Helen Mason, MBA, RN, Bay of Plenty District Health Board, Institute for Healthcare Improvement

Introduction: This research sought to identify how advance care planning can be implemented more broadly and successfully through considering: the strategic context; key success factors and barriers to implementation; existing systems which it can be built on.

Methods: Phase 1: Eighteen semi-structured interviews with internationally recognised experts including physicians, nurses, researchers, religious leaders and lawyers.

Phase 2: Four qualitative case studies of US health systems identified as leaders in end-of-life care and advance care planning. Sixty semi-structured interviews were conducted to support the case studies, mainly with physicians, nurses, senior leaders and change managers.

Notes and recordings from interviews were transcribed and coded thematically using Atlas.ti software. Participants confirmed themes identified.

Results: The research identified seven foundational elements for the implementation of advance care planning:

1. Strategic fit: a strategic commitment to patient- and family-centred care which supports and aligns with advance care planning.

2. Cultural change: this should first be promoted in the community, so there is an increased level of comfort with the concepts of end-of-life and death. Second, promotion should occur within health systems so that death is not seen as a failure and the system recognises the existence of a range of available end-of-life care options.

3. Senior leadership: senior leaders providing active, engaged and visible leadership.

4. Dedicated resources: first, quality improvement/ change management resources for implementation and second, dedicated resources for the actual delivery of advance care planning.
Eradicating rheumatic fever from Hawke's Bay

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Background and aims: Acute rheumatic fever (ARF) is a serious but preventable disease. Between July 2006 and June 2009, there were 26 admissions for ARF (5.8 per 100,000 people) at Hawke’s Bay District Health Board. Twelve of these cases occurred in the suburb of Flaxmere, Hastings. The ‘Say Ahh’ rheumatic fever programme was implemented in 2010 to reduce the incidence of ARF in children aged 5-14 years attending Flaxmere schools.

Methods: ‘Say Ahh’ is a school-based throat swabbing and treatment programme in nine low decile schools covering a population of approximately 1,800 children. The programme is provided by health workers (school nurses or kaiawhina). An opt-in consent process was followed for all children attending those schools aged 5-14 years. Health workers visited each school 2-3 times per week to assess children with sore throats. A throat swab was taken and antibiotic treatment offered to those with a positive result. Households of children with positive sore throats were assessed to identify contacts who may require throat swabbing. Affected families were offered referral to a social worker and a comprehensive housing assessment was undertaken, followed by housing insulation repairs as required. Assistance was also offered for access to Work and Income, Housing NZ and other Government organisations. Local Non-Government Organisations and charities supported the programme by offering household items for families, such as curtains, beds and linen.

Results: The total number of throat swabs taken in the ‘Say Ahh’ programme for the period studied (Oct 10–Sept 14) was 13,311, with a positivity rate between 11.4% and 17.5% and no reduction in the positivity rate seen over the period. The overall rate of ARF in Hawkes Bay has decreased from 7.0 cases per 100,000 in 2010 to 1.3 cases in 2014. In the five years before implementation, the annual incidence of ARF among children aged 5-14 at ‘Say Ahh’ schools was 221.1 per 100,000. In the four years after implementation, the rate was 76.2 per 100,000. This is a statistically significant reduction of 66% (p=0.02).

Conclusion: The programme delivered a high quality equitable service that reached those children most at-risk from ARF and continually linked the screening and treatment programme with actions to improve the underlying determinants of health. This approach has resulted in this programme being successful.
mortality
• Staff survey 9 months post implementation

Results: Compared to the previous year, after 12 months, the new model of care resulted in:
• ALOS reduction of 0.9 days from 6.12 to 5.24 days
• 18% reduction in mortality from 4.61 to 3.78 deaths per 100 separations
• 476 more separations from 10,747 to 11,212 patients per annum
• 7,015 bed days saved across the three sites
• 19 less beds across the Eastern Health General Medicine Service.
• Reduction in variation in the LOS between units reduced to an average 4.0–6.5 days

Qualitatively, physicians felt that the new model improved the quality of care provided to patients, improved communication between the multidisciplinary team, and sped up the senior decision making process.

Weekend discharge performance improved considerably especially on Sundays with total weekend discharges increasing from 710 to 1,098 (an increase of 54.6%) in the 6 months prior to the new model (Jan-Jun 2013) to the second 6 month of the new model (Jan-Jun 2014). In the same period there were an extra 222 Sunday discharges, an increase of 72.8%.

Conclusion: This work has resulted in increased standardisation on work flow, reduced LOS and the perception on increased decision making. All changes to clinical staffing with the new model were cost neutral with no compromise to teaching and training.

Taking a temperature check on safety learning from measuring improvement at scale with the NHS safety thermometer
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Background and aims: As part of the English Department of Health’s (DH) Quality, Innovation, Productivity and Prevention (QIPP) ‘Safe Care’ programme in 2010, 161 organisations came together to improve four high volume harms: pressure ulcers, falls, urinary tract infection (UTI) in patients with catheters and venous thromboembolism (VTE), which are estimated to collectively affect over 200,000 patients per year in the English NHS.

Methods: A point of care measurement tool, the NHS Safety Thermometer (ST), was developed to measure these four harms according to seven design principles: the tool would have clinically valid definitions, be efficient, be used wherever the patient is treated, provide immediate data over time, measure all harm experienced by the patient regardless of avoidability, measure harm at the patient level enabling a composite measure of ‘harm free’ care and be easy to aggregate.

Various iterations were produced using Plan, Do, Study, Act (PDSA) cycles working with frontline teams and content experts. Data were collected at the point of care through conversation with the patient, patient assessment and reviewing patient notes.

In 2012, all NHS organisations were incentivised through a Commissioning for Quality and Innovation goal to use the ST on 100% of patients on one day per month. Data were analysed and publicly available using run charts to describe special cause variation, and Pareto charts and funnel plots to understand variation. Data were used locally to set improvement goals and measure improvement.

Results: The number of organisations submitting data increased from 428 (July 2012) to 822 (May 2015) with 7,861,432 patients surveyed, an average of 201,575 per month. Settings where data are collected include acute and community hospitals, care homes and patients’ own homes.

Nationally, the proportion of patients receiving ‘harm free’ care has increased from 91.6% in July 2012 to 93.9% in May 2015. In the national data, from the first to the last median, this represents a decrease in harm from 8.2% to 6.1%, or a 25% decrease in the presence of harm.

Conclusion: PDSA methodology can be used to develop a measurement tool for use at point of care in a variety of care settings. The ‘harm free’ care measure engaged teams and detected change over time at a local and national level.


Post orthopaedic allied health assistant (AHA): Hip and happening
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Aim: Health care globally is experiencing funding and resourcing issues with decreasing numbers and complexity of patients to manage. It is necessary to review service and discipline structures to provide cost effective patient care without compromising quality and safety. One strategy is to optimise and upskill the allied health assistant (AHA) workforce to practice at the higher end of their scope. This project aimed to assess the cost effectiveness and efficacy of the Monash Health Acute Orthopaedic AHA role.

Methods: This project required the reallocation of an AHA to fill a physiotherapist (PT) vacancy due to financial and resource challenges. A range of productivity and
quality data was collected 12 months prior to AHA recruitment and 12 months after recruitment, including the number of patients attending therapy, number of therapy sessions, and length of stay, incidents and discharge destination.

**Results:** The staff cost saving of a Grade 3 AHA as compared to a Grade 2 PT approximately $27,340/annum. Comparing pre- and post- role implementation data, the number of separations increased from 131 to 181 (38%); the number of occasions of service (OOS) increased from 542 to 724 (34%); total time for all OOS increase from 19,035 to 30,095 minutes (58%) with the average OOS time increasing from 35.12 to 41.57 minutes (18%). Total length of stay reduced from 126 to 91 days (38%); average length of stay for non-complex hips reduced from 6.2 to 5.3 days and non-complex knees reduced from 5.4 to 4.8 days. The cost saving, per patient per day on this ward is approximately $615. Discharge to home increased from 83 to 113 (40%). There was no change in adverse clinical incidents reported or complaints or compliments during the time period investigated.

**Conclusion:** Reallocation of lower acuity ambulation and therapy tasks from a PT to an AHA, utilising the ‘right person right job’ philosophy, has resulted in increased therapy at less cost without compromising quality of care. This role has demonstrated to be a patient centred, cost effective and quality service provision model.

1. Unlocking skills in hospitals: better jobs, more care.

**Spread and sustainability factors for successful healthcare improvement**

Cathy Vinters
Clinical Excellence Commission (CEC)

**Background and aims:** Many projects with excellent results fail to spread or sustain. This study aims to examine the factors that need to be in place to achieve spread and sustainability.

**Methods:** The study began with a literature review via Access Portal, Google Scholar, Medline and Ovid.

In October 2014, nine health-related organisations in England and Scotland which had demonstrated success in spreading and sustaining improvement initiatives were visited under a Hospital Alliance for Research Collaboration (HARC) scholarship. Interviews were conducted with 40 individuals and meetings held with a total of 190 clinicians and quality improvement specialists at all levels of these organisations to learn what factors they identified as essential for spread and sustainability.

**Results:** A thematic analysis identified factors that need to be in place to achieve spread and sustainability.

**Enablers to spread:**
- Strong leadership at executive and project team levels.
- Culture, people feeling able and supported to work in new ways working.
- Significant levels of ownership, time, will, courage and effort.
- Strong belief in self and the team.
- Effective communication to all stakeholders about the problem being solved.

**Enablers to sustaining:**
- Staff stability.
- Strong leadership at executive and project team level.
- Availability of tools (such as the British NHS Spread and Sustainability Model1) and training about sustainability.
- Staff understand how to effectively sustain improvements.
- Effective communication to all stakeholders about the benefits of the improvement.

**Discussion:** Teams embarking on improvement projects should be aware from the outset of the factors that support spread and sustainability and incorporate these into the project.


**Transformed access to appointments: A study with eight healthcare institutions within Singapore Health Services**

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**Introduction:** Singapore Health Services (SingHealth) accounts for almost 50% of all outpatient services delivered in Singapore public healthcare. Before Sept 2013, many SingHealth institutions experienced high call volumes and abandoned calls in our call centres. Patients from our primary healthcare network experienced long waiting times (~25 mins) for referrals to specialist outpatient clinics. In addition, confusion arising from inconsistent rules for booking and coordinating appointments across SingHealth institutions resulted in high internal call volumes (~67k calls per year or 8.5% of annual call volume) and increased workload.

**Aim:** To improve the accessibility of the appointment system for patients and staff.

**Methods:** Gembal walks were used to observe issues; we developed process maps, and identified bottlenecks and waste. Detailed, large-scale surveys were conducted for patients, caregivers and ground staff (500 staff surveyed, 83% response rate). Insights gained were used to develop and test changes using plan, do, study, act cycles.
Clinical and administrative staff from primary and tertiary healthcare institutions in SingHealth worked to improve appropriateness of referrals, develop electronic referral protocols, and redesign the workflow. Appropriateness was tracked electronically and primary care physicians and specialists met regularly to discuss inappropriate referrals. Specialists provided Continuing Medical Education sessions to share knowledge to make better referral decisions.

Staff across several SingHealth institutions were cross-trained and empowered to book appointments across institutions and disciplines. Appointment rules were streamlined. Internet and mobile appointment platforms were redesigned to be more user-centric.

Results: The percentage of correctly fast-tracked referrals improved from 36% to 89% for Ortho (non-spine) urgent referrals.

Before intervention, primary care clinic staff were not trained and given access to book into specialist care institutions’ appointments. Now, they can now book most of the referral appointments for 5 specialist care institutions.

Abandoned calls have also dropped from as high as 37% in FY2015 to 6% in FY2014 with no extra staffing.

Conclusion: These interim results achieved through inter-disciplinary and cross institutional workgroups and platforms are encouraging for SingHealth’s efforts in transforming patient service.

Falls prevention is better than a cure
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Background and aims: Patient fall is one of the top four clinical safety incidents at Eastern Health. Analysis of the contributory factors identified failure to practice in accordance with the falls performance standard as the most significant cause.

Eastern Health tested whether improved compliance with the falls performance standard would reduce the incidence of falls among inpatients.

Methods: The project applied action learning methodology based on the performance excellence approach on two inpatient wards. The approach includes three steps:
1. Agree the performance standard.
3. Implement improvement initiatives to address any performance gaps.

The methodology:
• A ‘Rapid Improvement Event’ with staff and consumers from two pilot wards identifying ‘barriers’ to compliance with the performance standards.
• Plan, do, study, act (PDSA) cycles to test and learn from interventions designed and implemented during the project.
• Leadership huddles were conducted throughout the project to determine and address the human factors preventing compliance.
• Three focus groups (one for each pilot ward which included leadership and front line staff and one for the project leadership team) were conducted at the conclusion of the project.

Compliance with the performance standard was monitored through an audit program. Falls rates were monitored through the incident reporting system. Weekly performance reports were provided to the Executive.

Focus group information and data from the PDSA cycles was analysed at the conclusion of the pilot project to identify the critical success factors.

Results: Compliance with the falls standard increased from 74% in 2013 to 98% on Ward 1 and from 78% to 99% on Ward 2 during the pilot.

10.5 on Ward 2 during the pilot.

Critical success factors identified were:
• Ownership at the local level
• Data supporting the improvement
• Integrate the project into standard daily and weekly work (e.g. weekly audits and meetings)
• High presence of senior leadership
• Staff opportunity to voice views and suggestions
• Partnering with consumers.

Conclusion: The results of the pilot project demonstrated a correlation between improved compliance with the performance and reducing the rate of fall. The qualitative analysis also identified a number of critical success factors and barriers to achieving compliance with the performance standard. This information has informed ongoing implementation of the approach across all inpatient areas at Eastern Health and a sustained focus on reducing patient falls.

Turning haggis into pavlova ... Scotland to New Zealand safety in practice
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Counties Manukau Health

Background and aims: The Scottish Patient Safety Programme in Primary Care was established in April 2013 to reduce the number of avoidable harm events from healthcare delivered in primary care in Scotland. The Scottish programme aimed for 95% of primary care clinical teams to achieve reliability in three high-risk areas (Warfarin, prescribing and monitoring of Disease-modifying anti-rheumatic drugs (DMARDs), and medicines reconciliation) by 2016. Safety in Practice customised the Scottish programme for New Zealand general practice (GP). GP
teams aimed to achieve safer Warfarin management, medication reconciliation, and results handling.

**Methods:** We developed a collaborative of 23 general practices to implement a primary care trigger tool (structured case notes review), safety climate surveys and a monthly audit of three care bundles. The concept of utilising a care bundle audit in the three chosen high risk areas is to improve reliability in implementing best practice.

- Warfarin prescribing and monitoring
- Medication reconciliation following discharge from hospital
- Laboratory results handling systems

In Year 2, a fourth audit bundle for safer opioid prescribing was added. Practices kept individual data to track their own progress, as well as submitting their bundle results for collation and analysis at a campaign level to track overall progress.

**Results:** The monthly audit results showed an overall composite measure improvement in all three patient safety bundles areas.

Warfarin Management: Improvement in compliance to best practice from 10% in April 2014 to 74% in February 2015.

Medication reconciliation following discharge from hospital: Improvement in compliance to best practice from 15% in April 2014 to 62% in Feb 2015.

Practice test result handling: Improvement in compliance from 60% in April 2014 to 90% in February 2015.

Practices self-completed the safety climate survey and the primary care trigger tool (structured case review) and composite group data was not collected. Practice-based meetings allowed reflection on data collected and identification of changes to be tested within the practice.

**Conclusion:** Safety in Practice improved compliance with best practice among participating general practices in warfarin management, medication reconciliation and laboratory test results handling.

**Engage to perform:**

**The role of doctors in high performing organisations**

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**Background and aims:**

Medical engagement is "the active and positive contribution of doctors, within their normal working roles, to maintaining and enhancing the performance of the organisation, which itself recognises this commitment, in supporting and encouraging high quality care". The aim of this study was to assess the level of medical engagement in health service organisations (HSO) in the UK, Australia and New Zealand (ANZ); understand the relationship between medical engagement and organisational performance, and compare results between the countries.

**Methods:** All medical staff at 85 NHS Trusts in the UK and 12 health service organisations in ANZ were surveyed, using a medical engagement scale (MES) instrument. The response rate at most sites was between 25% and 30%. The MES was developed with a sample of over 20,000 NHS staff, good reliability (0.7 to 0.93) established for the sub-scales (Working in an Open Culture, Having Purpose and Direction, Feeling Valued and Empowered) and validity.

The MES consists of 30 items and is administered via a website link. It includes organisational identifiers such as division, role and length of time working in the organisation.

The resulting analysis provides an overall index of Medical Engagement levels as well as scores on the sub-scales that make up the index. These sub-scales act as a diagnostic tool identifying areas where the organisation might focus efforts to enhance levels of measured medical engagement. The data are collected from each participating organisation and then combined to provide a cumulative normative dataset.

**Results:** UK findings: A large number of significant correlations were observed between the medical engagement data and the set of performance measures (Care Quality Commission-2013). Organisations with high levels of medical engagement performed well on the external indicators. Organisations with low levels were usually underperforming in other areas.

The relationships included a wide range of indicators, from clinical performance, financial management, safety indicators, patient experience and overall quality standards.

We found a strong association between these results and previously published data (2008). This suggests that medical engagement has a sustained probable causal link to organisational performance.

**Australasian results:** We now have data from 12 sites and over 2,100 doctors have completed the survey, thereby establishing an ANZ norm.

The data reveal relatively lower levels of engagement expected at the 12 ANZ sites based on the UK norms.

Data collected at four New South Wales HSO have also been analysed and compared to the ANZ norm. The profiles of medical engagement vary at the sites and also across the MES scales and sub-scales. This is likely to be replicated when further analysis of the remaining eight sites is completed.

**Conclusion:** Further investigation is required to explore how far the pattern of linkage between MES and organisational performance established in UK is also true of ANZ data.

**URL:**