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100 YEARS AGO

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Childhood immunisations in Northland, New Zealand: declining care and the journey through the immunisation pathway
Juliet Rumball-Smith, Timothy Kenealy

Immunisation is important not only for individual health, but also the wellbeing and resilience of a community to vaccine preventable disease (such as measles). This paper reviews the data for babies born in Northland 2009–2013, a region with consistently low immunisation coverage. One contributing factor to this state is the high proportion of Northlanders who actively choose to refuse immunisation for their babies—the rate of immunisation ‘decline’ in Northland is more than twice the national average. We follow this group of children and find that this decision is long-lasting, as more than 95% of these children go on to be declined their subsequent immunisations as well. This choice has important implications for the health of these children, and of the wider community.

Increased uptake of cervical screening by women with HIV infection in Auckland regardless of ethnicity, requirement for an interpreter or level of education
Michele Lowe, Rupert Handy, Joan Ingram, Mitzi Nisbet, Stephen Ritchie, Mark Thomas, Simon Briggs

Women with HIV infection should receive a yearly cervical smear. The number of women with HIV infection in Auckland who receive a yearly cervical smear increased over the duration of this study. There are still some women with HIV infection who do not receive yearly cervical smears. We were not able to identify barriers that prevent these women from receiving a yearly cervical smear.

Stroke thrombolysis in New Zealand: data from the first 6 months of the New Zealand Thrombolysis Register
Purwa Joshi, John Fink, Peter Alan Barber, Alan Davis, Jeremy Lanford, Andrea Seymour, Peter Wright, Wendy Busby, Ginny Abernethy, Annemarei Ranta

Stroke thrombolysis can help to reduce post-stroke disability, but requires rapid administration and carries a risk of bleeding. This paper reports results from the National Stroke Thrombolysis Register. Treatment rates are improving and bleeding events were few and consistent with international literature indicating that the use of this treatment in New Zealand is safe. However, treatment delays could be reduced. Patients/witnesses need to call ambulance services FAST (Face, Arm, Speech, Time) and hopefully the current national Ministry of Health-funded FAST campaign will help raise public awareness. In-hospital treatment delays can also be improved through better co-ordination of ambulance, ED, radiology, and stroke services.

Red reflex screening in New Zealand: a large survey of practices and attitudes in the Auckland region
Naz Raoof, Shuan Dai

All babies in New Zealand are required to undergo ‘red reflex’ screening very soon after birth, which helps detect potentially sight threatening conditions such as cataracts. We sent a survey to health care professionals, including general practitioners, midwives and paediatricians, of whom 483 responded. We found that while the majority of respondents were confident in undertaking this test, 17% replied that they were “not sure” or “underconfident”. Although this test is performed in all newborns, less than one-fifth of professionals undertaking the test have had any formal training. This is an area that therefore needs to be addressed.
SUMMARIES

Nurse specialists for the administration of anti-vascular endothelial growth factor intravitreal injections

Priya Samalia, David Garland, David Squirrell

Common retinal diseases, such as ‘wet’ age-related macular degeneration, are treated with intravitreal injections of medications known as anti-vascular endothelial growth factors. The number of individuals with these diseases is increasing, leading to an increasing demand for these treatments. Meeting these increasing treatment needs is challenging. This paper shows that the use of nurse specialists for the administration of these treatments is an effective way to address the increasing treatment needs and nurse specialists can administer these treatments safely and effectively.

People ageing with spinal cord injury in New Zealand: a hidden population? The need for a spinal cord injury registry

Richard Smaill, Philip J Schluter, Pauline Barnett, Sally Keeling

Each year in New Zealand, approximately 80–130 people have a spinal cord injury (SCI), mainly occurring among young and middle-aged people who sustain a traumatic injury or non-traumatic medical condition, resulting in a disability that has life-long major consequences. The aim was to identify and access the various existing SCI databases to establish a single research database of ageing New Zealand people who sustained a SCI before 1 January 1990. A total of 1,174 people with reliable contact details were identified and included in the database. An unexpectedly large ageing SCI population was uncovered, which had largely been hidden due to the uncoordinated, fragmented, and inconsistently collected information held within different organisations. With an increasing ageing SCI population that often develop age-related, complex, secondary conditions around 20 or so years after the SCI, there is urgent need for a single well-managed and coordinated national New Zealand SCI registry to assist with the planning and delivery of comprehensive services.
New Zealand Spinal Cord Registry: a new milestone
Christine Howard-Brown, Ian Civil

The Ministry of Health, in its Tertiary Services Review in 1995, identified a number of issues specific to spinal cord impairment (SCI) rehabilitation.\(^1\)

These issues included variable acute care outcomes, an inability to compare data between the two spinal rehabilitation services, and a need for agreed quality measures, together with a method to collect and share them.

Now, more than 20 years later, acute care, and longer-term outcomes for people with SCI are still not systematically collected, and rehabilitation data collection is limited to inpatient data using the Australasian Rehabilitation Outcomes Centre (AROC) register.\(^2\)

This means little is known about the true incidence of SCI in New Zealand, or the acute clinical and longer-term outcomes for people with SCI.

The clinical challenges that stem from the absence of a structured SCI registry have been noted by many New Zealand researchers.\(^3\)\(^-\)\(^9\) The benefits of clinical registries to systematically collect data has a growing evidence base, demonstrating their value as key instruments for improving patient care, achieving optimal social, economic and quality of life outcomes, supporting health care planning, and for developing clinical research priorities.\(^10\)

As suggested in the paper by Smaill et al in this issue of the *New Zealand Medical Journal*, the benefits of a national SCI registry could also greatly inform planning and delivery of services through improving data access on an otherwise hidden population of people ageing with SCI.

The impetus for a SCI registry has grown and is recognised in the New Zealand Spinal Cord Impairment Action Plan 2014–2019.\(^11\)

The Action Plan, which has eight objectives, includes establishing a national SCI registry as a key activity which will contribute to achieving the best possible health and wellbeing outcomes for people with SCI.

As part of the implementation of the Action Plan, the Burwood Spinal Unit and Burwood Academy of Independent Living completed a 12-month feasibility pilot of two international registries.\(^12\) The pilot recommended adoption of the Rick Hansen Spinal Cord Injury Registry (RHSCIR), a pan-Canadian prospective observational registry which is principally funded by the Federal Government of Canada (Health Canada, Western Economic Diversification Fund). The Action Plan governance group endorsed the pilot’s recommendation, which has resulted in sustainable funding from ACC, Counties Manukau and Canterbury District Health Boards for establishing and maintaining a New Zealand RHSCIR. Over the last few months, a registry governance group and two coordinator registry positions have been established, as well as a formal arrangement entered into with RHSCIR. RHSCIR is also working with the New Zealand registry governance group to enable inclusion of non-traumatic spinal cord impairment data and long-term follow-up data, as data collection currently covers each new acute hospital admission to discharge from rehabilitation services. With ethics approval, *a priori* questions and data points confirmed, data entry will commence on 1 August 2016.

This marks an important milestone in the management of SCI in New Zealand, as the NZRHSCIR will support evidence-based quality improvement, including international benchmarking and presents unparalleled research opportunities.
REFERENCES:


There has been a 2,000% increase in the post-onset life expectancy of people with a spinal cord injury (SCI) over the past 50 years. This compares to a 30% increase for the nondisabled population. The study of ageing with a spinal cord injury is highly relevant to SCI survivors, but also of interest to health care providers and insurance companies.

Richard Smail et al's article in this edition of the New Zealand Medical Journal has summarised the need for a national registry for SCI patients. Their prayers have been heard with the mandate and funding for a national SCI registry approved by the national SCI action plan.

This editorial will concentrate on the clinical aspects of ageing and SCI, and hopefully guide the district general hospitals and primary care interface, who may only see one or two SCI patients a year in their practise.

Longitudinal studies have shown that SCI patients in the decade post-injury are at high risk of developing megacolon. The amount of time elapsed since injury was the strongest predictor of megacolon, while advancing age also proved a significant independent risk factor. There is a higher incidence of volvulus in this group of patients. The presentation of acute abdomen differs significantly from the able-bodied population. Abdominal pain may not be the presenting feature, instead they present with autonomic dysreflexia, referred shoulder tip pain, increased spasticity, nausea and vomiting, and abdominal distension may lead to a prompt diagnosis. Haemorrhoids, anal fissure and recto-mucosal prolapse are also common presentations. The time to complete their bowel regime increases, and ultimately they will need a colostomy to manage their bowel. Rosito et al showed that the quality of life (QOL) improved significantly (p<0.0001) after colostomy. Significant improvements were recorded in the areas of physical health, psychosocial adjustment and self-efficacy.

Bladder and kidney health in a SCI patient has improved dramatically in the past 50 years. Renal failure, once the most common cause of death in SCI, is very rarely seen. SCI produces bladder dysfunction, leading to the impairment of storage and voiding functions (ie, ranging from urinary incontinence to complete loss of the capacity to empty the bladder). Functionally, the bladder is initially areflexic (with complete urinary retention), but then becomes hyperreflexic due to the emergence of a spinal micturition reflex pathway. However, voiding is commonly inefficient due to simultaneous contractions of the bladder and urethral sphincter (detrusor sphincter dyssynergia).

This group of patients need lifelong monitoring of their upper tracts with ultrasound of the kidneys and frequent video-urodynamic studies. Long-term indwelling catheter increases the chance of recurrent urinary tract infection and also a higher incidence of bladder and kidney stones. As many as 5% of patients may develop squamous cell carcinoma after 5–10 years with an indwelling catheter. The reflex voiders, who manage their bladder with an external collecting device, may need repeat sphincterotomy to avoid high poor emptying residuals, and repeated urinary tract infections. Patients managing their bladder with intermittent self-catheterisation may need to change their bladder management, with a decline in their physical health from overuse syndrome or neurological decline secondary to syringomyelia.
Upper limb pain is common, and most likely associated with overuse syndrome or peripheral nerve entrapment. Ulnar nerve entrapment and carpal tunnel syndrome are common and may need surgical intervention. These individuals need increased care packages post-surgical intervention and may need admission to the spinal unit for the short-term until they can use their hands and arms effectively. The most common overuse syndrome causing pain in the upper extremities is degenerative joint disease, rotator cuff tears, rotator cuff tendinitis, subacromial bursitis and capsulitis. The treatment for these chronic conditions is usually conservative, with physiotherapy measures, local anaesthetic, and steroid injections. Paraplegic or tetraplegics who are dependent on a manual wheelchair may need a hand-controlled wheelchair.

Neurogenic scoliosis is very common if the SCI is in the paediatric age group. Charcot’s joint, involving the thoracolumbar spine, and a high tetraplegics involving the shoulder joint, is worthy of mention. Osteoporosis occurs uniformly in individuals with SCI, with bone loss beginning immediately after the injury. The maximum bone loss is in the first 3–5 months post injury, thereafter there is a linear loss of bone density throughout their lives. They present with long bone fractures with trivial fall, usually a delayed presentation. The majority of these are managed conservatively. These patients are prone to develop pressure ulcers if they are put in a full plaster cast. They can be effectively treated in a bivalved plaster cast with frequent skin checks or a removable brace.

There is currently no consensus as to when a bone mineral density test should be undertaken, or the role of preventative bisphosphonate treatment in the acute phase. The consensus among the authors of this editorial is to ask for a bone mineral density test in post-menopausal women with SCI, a history of long bone fracture, or when the patient is considering standing in a standing frame after a period of time. These patients do have T-scores in the osteoporotic range (-2.5 and lower), and may need treatment with bisphosphonates.

Autonomic failure resulting in fluctuation between autonomic dysreflexia and postural hypotension is common. Mechanical means, like abdominal binders and compression stockings, should be trialled as first-line management; oral vasoressors, like midodrine, may be needed prior to mobilisation. Autonomic dysreflexia occurs in patients with injury above T6. This is characterised by an uncontrollable rise in blood pressure secondary to noxious stimulus below the level of the lesion, and is a medical emergency. The majority of times, this is related to bladder drainage. Identification and removal of the noxious stimulus is key to the management of this condition. Sublingual glyceryl trinitrate (GTN) spray, or nifedipine, are the drugs of choice. Patients on phosphodiesterase type 5 (PDE5) inhibitors for erectile dysfunction should have nifedipine, rather than GTN spray.

The tetraplegic population in particular, and to some extent high paraplegics, are prone to sleep apnoea. This warrants an investigation with sleep study. Compliance with continuous positive airway pressure (CPAP) devices is poor in this group of patients, if tolerated it has a positive impact on daytime sleepiness and quality of life measures.

Metabolic syndrome and cardiac health needs increase with ageing in SCI. The rates of diabetes are 4 times higher than normal population. There is also abnormal low level of growth hormone and testosterone levels in patients with SCI. Hyponatremia with chronic increased water intake can be seen in some patients. Syndrome of inappropriate antidiuretic hormone secretion (SIADH) of neurogenic origin is a common presentation.

Callaway et al identified five key themes emerging in participants who were on average 58.5 years of age, and were 20 years post-injury: (i) spasm and pain; (ii) sexual dysfunction; (iii) pressure areas; (iv) fatigue; and (v) the impact of secondary health conditions on life-role participation, and the choice of supports and equipment. They concluded that secondary health conditions can significantly impact occupational participation following SCI.

Spasm and neuropathic pain have a fluctuating course and can worsen with time. Once all pharmacological means have been exhausted for spasms, there is a role for an intrathecal baclofen pump. Botulinum
toxin injections for focal spasticity are also beneficial. Polypharmacy is a common issue with this group of patients, and frequent reviews of the medication is warranted.

During the first year following the onset of SCI, approximately 15% of patients develop a decubitus ulcer. The rate of a decubitus ulcer increases to 30% 20 years post SCI. Pressure ulcers have many contributing factors; recreational drug use, self-neglect, poor nutrition, cigarette smoking, and a lack of compliance, to name a few. Complete injuries and a previous pressure ulcer are the best predictor of recurrence of pressure ulcers. Conservative management with bedrest and regular turns is the single most important measure in treating these pressure ulcers. Funding bodies may have to fund increased care packages to facilitate bedrest. The district nurses do a stellar job, as most patients heal in the community. Patients who do not heal with conservative measures need surgical input through localised plastic surgical interventions, or through spinal units. This requires a longer hospital stay, anywhere between 3 and 6 months, and comes with huge psycho-social cost to the patient; not to mention the health dollars involved.

The individuals injured in the paediatric and adolescent age group can have a satisfactory sex life as they grow older with their SCI, and can go on to have a family if they so choose. Ovulation and fertility are generally unaffected in women with SCI. In men, infertility may be caused by erectile dysfunction, ejaculatory dysfunction, poor sperm quality, or a combination of all three. The current mainstays of treatment for male infertility because of SCI are electroejaculation and vibratory stimulation. With electroejaculation, ejaculation is induced using electrical stimulation via a rectal probe. Seminal emission can be induced in nearly 100% of patients, with specimens suitable for insemination in 70–90% of cases. Vibratory stimulation is less invasive than electroejaculation, and has a success rate of 81% in SCI patients with levels above T10. The procedure involves applying vibratory stimulation to the penis in a standardised fashion. Nearly all patients who fail vibratory stimulation will still respond to electroejaculation. Once sperm is obtained, intrauterine insemination, rather than vaginal insemination, should be used. If intrauterine insemination fails, in vitro fertilisation with or without intracytoplasmic injection can be used.16 In New Zealand for ACC clients, four cycles of IVF is funded. Men with traumatic SCI-related erectile dysfunction are eligible for ACC-funded PDE5 inhibitors, 2 tablets a week, 8 a month.

In spite of a rise in medical and functional problems, reported QOL and life satisfaction remain relatively good and stable in ageing patients with SCI.17

Research has offered ample evidence that spousal support can be seen as an important contributing factor to the ongoing health and well-being of ageing individuals, whether or not they have SCI. In fact, spouses may be the most important element in successful rehabilitation and long-term home care for people with SCI.18

Currently, all SCI patients are followed lifelong by the two spinal units (Burwood Spinal Unit, Christchurch, and Auckland Spinal Rehabilitation Unit, Auckland) through multidisciplinary outreach clinics throughout the country. Patients who are more than 20 years post-SCI should have more frequent follow-up. Yearly, follow-up is the norm in other developed countries, like UK and Australia. A nationwide hub-and-spoke model to deliver physiotherapy, FES (Functional Electrical Stimulation) bicycles, and other emerging technologies with a focus on maintaining fitness is needed.

It is difficult to cover all aspects of ageing in SCI in this editorial. Some good examples of online resources for clinicians in Canterbury can be found at Health-Pathways, developed by the Canterbury Initiative. This can be accessed by following the link, http://www.healthpathways.org.nz/ or through the CDHB home page, and scrolling down to Spinal Injuries. Auckland-based online resource for sex and intimacy in SCI can be found at http://www.sexsci.me/. Some international resources are www.scireproject.com and www.elearnsci.org. These resources are free, but you may need to register with a username and password.
REFERENCES:

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Seeing into the future: ophthalmologists and specialist nurses working together

Elissa M McDonald, Felix SF Ram

New Zealand faces both a limited number of ophthalmologists—particularly in regional centres—and an aging population, who typically have an increasing need for eye care. Therefore, we need to ask: Who will take care of the nation's eyes in the future?

One solution that has proven to be successful is ophthalmologists working with ophthalmology clinical nurse specialists (OpCNS). These nurses have the clinical expertise to assist ophthalmologists, and in some centres perform procedures such as chalazion incision, corneal suture removal, and conduct nurse-led glaucoma, corneal, diabetic retinopathy and uveitis clinics, in collaboration with ophthalmologists. Not only do these partnerships extend and utilise nurses expertise, but are of benefit to ophthalmologists in managing burgeoning patient loads.

This issue of the New Zealand Medical Journal includes a paper by Samalia et al, which highlights the benefit, collaboration, and safety of appropriately-trained OpCNS's working with ophthalmologists to deliver intravitreal injections of vascular endothelial growth factor (VEGF) inhibitors (bevacizumab, ranibizumab, and aflibercept).

VEGF inhibitors are used in conditions such as neovascular age-related macular degeneration, diabetic macular oedema, and retinal vein occlusion, where unchecked VEGF can cause inappropriate vascularisation of retinal and anterior chamber structures leading to visual loss, increased intraocular pressure and, at worst, phthisical eye (a condition where significant damage to the eye occurs leading to blindness and shrinkage of the globe). VEGF inhibitors have been proven to be superior to laser photocoagulation (where heat from a laser is used to seal or destroy abnormal vascular growth in the retinal tissues), in limiting the production of VEGF and therefore reducing the risk of sight-limiting sequelae.\(^1,2\) Another benefit of intravitreal injections over laser photocoagulation is the efficiencies in time, 10–15 minutes per patient with intravitreal injections compared with up to 60 minutes with laser. This allows a greater number of patients to be treated more effectively, which is good news for an aging population. However, in order to prevent visual loss and maintain existing sight, VEGF inhibitors need to be injected on a regular (initially 4–6 weekly) basis. Indeed, a study investigating long-term outcomes in patients treated with intravitreal ranibizumab identified that one-third of participants with exudative age-related macular degeneration were still at risk of decreased visual acuity and required continuing intravitreal injections 7 years following initial treatment.\(^3\) The sheer number of patients requiring regular VEGF inhibitors has meant that in some centres ophthalmologists are spending the greatest proportion of their working day delivering intravitreal injections, which is concerning as New Zealand is reported to have a ratio of one ophthalmologist to every 38,000 people.\(^4\)

Studies have identified that maintaining visual acuity is the most important consideration to patients. Patients identified drug label status (intravitreal bevacizumab has been used off-label) and cost, along with the designation of the provider, as least important factors.\(^5\) In fact, in order to
prevent decreased visual acuity, patients were prepared to endure increased treatment burden, regular intravitreal injections at short intervals including longer periods of waiting and travelling to receive treatment.6 Although, patients preferred to attend a one-stop service, and ideally with less frequent follow-up.5,6

The Royal College of Ophthalmologists have changed their policy to allow administration of VEGF inhibitors by non-medical health-care practitioners subject to appropriate training and supervision,7 while a recent systematic review investigating non-physician delivered intravitreal injections in 31,303 eyes concluded that the practice was feasible and safe.8 Likewise, the study by Samalia et al investigates a safe, economical solution to the growing need for VEGF inhibitor treatment that can potentially benefit specially-trained ophthalmology nurses, ophthalmologists, and patients alike. By conducting a safety audit of three appropriately trained OpCNS’s who delivered almost 3,000 intravitreal injections over an 18-month period, Samalia et al were able to identify any potential concerns and benefits of extending the responsibility of intravitreal injections to appropriately-trained specialist nurses.

Risks to any patient receiving intravitreal injections, while small, can be serious, and include endophthalmitis (infection affecting the entire globe), vitreous haemorrhage (bleed into the vitreous), uveitis (inflammation of the iris and ciliary body) and increased intraocular pressure. It was pleasing to see in Samalia et al’s study that these complications were minimal, and were comparable to those documented in the literature by ophthalmologists.8,9

While both generalist and specialist ophthalmologists manage patients with neovascular pathologies, it is important to identify that in Samalia et al’s study, responsibility for patient management remained with the ophthalmologist and OpCNSs worked in collaboration to provide effective and timely care. The results of the safety audit confirm that the comprehensive specialist nurse training programme was effective in preparing nurses to safely extend their scope of practice, and could potentially be used as a model to train ophthalmology specialist nurses in other New Zealand centres, especially remote regional centres, to help manage increasing demand for intravitreal VEGF inhibitors and provide the much needed care for our increasingly aging population.

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REFERENCES:


EDITORIAL


Childhood immunisations in Northland, New Zealand: declining care and the journey through the immunisation pathway

Juliet Rumball-Smith, Timothy Kenealy

ABSTRACT

AIM: In a region with high rates of immunisation refusal, we examine whether refusing an immunisation at 6 weeks (the first scheduled immunisation) predicts the pattern for subsequent scheduled immunisations, and the characteristics of those who declined these immunisations.

METHOD: We used data from the National Immunisation Register to identify 11,972 children born between 1 January 2009 and 31 December 2013 (inclusive), and who had their first immunisation (due at 6 weeks age) in Northland, New Zealand. At each immunisation event, individual vaccines are recorded as being delivered or declined. This cohort was 'followed' to determine which of these children received or declined the scheduled 3-month and 5-month immunisations.

RESULTS: Immunisation providers delivered a full immunisation programme to 10,828/11,927 (90%) of the cohort. Caregivers of 897 (7%) of children declined the 6-week vaccination. Of this group, 872 (97%) also declined the 3-month and 850 (95%) declined the 5-month immunisations, constituting 872/962 (91%) and 850/923 (92%) of all declined immunisations, respectively. In the decline group, there was variability with primary care practice, and differences according to ethnic group and deprivation profile.

CONCLUSION: Increasing Northland's immunisation coverage may require primary care providers to more actively engage with declining caregivers prior to the 3-month and 5-month vaccinations. Immunisation information and decision-making programmes targeted at parents and providers in the antenatal and prenatal period may also be of benefit, in addition to considering regulatory and incentive strategies.

Childhood immunisation is unanimously supported and encouraged by governments worldwide, the International Pediatric Association and the World Health Organization. New Zealand has made gains in immunisation coverage in the last decades, from less than 60% at age 2 years in 1991, to around 92% in 2014.1 2 These improvements reflect the prioritisation of immunisation coverage in national policy, and associated interventions, such as the creation of the National Immunisation Register (NIR) in 2005, public monitoring of District Health Board (DHB) performance against national health targets, and funding to ensure minimal financial barriers in access to primary care for children. However, the coverage rate is sub-optimal for some groups of New Zealanders, and the Northland region has been a consistent outlier with lower coverage that the national average.

New Zealand provides free immunisations to residents, according to a schedule of delivery at seven specified ages between 6 weeks and 12 years. The immunisation schedule in use during the study period called for two vaccines at age 6 weeks, 3 months and 5 months: the first, a combination vaccine covering diphtheria, tetanus, pertussis, polio, hepatitis B, and Haemophilus influenza type b; and the second a pneumococcal vaccine. March 2015 data recorded that only 87% of Northland babies were fully immunised.
at age 8 months, such that they have had timely delivery of their immunisations at 6 weeks, 3 months and 5 months. This level of ‘coverage’ is well below the national Health Target of 95%, and also below estimates required for ‘herd immunity’ for some of the vaccine-preventable diseases included in the schedule.\(^4,5\)

Low ‘coverage’ encompasses three distinct groups: first, the small number who may or may not receive vaccines, but opt off the NIR. Second, those whose receipt of the vaccines are untimely—for example, children who have not received the 6-week, 3-month, and 5-month vaccines by age 8 months are considered ‘not fully immunised’ by the New Zealand Ministry of Health, and so are not counted in the coverage estimates. That is, vaccines classified as ‘completed’ on the NIR also include those given outside the coverage period, and the proportion of completed vaccinations in a population does not necessarily align with coverage. The third important group includes those children whose caregivers make an active choice to decline a specific vaccination.

The factors associated with refusing vaccination and timeliness of vaccination may differ, and require separate strategies to address. We have chosen to focus this research on the third group mentioned above—the population who actively refuse immunisations for their children. Nationally, by age 8 months, around 3.5% of caregivers are recorded as declining one or more of these childhood vaccinations, and this proportion has been noted to be higher in Northland. This research aimed to describe how children moved through the immunisation pathway in the Northland region, and to identify the characteristics of babies whose caregivers declined childhood immunisations, as formally documented as such on the NIR. We used an extract from the NIR to ‘follow’ the journey of Northland children from immunisations due at age 6 weeks until those due at 5 months.

Methods

Sample

Children are automatically registered with the NIR at birth. Caregivers can choose to ‘opt-off’, an option taken by less than 1% nationally.\(^5\) The NIR notifies the nominated primary care provider, which must confirm or decline that the child be enrolled at their practice. After that, the NIR is updated directly from the primary care patient management system after an immunisation event. The NIR captures immunisations occurring anywhere in the country. We obtained a NIR data extract from Ministry of Health pertaining to all babies with addresses coded as part of the Northland District Health Board (DHB) domicile at the time of their 6-week immunisation, and born between 1 January 2009 and 31 December 2013 (inclusive). This work was audited for the purposes of improving service and, as such, did not require formal ethics review (confirmed by the New Zealand Health and Disability Ethics Committees).

Measures

The data were structured in long format with multiple entries for each individual, identified through their unique National Health Index number. Each line of data pertained to an immunisation event (eg, 6 weeks) and a specific vaccine event (several vaccines may be due at the same event, and each vaccine gets its own line in the data). Each vaccine-event was coded as ‘completed’ (for a child receiving the vaccine) or ‘declined’, which is used only when the caregiver specifically states that they do not consent to the vaccination due at that particular age.

We created a wide format database (one line per individual) with indicator variables giving the status of each vaccine due at 6 weeks, 3 months and 5 months. We defined a ‘decline’ as the decline of one or more of the scheduled vaccinations at a given due date; ‘accept’ was defined by the ‘completed’ indicator for all of their scheduled immunisations. We used the individual’s National Health Index ethnic group—this source has been shown to have reasonable accuracy.\(^6,7\)

Analysis

We used descriptive statistics to describe the cohort and count numbers of vaccines accepted or declined. Sub-groups by acceptance or decline status are compared by demographic variables using the Pearson’s Chi-squared test. Statistical significance is cited at p ≤0.05. Tests were conducted in Stata v 13.
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Table 1: Demographic characteristics of the cohort (n=11,972).

<table>
<thead>
<tr>
<th>Year of birth</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2,416</td>
<td>20.2</td>
</tr>
<tr>
<td>2010</td>
<td>2,577</td>
<td>21.5</td>
</tr>
<tr>
<td>2011</td>
<td>2,427</td>
<td>20.3</td>
</tr>
<tr>
<td>2012</td>
<td>2,340</td>
<td>19.6</td>
</tr>
<tr>
<td>2013</td>
<td>2,212</td>
<td>18.5</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>312</td>
<td>2.6</td>
</tr>
<tr>
<td>Māori</td>
<td>6,496</td>
<td>54.3</td>
</tr>
<tr>
<td>NZ European</td>
<td>4,551</td>
<td>38.0</td>
</tr>
<tr>
<td>Pacific</td>
<td>260</td>
<td>2.2</td>
</tr>
<tr>
<td>Other</td>
<td>353</td>
<td>3.0</td>
</tr>
<tr>
<td>Quintile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>385</td>
<td>3.3</td>
</tr>
<tr>
<td>2</td>
<td>1,262</td>
<td>10.7</td>
</tr>
<tr>
<td>3</td>
<td>1,875</td>
<td>15.9</td>
</tr>
<tr>
<td>4</td>
<td>3,358</td>
<td>28.5</td>
</tr>
<tr>
<td>5</td>
<td>4,908</td>
<td>41.6</td>
</tr>
</tbody>
</table>

Note: 1=Ethnicity defined according to National Health Index, prioritised ethnicity coding. 2=Quintile defined from New Zealand Deprivation Index 2006, where 1=least deprived, 5=most deprived. 184 individuals were missing data.

Results

The data included 12,034 children born between 1 January 2009 and 31 December 2013, domiciled to the Northland region at the time they are recorded as receiving or declining the vaccines due at 6 weeks. Nearly all these children received the immunisation service at primary care clinics in Northland. The 30 children whose 6-week service was delivered outside the region, and the 32 with missing clinic and region data, were excluded from further analysis, leaving a final sample of 11,972.

Table 1 shows similar numbers of children included from each year 2009–2013. More than half of the cohort identified as Māori, and around 42% lived in the most materially and economically deprived quintile in the country.

Figure 1 shows the number of children receiving and declining vaccinations due at 6 weeks, 3 months and 5 months. Of 11,972 children followed, 10,828 (90%) received all the vaccinations. Eight hundred and ninety-seven (8%) were declined one or more of the 6 week vaccines. Of those who accepted the 6 week vaccines, 10,828 (99%) went on to accept both their 3-month and 5-month vaccinations. Of those who declined any of their 6-week immunisations, only 22 subsequently accepted both the 3-month and 5-month vaccinations. Of those who declined any of their 6-week immunisations, only 22 subsequently accepted both the 3-month and 5-month immunisations. There were 897 caregivers who declined one or more 6-week vaccination for their baby; 872 (97%) of these also declined the 3-month, and 850 (95%) declined the 5-month immunisations, constituting 872/962 (91 %) and 850/923 (92%) of all declined immunisations, respectively. Attrition was small—30 (0.3%) babies had no NIR entry for either accepting or declining vaccines due at 3 months, and 74 (0.6%) had no record for vaccines due at 5 months.

Table 2 shows demographic characteristics of the group that declined one or more vaccine due at 6 weeks. A majority of these children were New Zealand European (52%), with 42% identified as Māori. The
Māori decline group was most likely to reside in quintile 5 areas (50%) compared with 24% for the non-Māori babies. However, this difference likely reflects the differential distribution of deprivation in the total cohort. When we analysed socio-economic position separately within the Māori and NZ European groups, there was no clear pattern in the proportion of decline by deprivation. Analysis by year suggests that there may be a reducing rate of declined vaccinations from 2009–2013 (2009: 8.8%; 2010: 8.0%; 2011: 6.9%; 2012: 7.1%; 2013: 6.6%; test for trend p=0.06).

There were 40 identifiable Northland primary care providers. Apart from one outlier, with a decline prevalence of 63%, the proportion of declines varied from 2.2% to 14.6% with a mean of 8.6%. There were ten clinics with a decline proportion of more than 10%; collectively, these practices cared for around 40% of those who declined the 6-week vaccinations. The outlier is a small urban clinic which has had consistently high rates of immunisation refusal over many years. Anecdotally, it is said to have a high proportion of clients who favour complementary and alternative medicines.

**Discussion**

We analysed a cohort of 11,972 babies born in Northland over 5 years from 2009 to 2013. More than 40% of these babies were characterised as living in marked socio-economic deprivation, representing startling losses in opportunity for health in the future, which will only be exacerbated if they are also subject to vaccine-preventable illness.

Of this cohort, about 7% declined one or more of the scheduled 6-week childhood immunisations, a proportion of around twice the national average in 2014. Forty percent of these babies were Māori, and 52% New Zealand European. There was no pattern within ethnic groups by deprivation quintile. Ninety-five percent of those children who were declined their 6-week childhood immunisations were also declined the vaccinations at the 3-month and 5-month milestones, such that this small group accounted for more than 90% of subsequent declined vaccines. This is consistent with other reports from New Zealand and internationally. The proportion of those declining immunisation at 6 weeks may have decreased over the last 5 years.

The study has some limitations. First, this research was designed to provide data to support activities in the Northland region, and so is descriptive and cross-sectional only. Second, the sample is not an entire birth cohort—we have no information on those children who did register with the NIR, but who did not ever subsequently engage with an immunisation provider, such that they are not recorded as a

**Table 2: Characteristics of children whose caregiver declined one/more 6-week vaccines.**

<table>
<thead>
<tr>
<th></th>
<th>Decline</th>
<th>Accept</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>897</td>
<td>11,075</td>
<td></td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>8</td>
<td>304</td>
<td>2.7</td>
</tr>
<tr>
<td>Māori</td>
<td>372</td>
<td>6,124</td>
<td>55.3</td>
</tr>
<tr>
<td>NZ European</td>
<td>464</td>
<td>4087</td>
<td>36.9</td>
</tr>
<tr>
<td>Pacific</td>
<td>39</td>
<td>246</td>
<td>2.2</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>314</td>
<td>2.8</td>
</tr>
<tr>
<td><strong>Quintile</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>32</td>
<td>353</td>
<td>3.3</td>
</tr>
<tr>
<td>2</td>
<td>102</td>
<td>1,160</td>
<td>10.7</td>
</tr>
<tr>
<td>3</td>
<td>202</td>
<td>1,673</td>
<td>15.9</td>
</tr>
<tr>
<td>4</td>
<td>241</td>
<td>3,117</td>
<td>28.5</td>
</tr>
<tr>
<td>5</td>
<td>310</td>
<td>4,598</td>
<td>41.6</td>
</tr>
</tbody>
</table>

Note: 1 = decline n=887, accept n=10,901, 184 missing data
‘decline’ or an ‘accept’. This proportion is likely to be small, however their exclusion may underestimate the association seen between decline at 6 weeks and subsequent decline. We also have no information on children who have ‘opted out’ of the NIR, however, estimates from the Northland DHB suggest the proportion of opt-offs is less than 1% at the 6-month milestone. Statistics New Zealand states that there were 11,232 births in the Northland region between 2009 and end-2013.11 The 11,972 children in our cohort are net of any migration in or out of Northland between birth and 6 weeks of age. All these factors considered, our cohort is otherwise a near-complete population of children present in Northland for the 6-week vaccination, so confidence in our findings is high.12 Third, this research considered only the first three vaccination milestones. Considering the consistency and strength of the association, we can assume that the pattern will continue into later vaccination events. Finally, there are many factors that may influence vaccination that have not been examined here, including the Lead Maternity Carer (mostly midwives) responsible for each child’s antenatal and post-natal care. Anecdotes suggest that these providers have a strong influence on immunisation choices, and that some midwives hold ambivalent or negative views about immunisation.13

We find that despite the prioritisation of immunisation coverage by Northland DHB and associated targeted resources, primary care providers were not able to change the immunisation journey for 95% of the children for whom their caregivers declined the 6-week immunisation. The Immunisation Advisory Centre recommends that immunisation providers offer to contact and re-engage with caregivers who have previously declined vaccines when the next scheduled immunisation is due.14 However, a rapid survey of Northland primary care practices identified that a third of 38 centres followed an informal policy of delaying re-contact of declining caregivers until the 15-month milestone; that is, they considered a decline at 6 weeks as a decline for the entire primary series. Accordingly, many of the caregivers who declined initially did not receive the pre-call and reminder systems that the ‘accepting’ parents received. It is likely that some of these caregivers may have re-evaluated their decline decision at an earlier stage, had they had the opportunity. On the other hand, one New Zealand study found that nearly all caregivers made their decision about whether or not to immunise during the antenatal period.15 Together with our findings, this suggests that activities and interventions related to immunisation should be focused prior to the 6-week scheduled visit.

It is important to consider the heterogeneity of the caregivers who choose to decline immunisation for their baby. While some of these individuals may be opposed to all vaccines (and without doubt), the remainder are likely to be ‘vaccine hesitant’. This latter group, defined by the ‘delay in acceptance or refusal of vaccination despite availability of vaccination services’, encompass a continuum, from full acceptance to full decline of all vaccines. The factors involved for the choices of this group were recently conceptualised by the SAGE Working Group on Vaccine Hesitancy (SAGE) as the ‘3Cs model’—Confidence, Convenience, and Complacency. These three broad categories each require different approaches and interventions; vaccine hesitancy is a growing area of research.16

In Northland (and likely elsewhere), some caregivers may decline immunisation because of difficulties in accessing this care. Although immunisation is free-of-charge through their registered general practitioner, there may be other barriers not directly financial. The recently published 2014 New Zealand Health Survey found Northland Māori were more likely to report transport as contributing to unmet need for general practice services than the New Zealand European respondents. Northland Māori were also less likely to state they had full trust and confidence in their general practitioner.17 This makes it important to continue to fund nurse or kaimahi-driven services such as pre-call and outreach.18

In our cohort, the proportion who declined immunisation was more than twice the national proportion at the same milestone. While there has been significant improvement in national immunisation coverage over the past decade (and our estimates suggest that the rate of decline
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in Northland has decreased over the period of this study), it is possible that we have reached the limit of what we can achieve within our present regulatory framework. Others (including the World Health Organization) have suggested that supplementary measures may be required in New Zealand, particularly in areas of greater need. This may be a time to consider other potential policies for immunisation, such as incentives for caregivers and vaccination providers, or quasi-mandatory strategies such as ensuring full immunisation at school entry (with the possibility of defined exemptions). Resources for focusing our education and outreach systems on the antenatal and early post-natal period may also decrease the prevalence of immunisation refusal.

In conclusion, we recommend that high-needs/low-coverage areas such as Northland undergo regular immunisation surveillance (involving cohorts of children), to monitor improvement and patterns at a regional level. Primary care should actively pre-call and invite caregivers who decline the 6-week immunisation to nevertheless bring children for later vaccinations. Research into exemplar Lead Maternity Carers may identify how they successfully support caregivers in the decision-making around immunisation. It is probable that primary care and public health providers need to employ multiple messages and activities to decrease the incidence of immunisation refusal in Northland, reflecting the heterogeneity of those who refuse vaccines in this area. SAGE recommends providers working to understand the factors contributing to vaccine hesitancy in their specific population; and carefully tailoring interventions to their reasons, the target group, and the broader context. This research also supports the consideration of further facilitative national immunisation policy, in order to support the success of this important public health intervention.

Competing interests:
Nil

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REFERENCES:
8. Poulton R, Caspi A, Milne BJ, et al. Association...


20. NZ Health Committee, Inquiry into how to improve completion rates of childhood immunisation, and Briefings from the Chief Coroner on the coronial process, from Dr Michael Tatley on the adverse reaction process, and from Professor Sir Peter Gluckman on how to improve completion rates of childhood immunisation. 2011: Wellington: Report of the Health Committee, presented to the House of Representatives.


Increased uptake of cervical screening by women with HIV infection in Auckland regardless of ethnicity, requirement for an interpreter or level of education

Michele Lowe, Rupert Handy, Joan Ingram, Mitzi Nisbet, Stephen Ritchie, Mark Thomas, Simon Briggs

**ABSTRACT**

**BACKGROUND:** Current guidelines recommend that women with HIV infection receive annual cervical smears.

**METHODS:** We evaluated the uptake of annual cervical smears by women with HIV infection under the care of the Infectious Disease Service at Auckland City Hospital. In an attempt to identify potential barriers to regularly receiving an annual cervical smear, we invited the women to complete a questionnaire. The responses from women who had regularly received an annual cervical smear were compared with those who had not.

**RESULTS:** The proportion of women who had received a cervical smear increased from 44% in 2001, to 73% in 2010 (p=0.001). Ninety-three women (76%) completed the study questionnaire. No statistically significant differences were found in the questionnaire responses between the women who had regularly received an annual cervical smear and those who had not.

**CONCLUSION:** The proportion of women in this cohort who received a cervical smear in 2010 is comparable with other studies of women with HIV infection in New Zealand and overseas. We have not been able to identify barriers that prevent women with HIV infection in Auckland regularly receiving an annual cervical smear. We plan to encourage women who have not received a cervical smear in the previous 2-year period to have a cervical smear performed when they attend the Infectious Disease Clinic, and will continue to notify the National Cervical Screening Programme that all women who are newly diagnosed with HIV infection should have an annual recall code attached to future cervical smear reports. We expect that these interventions will further increase the proportion of women with HIV infection in Auckland who receive an annual cervical smear.

Women with HIV infection have an increased risk of cervical cytologic abnormalities and cervical cancer compared to women without HIV infection. The current New Zealand and American recommendations are that women with HIV infection receive cervical screening when their HIV infection is diagnosed, 6 months later if the initial screen is normal, and then annually if the second screen is normal.

The Infectious Disease Service at Auckland City Hospital cares for the majority of adults with HIV infection in the Auckland and Northland regions of New Zealand; regions that contain a population of approximately 1.3 million adults.
An audit of women with HIV infection under the care of the Infectious Disease and Sexual Health Services at Auckland City Hospital showed that as of 31 December 2007, only 69 (56%) of 123 women met our definition for regularly receiving an annual cervical smear.

Following this audit, we introduced a number of interventions intended to increase the regular uptake of annual cervical smears by women with HIV infection under our care. These interventions included sending a letter documenting the importance of annual cervical smears for women with HIV infection to all general practitioners (GPs) caring for women with HIV infection in the Auckland area, documenting this issue in the first clinic letter for women with HIV infection who were newly referred to the Infectious Disease Service, and sending a list of all women with HIV infection seen by the Infectious Disease Service to the National Cervical Screening Programme (NCSP) stating that these women were immunocompromised. This notification resulted in an annual recall code being attached to the woman's future cervical smear reports that were sent to the woman's cervical smear taker.

The aims of this study were to assess the current uptake of annual cervical smears by women with HIV infection under our care, and to attempt to identify potential barriers to regularly receiving an annual cervical smear with a questionnaire-based survey.

**Methods**

We evaluated the uptake of annual cervical smears between 2001 and 2010 in the cohort of women with HIV infection aged 20 to 69 years who had received at least 2 years of active follow-up from the Infectious Disease Service at Auckland City Hospital as of 31 December 2010. This age range was used as the NCSP does not recommend cervical screening for women younger than 20 or older than 69 years. Women were included in the yearly assessments from the first full year that they had received follow-up by an HIV care provider in New Zealand.

In order to measure the proportion of women who had received annual cervical smears, each woman's cervical smear history dating back to 2001 was obtained from the NCSP. To allow for some variation in the interval between each cervical smear, we defined an annual cervical smear using the ratio between the number of cervical smears received and the number of years since HIV diagnosis, or since January 2001, for those diagnosed with HIV infection prior to 2001. A woman was considered to have regularly received an annual cervical smear if this ratio was 0.8 or above, provided there were no intervals between two cervical smears of more than 2 years. For those women who were diagnosed with HIV infection before their arrival in New Zealand, we used the number of years they had resided in New Zealand, instead of the number of years since the diagnosis of their HIV infection.

We invited the women in our study cohort to complete a questionnaire (Appendix A) when they attended their usual outpatient Infectious Disease Clinic appointment. Women were given the opportunity to answer the questionnaire at the time of their appointment or at a suitable later time. Women were offered access to an interpreter, if required, to help them answer the questionnaire.

Women were divided into two groups depending on whether, or not, they met our definition for regularly receiving an annual cervical smear. We compared the questionnaire answers from both groups in an attempt to identify barriers to regularly receiving an annual cervical smear.

Ethical approval was granted by the Northern X Regional Ethics Committee.

The Fisher's exact test, Chi-square test and Mann-Whitney U-test were used to compare demographic and questionnaire variables.

**Results**

As of 31 December 2010, the Infectious Disease Service at Auckland City Hospital cared for 723 adult patients with HIV infection, of whom 146 (20%) were women. The 123 women who were aged 20 to 69 years and had been under our care for at least 2 years prior to 31 December 2010 comprised the study cohort.

The median age of the 123 women was 40 (range 24 to 61) years. Their self-reported ethnicity was African (n=64), New
Zealand European (n=20), Asian (n=18), European (n=9), Pacific person (n=7), Māori (n=4) and Middle Eastern (n=1). They had been diagnosed with HIV infection for a median of 7 (range 2 to 24) years, and had been under follow-up by a New Zealand HIV care provider for a median of 6 (range 2 to 18) years.

The proportion of this cohort of 123 women who received a cervical smear during each year between 2001 and 2010 is shown in Figure 1. Twenty of 45 (44%) women had received a cervical smear in 2001, compared to 90 of 123 (73%) women in 2010 (p=0.001). Eleven (9%) of the 123 women had not received a cervical smear in either 2009 or 2010.

Sixty-six (54%) women met our definition for regularly receiving an annual cervical smear during the study period. The median age for those women who met and who did not meet our definition for regularly receiving an annual cervical smear was 38 (range 24 to 61) years and 41 (range 27 to 58) years, respectively (p=0.09). The proportion of women who regularly received and who did not regularly receive an annual cervical smear with regard to their demographic and clinical characteristics is shown in Table 1. No statistically
significant difference was found for any of these characteristics.

Ninety-three of the 123 (76%) women completed the study questionnaire. Questionnaires were not completed for the following reasons: declined to participate (n=5); consented to participate but did not return the questionnaire despite repeated reminders (n=11); or were not asked to participate/did not attend clinic during the 12-month enrolment period (n=14). Fifty-four of the 93 (58%) women who completed the questionnaire, and 12 of the 30 (40%) women who did not complete the questionnaire, met our definition for regularly receiving an annual cervical smear during the study period. These proportions were not statistically significantly different (p=0.10).

The median age of the 93 women who answered the questionnaire was 40 (range 24 to 58) years. Their self-reported ethnicity was African (n=46), Asian (n=17), New Zealand European (n=12), Pacific person (n=7), European (n=6), Māori (n=4) and Middle Eastern (n=1). Some of the following data are incomplete, as not all women answered every question in the questionnaire. Fifty-five (60%) of 92 women reported that English was not their first language. Seventeen (20%) of 84 women required an interpreter (9 a medical interpreter, and 8 a non-medical interpreter) when completing this questionnaire, 14 (17%) of 82 women required an interpreter when attending Infectious Disease Clinic, and 15 (18%) of 83 women reported that they could not read English. The highest level of education for 88 women was reported as no formal education (n=10), primary/secondary education (n=38), or university degree or diploma (n=40). Six (6%) women had been circumcised and 3 (3%) were uncertain as to whether they had been circumcised. The proportion of women answering the questionnaire who regularly received and who did not regularly receive an annual cervical smear for different patient characteristics is shown in Table 2. No statistically significant difference was found for any of these characteristics.

The responses (agree or disagree) to the questions grouped under the headings of smear knowledge, family views/support,
and barriers to obtaining a cervical smear were analysed for the proportion of women who met or did not meet our definition for regularly receiving an annual cervical smear. No statistically significant difference was found in any of these responses. Ninety-seven percent, 96%, 95% and 88% of women, respectively, agreed with the following statements: I know what a cervical smear is; I understand why I need to have cervical smears; women with HIV infection need yearly cervical smears; and women with HIV infection have an increased risk of abnormal smears.

Discussion

We found that the proportion of women with HIV infection under active follow-up from the Infectious Disease Service at Auckland City Hospital who received a cervical smear during each year between 2001 and 2010 increased significantly, from 44% in 2001, to 73% in 2010 (p=0.001).

The regular uptake of an annual cervical smear was not significantly lower for women who had demographic features that may be expected to be associated with decreased adherence to screening recommendations. The regular uptake was not significantly lower in non-New Zealand European women, in women for whom English was not their first language, in women with a low level of formal education, or in women who required an interpreter at clinic. We acknowledge the relatively small number of women in some of these categories in our study population.

The following factors have been associated with women with HIV infection not receiving a cervical smear in other studies: older age, non-Caucasian ethnicity, non-English speaking, lower levels of formal education, unemployment, drug use including smoking, depressive symptoms, being sexually inactive, women who obtain their gynaecological care at a location other than their usual source of HIV care, CD4 count <200 cells/mm³ and HIV viral load >50 copies/mL or in one study HIV viral load <400 copies/mL.7-10 Although we did not find that women for whom English was their second language were less likely to regularly receive an annual cervical smear, given that this has been identified in other studies, GPs in Auckland should be aware that they are able to access telephone interpreters through their District Health Board Interpreting Service free of charge.

We were encouraged by the finding that almost all of the women in this study appeared to have a good understanding of cervical smears and the reasons why yearly cervical smears are recommended. Many of the women in this study have had a number of targeted interactions in an attempt to increase their cervical smear knowledge. These have included discussions with their Infectious Disease physician, HIV nurse specialist, or HIV social worker, as well as being given written information carefully explaining the benefits of receiving a yearly cervical smear.

In their answers to our questionnaire, women did not consistently identify barriers to regularly receiving an annual cervical smear. We were surprised that women who agreed with questionnaire statements regarding potential barriers to regularly receiving a cervical smear did not have a significantly lower regular uptake of annual cervical smears, but again acknowledge the relatively small number of women who agreed with a number of these questionnaire statements.

In our previous audit of cervical screening in women with HIV infection in Auckland,4 the only factor that was associated with not regularly receiving an annual cervical smear was women who received their cervical smears from their GP. We postulated that not all GPs may have been aware of the need for an annual cervical smear in women with HIV infection, and introduced interventions aimed at increasing this awareness. We are encouraged that in this study there was no association between receiving a cervical smear from a GP and lower rates of receiving annual cervical smears. We postulate that our interventions have contributed to this improvement.

Although only 54% of the women in our cohort met our criteria for regularly receiving an annual cervical smear, it was encouraging to note that the proportion of the 123 women who received a cervical smear each year increased during the 10-year study period from 44 to 73%.
(p=0.001). The proportion of women in this cohort who received a cervical smear in 2010 is comparable to other studies of women with HIV infection with self-reported, or medical record confirmed, yearly cervical smear rates of 77 and 78%.9,10 The NCSP does not provide data on the proportion of immunocompromised women in New Zealand who receive yearly cervical smears; the only other available New Zealand data is a study from Waikato Hospital11 which showed that for the period March 2008 to March 2009, 68% of women with HIV infection, and 40% of women with a renal transplant, had received a cervical smear within the previous year. The NCSP aimed to increase cervical screening coverage to at least 80% in all population groups by 2014.12 Although the NCSP strategic plan does not comment specifically on a coverage target for immunocompromised women, our current cervical screening coverage remains below the NCSP general target of 80%.

Although we have not been able to identify barriers that can be targeted to increase the proportion of women regularly receiving an annual cervical smear, targeting the relatively small number of women who had not received a cervical smear in the most recent 2-year period would be an option; only 11 (9%) of the 123 women in this cohort had not received a cervical smear in 2009 or 2010. These women could be offered a cervical smear at the time of their next Infectious Disease Clinic visit that would be performed by one of our HIV nurse specialists; this opportunistic approach to cervical screening is supported by the NCSP13 as a way of increasing cervical smear uptake, as long as the woman is advised that she will need to return to her usual smear taker for her next cervical smear at the appropriate time interval, and both the woman and her GP are provided with the results of the cervical smear.

The strengths of this study include the very good response rate to our questionnaire and that we were able to obtain accurate cervical smear history data from the NCSP. Accurate cervical smear history data is important, as studies have shown that women may over report cervical smear uptake by as much as one quarter to one third.14,15 This study has a number of limitations. The relatively small sample size contributed to a lack of statistical power. A number of women, for whom English was not their first language and/or who had difficulty reading English, choose to answer the questionnaire without an interpreter or with a family member or friend interpreting, which may have resulted in less accurate responses. The strong relationship that many of the women in this study have with the Infectious Disease Service may have influenced the way that some women answered the questionnaire; some women may have consciously or subconsciously answered questions in a way that they felt would be pleasing to the study investigators. We did not attempt to address the complex issues of HIV stigma and discrimination or sexual violence in this study; these are areas that require further research.

While it can be argued that our definition of what constituted the regular receipt of an annual cervical smear was somewhat lax, we felt that this definition reflected the real world where there may be a delay between notification of the need for a cervical smear and having this test performed.

We have found that an increased proportion of women with HIV infection under active follow-up from our service received a cervical smear in 2010 compared to 2001, and that only a small number of women had not received a cervical smear in the last 2 years of the study period. We have not been able to identify barriers that prevent women with HIV infection in Auckland regularly receiving an annual cervical smear. We plan to target women who have not received a cervical smear in the previous 2-year period with the opportunistic offer of a cervical smear when they are seen at the Infectious Disease Clinic, and will continue to notify the NCSP that all women who are newly diagnosed with HIV infection are immunocompromised, so that these women have an annual recall code attached to future cervical smear reports. We expect that these interventions will further increase the proportion of women with HIV infection in Auckland who receive an annual cervical smear.
Appendix A: Questionnaire

Participant study number _____
Participant NHI _________

Please circle the correct answer

Age: 20-29   30-39   40-49   50-59   60-69
Ethnicity: ________________________________

| English is my first language | Yes | No |
| I required an interpreter to complete this questionnaire | Yes | No |
| I require an interpreter for clinic visits | Yes | No |
| I can read written English | Yes | No |

Highest level of Education:
No formal schooling
Attended primary/secondary school
University degree or diploma

| I am enrolled with a Family Doctor (GP) | Yes | No |
| I have seen my Family Doctor in the past 12 months | Yes | No |
| I received the influenza vaccination in the past year | Yes | No |

Method of contraception:
Not required   Condoms   IUD   Hysterectomy or tubal ligation
Hormonal contraception such as pills, implants or injection
Hysterectomy or tubal ligation
Other, please state _______________

| My last smear taker was: | Male | Female |
| I had my last cervical smear at: | Family Doctor | Hospital | Family Planning | WONS | Sexual Health | Other |
| I had had a cervical smear before I came to New Zealand | Yes | Not applicable | No |
| My smear taker sent me a letter to remind me to get my smear | Yes | No |
| My smear taker phoned me to remind me to get my smear | Yes | No |
| I have had my womb/uterus removed | Yes | No |
| I have been circumcised/pharonic | Yes | No |

Smear knowledge:
The following statements are some ideas about cervical smears. Please indicate with a cross in the appropriate column the answer that best describes your belief about each of the sentences. There are no right or wrong answers. If a question does not apply to you please leave it out and move on to the next question.
### Family views/support:

It is important in many cultures that families/whānau understand and support women to have medical procedures. Please indicate with a cross in the appropriate column the answer that best describes your belief about each of the sentences. There are no right or wrong answers.

If a question does not apply to you please leave it out and move on to the next question.

<table>
<thead>
<tr>
<th>Family views/support:</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I know what a cervical smear is</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I understand why I need to have cervical smears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting a regular cervical smear can prevent cervical cancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women with HIV infection need yearly cervical smears</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Women with HIV infection have an increased risk of abnormal cervical smears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There is treatment available for abnormal cervical smear results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My husband/partner knows I have cervical smears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My family/whānau knows I have cervical smears</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My husband/partner encourages me to have a cervical smear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My family/whānau encourage me to have a cervical smear</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>My husband/partner doesn’t want me to have a cervical smear</td>
<td></td>
<td></td>
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<tr>
<td>My family/whānau don’t want me to have a cervical smear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My husband/partner understands the importance of cervical smear tests</td>
<td></td>
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</tr>
<tr>
<td>My family/whānau understand the importance of cervical smear tests</td>
<td></td>
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<tr>
<td>I am afraid someone from my family/church/community will find out I have cervical smear tests</td>
<td></td>
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</tbody>
</table>
**Barriers:**

The following sentences are some reasons why women may have or may not have cervical smears. Please indicate with a cross in the appropriate column the answer that best describes the reason you would or would not get a cervical smear test. There are no right or wrong answers.

If a question does not apply to you please leave it out and move on to the next question.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last time I had a cervical smear it was uncomfortable</td>
<td></td>
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<tr>
<td>I have previously had a bad experience when visiting my Family Doctor</td>
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<tr>
<td>Due to my circumcision, cervical smear examinations are difficult</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Due to my circumcision, cervical smear examinations are not possible</td>
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<tr>
<td>I get embarrassed when I have a cervical smear</td>
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<tr>
<td>I do not have time to get a cervical smear</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>I get cervical smears because I like to look after myself</td>
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<tr>
<td>It is too difficult to arrange transport to get to a cervical smear appointment</td>
<td></td>
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<tr>
<td>It is too expensive to have a cervical smear</td>
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<tr>
<td>The health centre where I have my cervical smear is not open at times that suit me to get a cervical smear</td>
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<tr>
<td>I have not had a cervical smear because I am afraid to find out I have cancer</td>
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<tr>
<td>I do not have any problems or symptoms so I do not need a cervical smear</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I do not have sex so I do not need a cervical smear</td>
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<tr>
<td>I have nobody to look after my children while I have a cervical smear</td>
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<tr>
<td>I would be more likely to have a cervical smear if there was an interpreter available</td>
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<tr>
<td>My cervical smear taker is aware that I have HIV infection</td>
<td></td>
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<tr>
<td>I find it easy to talk with my cervical smear taker about my HIV infection</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

We would value any further comments you may have on why you would or would not have a cervical smear test.
Competing interests:
Nil

Acknowledgments:
We would like to thank all of the women who kindly agreed to participate in this study. Funding for this research was received in the form of a research grant from the Auckland City Hospital A+ Trust.

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URL:

REFERENCES:
Nurse specialists for the administration of anti-vascular endothelial growth factor intravitreal injections

Priya Samalia, David Garland, David Squirrell

ABSTRACT

AIM: The number of individuals with chronic conditions such as age-related macular degeneration (AMD) is increasing, and consequently the treatment burden for anti-vascular endothelial growth factor (anti-VEGF) intravitreal injections is also increasing. The use of nurse specialists to administer anti-VEGF intravitreal injections has been proposed to address this treatment burden. This was a prospective safety audit to determine the safety of nurse specialists for the delivery of anti-VEGF intravitreal injections.

METHOD: A prospective safety audit was undertaken for a nurse specialist-delivered injection service in the Ophthalmology Clinic, Greenlane Clinical Centre. The department’s senior medical retinal consultant supervised the nurse specialist training programme. The clinical safety of anti-VEGF intravitreal injections delivered by nurse specialists, and the impact of this programme on clinical capacity at our Institute was reviewed.

RESULTS: The nurse specialists administered a total of 2,900 injections over an 18-month period. Two patients developed endophthalmitis post injection (1 infective, 1 non-infective). Two patients had a vitreous haemorrhage, and five patients had raised intraocular pressure. The incidence of post-injection endophthalmitis, vitreous haemorrhage and raised intraocular pressure was 0.07%, 0.07% and 0.17%, respectively.

CONCLUSION: The nurse specialist-delivered injection service is a safe and effective service for treatment of wet AMD, diabetic macular oedema and vein occlusion.

The introduction of intravitreal anti-vascular endothelial growth factor (anti-VEGF) agents has revolutionised the treatment of patients with neovascular age-related macular degeneration (nAMD), diabetic macular oedema, and retinal vein occlusions. Anti-VEGF agents administered via intravitreal injection have been proven to have robust health economic benefits, but optimal treatment generally requires regular 4- to 6-weekly injections.

Over the past 5 years, the demand for intravitreal services has risen rapidly, and a recent survey conducted by Macular Degeneration New Zealand (MDNZ) reveals that many eye clinics across New Zealand are already struggling to cope with this demand. Furthermore, the demographic changes occurring within our society mean that the prevalence of nAMD, diabetes, and retinal vein occlusion, is projected to increase sharply over the next decade.

If the publically funded ophthalmology services are to meet this challenge, there is a pressing need to develop new service models that will facilitate the delivery of these intravitreal treatments. Currently, New Zealand spends the least of all the developed Organisation for Economic Cooperation and Development (OECD) countries on the treatment of nAMD, in part due to minimal use of Lucentis and Aflibercept, and it has a relatively low ophthalmic workforce, with approximately 1 ophthalmologist per 38,000 people. Simply asking the existing ophthalmology workforce to ‘do more, faster’ is not feasible, and it is increasingly recognised that ophthalmology departments will have to ‘work smarter’ utilising the skills of the multidisciplinary team.
In 2012, the Auckland District Health Board (ADHB) funded a pilot study with the specific purpose of training nurse specialists to administer anti-VEGF intravitreal injections. In this paper we report the 18-month outcomes of this project.

Methods
Implementing a nurse injector scheme
Training
Nursing Council of New Zealand approval was obtained prior to the commencement of this study. The training and indemnity packages were developed jointly by the designated ophthalmologist, ADHB, and the University of Auckland Ophthalmology Department. Approval from the institutional nursing supervisor and the Chief Medical Officer was also obtained prior to the study commencing. Three nurse specialists with prior operating theatre backgrounds and proficient in the delivery of sub-Tenon's anaesthesia were identified to participate in this scheme.

The intravitreal injection procedure was standardised. All intravitreal injections were performed in a designated air filtration procedure room with linoleum floors under topical anaesthesia. Half-strength povidine-iodine was used to sterilise the eye and lids. Patients wore bouffant surgical caps, and injections were performed in the superotemporal quadrant, either 3.5mm (pseudophakic eye), or 4mm (phakic eye), away from the limbus. Retinal perfusion was determined immediately post intravitreal injection by confirming a vision of at least 'count fingers'. Injections were performed under direct supervision until adequate experience (50 cases) had been acquired, after which injections were performed unsupervised. Lubricating drops were given to use post-procedure on an as needed basis for comfort. No pre-injection or post procedure antibiotics were given. The patient was not reviewed again until their next appointment, unless they presented to the emergency eye clinic with complications.

Implementation and patient safety
At all times, the designated ophthalmology consultant retained clinical responsibility for patients treated during the project. The injection clinics ran in parallel to ophthalmologists' clinics to ensure that there was always a doctor available next-door for advice or review if necessary. Nurse specialists delivered intravitreal bevacizumab, ranibizumab and aflibercept injections for nAMD, polypoidal choroidal vasculopathy (PCV), diabetic eye disease, and vein occlusions. Each nurse specialist recorded details of intravitreal procedures performed, and were required to conduct an ongoing audit, which included the retrospective review of patient notes of all patients presenting to the acute clinic with complications related to intravitreal injections.

All intravitreal procedures were recorded at the time the procedures were undertaken. Each nurse specialist also maintained personal records of intravitreal procedures performed. Departmental records, together with nurse specialist personal records, were retrospectively reviewed. Complications were identified on retrospective review of clinical notes from patients who presented to the acute eye clinic with complications post intravitreal injections. The safety audit period ran from 1 July 2013 to 31 December 2014.

Ethics approval
Institutional ethics approval was obtained from the Auckland District Health Board Research Office (A+7062).

Results and impact of the nurse injector scheme
The nurse injector scheme was introduced in July 2013. One nurse specialist started on 1 July 2013, and a further two nurse specialists were involved in the scheme in 2014. During the first 18 months of the scheme, these three nurse specialists performed a total of 2,900 intravitreal injections. No cases of retinal detachment, lens damage or central artery occlusion occurred (Table 1).

Ocular hypertension was defined as a patient who symptomatically had a visual acuity of less than ‘count fingers’ vision immediately following intravitreal injection, with a subsequent measured
Table 1: Complication rate of nurse delivered anti-VEGF intravitreal injections in the first 18 months of the nurse-injector scheme.

<table>
<thead>
<tr>
<th>Complication</th>
<th>Number of complications, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocular hypertension</td>
<td>5 (0.17)</td>
</tr>
<tr>
<td>Vitreous haemorrhage</td>
<td>2 (0.07)</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Lens damage/cataract</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Central retinal artery occlusion</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Endophthalmitis</td>
<td>2 (0.07)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9 (0.31)</strong></td>
</tr>
</tbody>
</table>

Table 2: Comparison of the number of injections delivered over a 3-month period (January to March) between 3 consecutive years.

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th></th>
<th></th>
<th>2014</th>
<th></th>
<th></th>
<th>2015</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Month</td>
<td>Doctor</td>
<td>Nurse</td>
<td>Total</td>
<td>Month</td>
<td>Doctor</td>
<td>Nurse</td>
<td>Total</td>
<td>Month</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td></td>
</tr>
<tr>
<td>Jan</td>
<td></td>
<td>205</td>
<td>0</td>
<td>205</td>
<td>Jan</td>
<td>239</td>
<td>20</td>
<td>259</td>
<td>Jan</td>
</tr>
<tr>
<td>Feb</td>
<td></td>
<td>168</td>
<td>0</td>
<td>168</td>
<td>Feb</td>
<td>145</td>
<td>122</td>
<td>267</td>
<td>Feb</td>
</tr>
<tr>
<td>Mar</td>
<td></td>
<td>190</td>
<td>0</td>
<td>190</td>
<td>Mar</td>
<td>152</td>
<td>105</td>
<td>257</td>
<td>Mar</td>
</tr>
</tbody>
</table>

Figure 1: Comparison of the percentage of intravitreal injections administered by nurse specialists and doctors over a 3-month period (January to March) between 3 consecutive years.
intraocular pressure of greater than 30mmHg.

Two cases of vitreous haemorrhage occurred. One case was observed with no evidence of a retinal tear or hole requiring treatment, and the vitreous haemorrhage settled spontaneously. The second patient had a dense vitreous haemorrhage requiring vitrectomy, with no retinal tear or cause for the haemorrhage found at the time of surgery.

One case of sterile endophthalmitis, and one culture-positive (*Staphylococcus epidermidis*) endophthalmitis occurred during the 18-month audit period. Both patients that developed endophthalmitis were diabetic. The patient with sterile endophthalmitis had previously had a similar reaction to bevacizumab and has subsequently been switched to ranibizumab. The patient with culture-positive endophthalmitis underwent vitrectomy with a final Snellen visual acuity of 6/7.5.

Clinical capacity

Since the introduction of this scheme, there has been a progressive increase in the number of intravitreal injections delivered at our institute (Table 2). Once the scheme was well established, nurse specialists were delivering the majority of anti-VEGF intravitreal injections (Figure 1). Mid-way through the project, in the first 3 months of 2014, 32% of all injections were delivered by nursing staff. In same 3 months in 2015, 84% of all injections were delivered by nursing staff. More recently, from May 2015 to July 2015, nurse specialists have delivered approximately 92% of all intravitreal treatments at our institute.

Discussion

The annual burden of anti-VEGF treatment for nAMD alone has been estimated at 2,400 injections per 100,000 persons aged over 60 years. As the population of New Zealanders over the age of 60 increases, the cumulative number of treatments needed across the country will increase markedly. The prevalence of AMD in New Zealand in 2014 was 184,400, and is similarly expected to rise markedly through to 2026. In the year 2013–2014, our institute served 90,000 patients and performed just under 4,000 anti-VEGF injections. Eighty percent of these treatments were for the treatment of nAMD.

Since 2013, the indications for anti-VEGF treatments have continued to expand into a spectrum of chronic diseases that include diabetic eye disease, retinal vein occlusion and pathological myopia. As a result of these pressures, our institution has experienced on average a 30–40% increase in the total number of intravitreal injections required per year (Figure 2).

The expanded nurse injector role initiative was an attempt to address whether nursing staff could safely deliver
these treatments and thus address the dilemma of how, within the public sector, these cost-effective treatments could continue to be delivered to our patients.

At the inception of this project in early 2012, the utilisation of nursing staff to administer intravitreal injections was unknown in New Zealand. There was, however, a scheme in operation in the South West of England, and although there was no published data, their early audit data appeared to demonstrate that suitably trained nursing staff could safely administer these treatments.\(^{14}\)

Furthermore, extension of the traditional nursing role to deliver patient care had already been shown to be beneficial in other areas of ophthalmology, including the delivery of sub-Tenon’s anaesthesia,\(^{15}\) glaucoma assessment,\(^{10}\) and chalazion management.\(^{9}\)

Our data reveals that suitably trained nursing staff can safely deliver intravitreal treatments in a large, public sector institution. The complication rates recorded in our continuous audit were low, and both the range and likelihood of complications were comparable with other published data. The most feared complication of intravitreal injections is post-injection endophthalmitis. The rate of endophthalmitis in our study was 0.07%, and this is comparable to other published data with reported rates of endophthalmitis after intravitreal injection of between 0.02% to 0.7%.\(^{16-27}\) One of our two cases was a patient who presented at day 2 with a painless panuveitis. Although treated as an infectious endophthalmitis, the patient was culture negative on vitreous biopsy, and the event was likely to have been a sterile uveitis related to bevacizumab. Since this event, the process of compounding bevacizumab has been brought ‘in house’ to the hospital pharmacy, and we have had no further episodes of sterile endophthalmitis.

Recently published data from the National Health Service in the UK provides evidence that suitably trained nursing staff can safely deliver intravitreal injections,\(^{28-30}\) with no significant difference in the rate of endophthalmitis between nurses and physicians in training.\(^{27}\) As a consequence, the Royal College of Ophthalmologists has recently changed its policy on the delivery of anti-VEGF treatments, and now states that the delivery of anti-VEGF agents by non-medical health care practitioners is reasonable, provided that certain conditions are met—including appropriate training and supervision.\(^{31}\)

As envisaged, the nurse injector scheme has had a positive impact on the medical retina service. Clinical nurse specialists delivered intravitreal injections safely, and both clinicians and patients now accept the use of nursing staff to deliver these treatments based on informal feedback. Capacity within the medical retina service has also increased as a consequence of the reduced reliance on medical staff for the administration of intravitreal injections. Furthermore, the nursing staff are now delivering the same number of treatments per clinical session as was previously being delivered by the Medical SMO team (14 treatments). In effect, we have successfully transferred the responsibility of delivering these ‘routine’ treatments to the nursing team, and in keeping with the ‘work smarter not harder’ ethos, this transfer of ‘routine’ tasks has been realised both as a cost-saving per treatment delivered, and better utilisation of medical staff time.\(^{32}\)

In conclusion, our data adds to the growing body of evidence which demonstrates that appropriately trained nurse specialists can safely administer anti-VEGF intravitreal injections. The utilisation of suitably trained nursing staff to deliver these treatments has had a positive impact on the medical retina service, allows for better utilisation of medical staff, and has improved accessibility to the service for our patients.
REFERENCES:


Red reflex screening in New Zealand: a large survey of practices and attitudes in the Auckland region

Naz Raoof, Shuan Dai

ABSTRACT

AIMS: Red reflex testing forms an essential part of newborn (within the first week of life) and infant (6 weeks of age) screening in New Zealand, as outlined in the Well Child/Tamariki Ora handbook. This survey of practitioners undertaking red reflex screening aimed to determine current practices and attitudes of screeners, as well as any barriers to screening.

METHODS: A short, multiple-choice, on-line questionnaire was sent to approximately 1,500 health care professionals undertaking red reflex screening, over a 4-week period.

RESULTS: Four hundred and eighty-three survey responses were received from 267 GPs (55.4%), 153 midwives (31.7%), and 50 paediatricians (10.4%). Thirty-six respondents (7.8%) performed red reflex screening only when they had time to do so, 13 (2.8%) only undertook this when there were concerns raised by the parents. Most respondents (97.3%) used an ophthalmoscope to perform screening. Seventy-nine respondents (16.6%) felt they were “not sure/underconfident” at performing this test. Only 83 of 479 respondents (17.3%) had received any formal training.

CONCLUSIONS: The development of an online resource or practical ‘refresher’ sessions would be well received and likely to improve current practices.

Red reflex testing forms an essential part of the examination of every neonate in New Zealand, outlined in the Well Child/Tamariki Ora Practitioners handbook circulated by the New Zealand Government. It is crucial to identify potentially treatable sight-threatening conditions in the neonate, most commonly the presence of congenital cataract, where the optimal period for surgery is thought to be in the first 4–6 weeks of life. An abnormal red reflex can also alert the clinician to other important conditions, both ocular (retinoblastoma, paediatric glaucoma) and systemic (metabolic conditions, congenital infections).

Although many countries formalise the requirement for red reflex screening within their national neonatal screening programme, the resources and training offered vary. The American Academy of Pediatrics, in conjunction with the American Association of Pediatric Ophthalmology and Strabismus (AAPOS), detail how to undertake red reflex screening in their 2008 Policy Statement. New Zealand outlines its national red reflex screening schedule in the Well Child/Tamariki Ora Practitioners handbook. This states that the first eye check should be done with an ophthalmoscope, either at the neonatal check (at birth, or within the first 48 hours) or the postnatal check (between 2–7 days of age). The screening is performed by a Lead Maternity Carer (LMC), who may be a midwife, obstetrician, or general practitioner (GP). At 6 weeks of age, the infant has another eye examination, by a “practitioner trained to use a direct ophthalmoscope”. At this time point, a brief assessment of visual behaviour and ocular alignment is also indicated.

Despite the presence of clear guidelines regarding eye screening in the Well Child/Tamariki Ora handbook, concerns have previously been raised regarding the quality of this screening. In 2005, Fry and Wilson undertook a survey of health care practitioners undertaking red reflex screening in the Nelson-Tasman region of New Zealand. Alarmingly, they reported...
that 16% of GPs and 29% of midwives were not undertaking red reflex screening when it was indicated, and that 18% of doctors and 47% of midwives were unclear about testing or its relevance. Indeed, in our regional referral unit, we continue to see babies with poor vision from congenital cataract due to delayed diagnosis. The aim of this paper was to undertake a survey of the current state of red reflex screening in the Auckland region of New Zealand, and to determine whether, 10 years on, practices have improved. Specifically, we aimed to determine: 1) if screening was taking place; 2) who was undertaking the screening; 3) the equipment used to undertake screening; 4) whether there were any barriers to undertaking screening; 5) the level of training received by screeners.

Methods

A short, on-line questionnaire (SurveyMonkey) was sent to approximately 1,500 health practitioners undertaking Well Child/Tamakiri Ora checks in the Auckland region. We identified obstetricians, paediatricians and their specialist nursing staff working at Auckland District Health Board (ADHB) from listings of medical staff. Midwives were identified via ADHB and local community midwifery representatives. General practitioners in the Auckland region were identified by accessing the database of The Royal New Zealand College of General Practitioners. Responses were collected over a 4-week period from 14 September 2015 to 11 October 2015.

Respondents were asked to select their role (general practitioner, paediatrician, obstetrician, junior doctor, hospital nurse, community nurse or midwife). They were then asked:

- How often they undertook eye screening for each child, according to guidelines
- At what age from birth up to 6-weeks the respondent felt red reflex testing was best done
- The equipment used to undertake red reflex screening
- The presence of any barriers to undertaking red reflex screening
- Whether there had been any formal training in red reflex testing
- Whether any additional training in red reflex screening would be considered beneficial.

Responses were analysed using the SurveyMonkey programme.

Results

The respondents

There were 483 respondents. The majority were GPs (267, 55.4%), followed by midwives (153, 31.7%). Paediatricians accounted for 10.4% (50 respondents). The results are shown in Figure 1.

Adherence to red reflex screening guidelines

Respondents were asked how frequently they undertook red reflex screening, when indicated as part of the Well Child/Tamakiri Ora check. This question was answered by 464 respondents. Only 90% of respondents (415, 89.4%) performed the red reflex test for every newborn they saw. A further 36 respondents (7.8%) performed this test only when they had time to do so; within this category were 23 midwives, 10 GPs, 2 paediatricians and 1 junior doctor. A further 13 (2.8%) only undertook this when there were concerns raised by the parents; there were eight midwives in this category and five GPs.

Timing of red reflex screening

In response to the question, “In your experience, when is red reflex testing best done?”, many respondents answered according to what they actually do, rather than what they thought best practice was. The majority of respondents answered that the best time to screen was at 6 weeks of age (234/467 respondents, 50.1%). Within this
category, there were 210 GPs, 18 midwives and 4 paediatricians. Testing at 1–3 days of age, and at 1 week of age, were equally popular (101/467 respondents each, 21.6%), with the majority of midwives and paediatricians selecting one of these responses.

**Equipment used**

Respondents were able to select one or more items used to undertake red reflex testing. Almost all the respondents used an ophthalmoscope to perform red reflex testing (464/477 respondents, 97.3%). A pen torch was used by 12 respondents (2.5%). An otoscope was used by four respondents (0.8%). A digital camera was used by three individuals, while one used a laryngoscope. Only one respondent used dilating drops.

**Barriers to screening**

Of 477 respondents, 177 (37.1%) felt that there was a barrier present that interfered with them undertaking red reflex screening. Ninety-six (20.1%) respondents felt clinically unconfident about interpreting the red reflex screening test. A further 66 patients (13.8%) reported difficulty in finding equipment necessary for testing. Fifteen respondents (3.1%) felt it was not clinically important enough to justify the time required to perform the test.

**Competence and training**

While the majority of respondents judged themselves either “competent” or “very competent” at performing red reflex testing (398/477, 83.4%), 79 respondents (16.6%) felt they were “not sure/underconfident” at performing this test. Only 83 of 479 respondents (17.3%) had received any formal training in how to undertake this screening test. A further 178 respondents (37.2%) had received informal training. Almost half the health professionals undertaking screening in this survey, however, reported that they had never received any formal training (218/479, 45.5%).

Further training in undertaking red reflex testing proved popular among our survey respondents, with 325 of 482 respondents (67.4%) judging that an online resource would help improve their skills in this area, while 252 (52.3%) supported a refresher course, or formal in-person training. A written resource was deemed useful by 169 individuals (35.1%). Only 39 individuals (8.1%) felt that no further support than that currently offered would prove useful; there were 23 GPs in this group, 12 paediatricians and 4 midwives. Additionally, 118 respondents (24.5%) stated that a free ophthalmoscope would help improve their skills in this area.

**Discussion**

Our study gives an overview of current practices in red reflex testing in the Auckland region of New Zealand. While 90% of respondents report that they check the red reflex for every baby they see as part of the *Well Child/Tamakiri Ora* checks, 10% of respondents do not follow the guidelines in every case. The major reason for not adhering to the guidelines is insufficient time to undertake this test. There were 31 midwives who reported that they did not follow guidelines in terms of undertaking screening in all cases, corresponding to 20.3% of midwives. Subsequent discussions with midwife groups have identified reasons for this omission, including time constraints, lack of an ophthalmoscope, and the difficulty of performing the red reflex test on an infant within the first 24–48 hours after birth. This is a concerning finding, especially as midwives tend to screen babies within the first week of life. This could suggest that we are potentially missing opportunities to detect sight-threatening visual problems, such as congenital cataract, at a very early stage. Additionally, 15 GPs (5.6%) did not follow the guidelines in all cases at the “6-week well baby check”, which, although a small number, remains concerning as the next visual screening opportunity is at the “B4 school check”.

Most respondents used an ophthalmoscope to undertake red reflex testing. Comments describing the difficulty in locating a functioning ophthalmoscope were common, even on hospital wards, which is surprising given that one would expect eye examinations to be a daily occurrence. Indeed, approximately a quarter of respondents welcomed the provision of an ophthalmoscope specifically for the purposes of red reflex testing. Most midwives use a pocket ophthalmoscope for red reflex test because of its lower cost; this type of ophthalmoscope, however, has very poor illumination which makes the red reflex difficult to be assessed, even by
experienced paediatric ophthalmologists (personal communication, S Dai, 2015). Only one respondent (a community nurse) used dilating drops when undertaking this test. The side effects of instilling dilating drops in small infants are well known, and described in the AAP recommendations for red reflex testing.5 In that publication, the authors state that the use of such mydriatics is thought to be safe in infants over the age of 2 weeks, once informed consent is gained. We would advise against the unmonitored use of mydriatics in babies aged less than 2 weeks in the community.

Less than one-fifth of those undertaking red-reflex testing had been provided with any formal training, while almost half the respondents had never received any training. It is not surprising that almost a fifth of respondents felt “not sure/underconfident” when performing the test. Our survey results also show that the majority of those undertaking red reflex screening would like further training or support, most popularly via an on-line resource or ‘refresher’ course. This perhaps reflects that while in theory the red reflex test is straightforward, undertaking this on an infant, with small eyes and who is resisting examination can be very challenging. Additionally, a number of comments on survey replies acknowledged the difficulty in eliciting the red reflex in a dark-skinned child.

It is difficult to make comparisons between our work and that of Fry and Wilson.6 Our paper refers to results from a more populous urban population, and we also asked different questions, given that the red reflex screening programme is now better established. Fry and Wilson report that 18% of doctors and 47% of midwives “did not understand why red reflex screening was important or what was being looked for”. Our survey, however, shows only 3.1% of or survey respondents agreed with the statement that red reflex testing was not “clinically important enough to justify the time required”.

We acknowledge that there are limitations to our study. We surveyed respondents using a multiple choice questionnaire, and therefore limited the responses available. This study also relies on self-assessments, and we have no objective outcomes upon which to evaluate the current state of red reflex screening. Yet this subjective, anonymous, self-reporting allows us perhaps greater honesty from respondents, who may be very reluctant to otherwise admit they are “underconfident” in performing this screening test, or that they do not always follow screening guidelines.

In conclusion, red reflex testing continues to be a relevant topic across several specialties and professions. This is emphasised by the large number of responses our survey attracted. While our survey demonstrated that there is good coverage of red reflex screening in neonates in the Auckland region, there is still improvement necessary. According to our experience, more than 70% of the congenital cataracts presenting to our referral centre over the last 12 months missed the red reflex test. A study in the UK reported that 29% of congenital/infantile cataracts were not detected before the first year of life,7 suggesting that issues with red reflex screening are not confined to New Zealand. It is not surprising to see almost one-fifth of screeners in our region felt “not sure/underconfident” about undertaking testing, and only 8.1% of respondents felt that they needed no additional support in developing their skills in this area. The development of an online resource, or practical ‘refresher’ sessions, would be well received and likely to improve current practices, which in turn may lead to the earlier diagnosis of congenital cataract.
Competing interests:
Nil

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Stroke thrombolysis in New Zealand: data from the first 6 months of the New Zealand Thrombolysis Register

Purwa Joshi, John Fink, Peter Alan Barber, Alan Davis, Jeremy Lanford, Andrea Seymour, Peter Wright, Wendy Busby, Ginny Abernethy, Annemarei Ranta

ABSTRACT
The New Zealand National Stroke Network introduced a National Stroke Thrombolysis Register on the first of January 2015 to assist with quality assurance and continuous service improvement. In the first 6 months, there were 179 [75 women, mean (SD) age 69.9 (14) years] treated with stroke thrombolysis out of a total of 2,796 ischaemic stroke patients, giving a national thrombolysis rate of 6.4%. The median [Inter-quartile range (IQR)] onset-to-treatment time was 154 (125–190) minutes, and the median (IQR) door-to-needle time was 74.5 (55.7–105.0) minutes. The rate of symptomatic intracranial haemorrhage following thrombolysis was 4.4%. These results are similar to other international centres, and indicate an approximate doubling of the proportion of stroke patients treated with stroke thrombolysis since a 2009 national audit. However, there is need for on-going efforts to improve treatment rates and process efficiency, particularly door-to-needle times.

Thrombolysis with intravenous (IV) alteplase is recommended by New Zealand and international guidelines for patients with ischaemic stroke who are able to be treated within 4.5 hours of onset. Thrombolysis should be given under the authority of a physician trained and experienced in acute stroke management, and should only be undertaken in hospitals with appropriate infrastructure, facilities, and network support. The delivery of this treatment has been shown to be feasible in large, medium-sized and some small district health boards (DHBs) in New Zealand.

A retrospective national audit of acute stroke services in New Zealand in 2009 showed that only 3% of ischaemic stroke patients were treated with thrombolysis. This was despite the fact that greater than 80% of the New Zealand population lived in catchment areas where DHBs offered thrombolysis. The main barriers to thrombolytic therapy included delays in reaching hospital, triaging priorities in the emergency department (ED) and delays in obtaining urgent imaging. The 2010 New Zealand Clinical Guideline emphasised the need for the collection of data in a central register of all patients treated with thrombolysis to allow for national benchmarking, quality assurance and service improvement. In 2014, a combined emergency and stroke physician consensus statement recommended the establishment of a national database to audit stroke thrombolysis and outcomes. Previous locally-driven thrombolysis data collection has been variable.

The National New Zealand Thrombolysis Register was introduced by the National Stroke Network in January 2015. Here, we report the data collected in the first 6 months of the register in order to provide a current account of the thrombolysis practices in New Zealand.
Methods

The thrombolysis register consists of an Excel spreadsheet developed by members of the National Stroke Network. The information recorded includes demographic information, time of symptom onset, hospital arrival, CT scanning, and alteplase bolus, as well as complications such as symptomatic intracranial haemorrhage (sICH) and whether the patient is alive at Day 7. Symptomatic ICH was defined as any intracranial haemorrhage and ≥4 point increase in National Institutes of Health Stroke Scale (NIHSS) score within 24 hours of treatment.\(^7\) Data collection to capture 3-month functional outcome was not currently feasible with available staff resources.

In late 2014, the register template was distributed to lead stroke clinicians to all New Zealand hospitals offering stroke thrombolysis. Clinicians from each hospital were asked to prospectively record data starting on 1 January 2015 for each thrombolysed patient. The register data from each hospital was submitted to a central co-ordinator every 3 months for collation and subsequent analysis. Clinicians were instructed to de-identify patient data prior to submission.

The combination of ischaemic strokes and strokes unspecified were used as the denominator for thrombolysis rates in accordance with Ministry of Health (MoH) thrombolysis indicator reporting guidelines. Ischaemic strokes and strokes unspecified were recorded via the National Minimal Dataset and cross checked against individual DHB or regional data at the time of analysis. The reason for including “stroke unspecified” is that some DHBs had significant proportions of strokes that had not been specified as either heamorrhagic or ischaemic/infarction, and several internal audits have demonstrated that most of these strokes are cerebral infarctions.

The 20 DHBs in New Zealand are grouped into four regions: Northern, Midland, Central, and South Island for the purpose of benchmarking, collaborative planning and resourcing of health services. Numbers were too small to allow meaningful analysis at individual DHB level. DHBs were also grouped according to the population they serve into small (<125,000 population), medium (125,000–250,000) and large (>250,000). The data were analysed according to the region as well as according to DHB size. Data analysis was conducted using Microsoft Excel and Stata 12.1.

Results

From 1 January 2015 to 30 June 2015, there were 2,796 patients with ischaemic stroke and stroke unspecified admitted to New Zealand hospitals. Over the same period, there were 179 (6.4%) patients (75 women, mean [SD] age 69.9 [14] years) treated with IV alteplase. There was complete data for 165. Six patients had strokes as an inpatient (3.4%). Fourteen patients had partially missing time data; however, their data were included in the analysis where available. Patient characteristics are presented in Table 1.

Approximately one-third of the patients treated with thrombolysis were over the age of 80 years, consistent with the proportional contribution of this age group to all strokes. The overall median (interquartile range, [IQR]) time delay between hospital arrival and delivery of alteplase bolus (door-to-needle time) was 74.5 (55.7–105) minutes, with a range of 20–210 minutes. The median [IQR] door-to-needle time for patients treated

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)*</td>
<td>69.9 (14)</td>
</tr>
<tr>
<td>Age ≥80 years, n (%)</td>
<td>53 (29.6)</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>104 (58.1)</td>
</tr>
<tr>
<td>Ethnicity, n (%)</td>
<td></td>
</tr>
<tr>
<td>NZ European</td>
<td>90 (54.5)</td>
</tr>
<tr>
<td>Māori</td>
<td>23 (13.9)</td>
</tr>
<tr>
<td>Pacific</td>
<td>10 (6.1)</td>
</tr>
<tr>
<td>Asian</td>
<td>11 (6.7)</td>
</tr>
<tr>
<td>Other European</td>
<td>29 (17.6)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.2)</td>
</tr>
<tr>
<td>Region, n (%)</td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td>59 (33.0)</td>
</tr>
<tr>
<td>Midland</td>
<td>38 (21.2)</td>
</tr>
<tr>
<td>Central</td>
<td>44 (24.6)</td>
</tr>
<tr>
<td>South Island</td>
<td>38 (22.4)</td>
</tr>
<tr>
<td>Treated out of hours***, n (%)</td>
<td>105 (58.6)</td>
</tr>
</tbody>
</table>

*SD = standard deviation; **refers to outside of regular work hours which are defined as 8am to 5pm, Monday to Friday.
out-of-hours was 82 (58–118) minutes, and in-hours 69 (52–99) minutes; a statistically significant difference of 13 minutes (p=0.045). Approximately one-third of all patients were treated within the ‘golden hour’ of 60 minutes from stroke onset.

The data for each region is presented in Table 2, along with the times for onset to hospital arrival (‘onset-to-door’), door-to-CT, door-to-needle, and onset-to-needle times. An onset-to-treatment time of 3 hours or less was achieved in 122/179 (68%) of patients. Five patients (2.9%) were treated outside of best practice guidelines beyond the 4.5 hours cut-off point (mean 9 minutes; range 5 to 15 minutes). None of these patients suffered complications including no sICHs.

Eight of the 179 (4.4%) patients had sICH following thrombolysis. Ten (5.6%) patients had died by 7 days, including 2 (1.1%) deaths in patients with sICH. The sICH and mortality rates in individuals aged ≥80 years were 5.5% and 8.9%, respectively; higher than in individuals <80 years old (4.0% and 4.1%). However, neither of these differences were statistically significant (sICH p=0.69 and mortality p=0.19). Other complications included angioedema in two (1.1%) and extra-cranial haemorrhage in two (1.1%) patients.

There was variation depending on DHB size. The thrombolysis rate was 4.7% at small DHBs, 6.1% at medium-sized DHBs, and 8.4% at large DHBs, but the differences were not statistically significant (p=0.14). There were also differences in median (IQR) door-to-needle times, which were 88 (58–103) minutes at small, 79 (62.5–116.5) minutes at medium, and 71.5 (51–99) minutes at large DHBs, although again, these differences were not statistically significant (p=0.28). Tertiary hospitals (Auckland, Waikato, Wellington, Christchurch, Dunedin), however, treated patients significantly faster with a median (IQR) of 67.5 (47–95) minutes compared to 81 (62–110) for patients treated in non-tertiary hospitals (p=0.014).

### Discussion

This report provides an account of thrombolysis practices in New Zealand between 1 January and 30 June 2015. This has been clinician initiated and achieved, without specific funding support to either set-up a national registry, or for DHB staff to collect the data.

Since 2009, the thrombolysis rate has more than doubled from 3% to 6.4%, which meets the current MoH thrombolysis target of 6%. This is similar to the national thrombolysis rate of 7% in Australia (2012), but lower than 9.1% in England (2011). With rates of >30% achievable in some well-organised centres, it is likely that the current MoH target will need to be updated in the not too distant future.

There is room to not only increase treatment rates, but also reduce treatment delays. Earlier treatment is associated with better outcomes, and every 15-minute acceleration in the start of treatment can

<table>
<thead>
<tr>
<th>Region</th>
<th>Onset-to-door</th>
<th>Door-to-CT</th>
<th>Door-to-needle</th>
<th>≤60 mins</th>
<th>Onset-to-Needle</th>
<th>≤3 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td>72 (48–98)</td>
<td>30 (21–39)</td>
<td>82 (62.5–110)</td>
<td>23.6 (13/55)</td>
<td>160 (136–204)</td>
<td>63 (36/57)</td>
</tr>
<tr>
<td>Midland</td>
<td>86 (60–115)</td>
<td>28 (21–38)</td>
<td>69.5 (56–92.8)</td>
<td>30.6 (11/36)</td>
<td>157 (137–193)</td>
<td>61 (22/36)</td>
</tr>
<tr>
<td>Central</td>
<td>68 (51–93)</td>
<td>32 (24–44)</td>
<td>74 (45.3–105)</td>
<td>40.5 (17/42)</td>
<td>143 (118–196)</td>
<td>75 (30/44)</td>
</tr>
<tr>
<td>Southern</td>
<td>70 (51–95)</td>
<td>34 (17–42)</td>
<td>69 (59–96.5)</td>
<td>28.6 (10/35)</td>
<td>153 (126–165)</td>
<td>82 (31/38)</td>
</tr>
<tr>
<td>National</td>
<td>72 (52–101.5)</td>
<td>30 (21–42)</td>
<td>74.5 (55.7–105)</td>
<td>30.4 (51/168)</td>
<td>155 (128.5–195)</td>
<td>68 (119/175)</td>
</tr>
</tbody>
</table>
result in 4% greater odds of walking independently on discharge.\textsuperscript{10-13} Improving the onset-to-treatment time will require increased efficiency at multiple steps, including the onset-to-door time, door-to-CT time and CT-to-needle time.\textsuperscript{10,13}

The registry data shows that the pre-hospital onset-to-door time contributed nearly 50% to the total onset-to-treatment time. While some of this is unavoidable due to geographic distances, especially in rural areas, many people still wait too long to call emergency services. In order to address this, a national campaign based on the FAST message (‘Face, Arm, Speech, and Time’) is currently underway. Similarly, ongoing collaboration with emergency services is vital to ensure that stroke patients are given high priority, and pre-hospital notification is routinely used to alert the stroke team.

The median door-to-needle times achieved in all regions are higher than the recommended target of 60 minutes.\textsuperscript{1} One rate-limiting step is the door-to-CT time. The most effective systems have protocols that facilitate the stroke team to meet the patient at the hospital door and proceed straight to imaging.\textsuperscript{10} This may not be possible in smaller hospitals, where the stroke team and radiology staff is not on-site 24 hours a day. Including radiology staff in the pre-notifications system may help to reduce these delays.

It is important to collaborate with emergency department colleagues to facilitate the availability of well-trained staff and well-rehearsed protocols for thrombolysis. The availability of a rapid response acute stroke team meeting all patients upon arrival can markedly reduce door-to-needle time.\textsuperscript{10} Yet, low volumes in smaller hospitals often result in treatment teams less familiar with treatment protocols and resultant delays, especially out-of-hours. Remote expert support through telestroke has been shown to effectively reduce treatment delays and increase treatment rates at smaller hospitals in Australia.\textsuperscript{14} A telestroke pilot project is currently underway in the Central Region.

Symptomatic ICH, defined as clinical worsening in the setting of ICH, is the most feared complication of stroke thrombolysis, and occurred in 8 (4.4%) patients. While we cannot conclude with certainty that all symptomatic worsening in these individuals was causally related to the ICH, this rate provides a conservative estimate of potential treatment-related harm, and allows for international comparison. This sICH rate is less than the 6.4% rate reported in the pivotal NINDS,\textsuperscript{11} and is comparable to sICH rates reported in other large observational studies conducted in England (4.3–5.8%)\textsuperscript{9} and the US (4.7%).\textsuperscript{15} There were few other significant complications reported.

Stroke incidence increases with age, and elderly individuals (aged ≥80 years) were proportionately represented in our cohort of thrombolysed patients. While increasing age is associated with poorer stroke outcomes in general, it is reassuring that there was no significant difference in sICH or mortality between >80 and <80-year-olds in our data. This is consistent with the available literature, which indicates that relative and absolute benefits of thrombolysis treatment are maintained in elderly people.\textsuperscript{11}

**Conclusion**

This report provides an overview of the current stroke thrombolysis practices in New Zealand. It demonstrates that New Zealand hospitals achieve an acceptable complication rate by international standards. In addition, the data highlight opportunities for improvement, especially as regards treatment rates and delays and emphasises the importance of on-going data collection to monitor progress.
Competing interests:
Nil

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People ageing with spinal cord injury in New Zealand: a hidden population? The need for a spinal cord injury registry

Richard Smaill, Philip J Schluter, Pauline Barnett, Sally Keeling

ABSTRACT

AIMS: To identify and establish a research database of ageing New Zealand people who sustained a traumatic or non-traumatic spinal cord injury (SCI) before 1990.

METHODS: All living New Zealand residents incurring a SCI before 1 January 1990 were eligible. A co-ordinated consultation with apposite New Zealand organisations was undertaken to identify and access existing SCI databases, and remove duplicate or ineligible records.

RESULTS: 1,400 people were identified. Using the national patient information management system to determine eligibility, 1,174 people remained after exclusions; 600 (51.1%) through the Auckland Spinal Rehabilitation Unit and 574 (48.9%) through the Burwood Spinal Unit. Common to both databases were people’s National Health Index number, contact details, basic demographic data, date of injury, and neurological level of SCI.

CONCLUSIONS: An unexpectedly large SCI population was uncovered; a population largely hidden due to the uncoordinated, fragmented and inconsistently collected information held within different organisations. As life expectancy rapidly increases for those with SCI, coupled with an accelerated ageing general population, this hidden SCI population can be expected to grow. A single, well-managed and coordinated national SCI registry is urgently needed in New Zealand for planning and delivery of services, especially for those developing age-related complex interwoven secondary conditions.

A new demographic phenomenon is emerging throughout the world; people with spinal cord injury (SCI) who are living increasingly longer after their injury event. SCI mainly occurs among young and middle-aged people who sustained a traumatic injury, or non-traumatic medical condition resulting in a disability that has life-long major consequences.

Approximately 80–130 people are diagnosed with a SCI in New Zealand each year, with an estimated incidence rate ranging from around 30 per million, to 49.1 per million people. Marked gender and ethnic differences exist, with estimated age-standardised incidence rates for males (71.9 per million) significantly higher than for females (26.0 per million), while Māori (46 per million) and Pacific (70 per million) people have significantly higher incidence rates than people of European origin (29 per million). Males aged between 15 and 29 years account for nearly half of all newly acquired SCIs, with motor vehicle accidents (54%), followed by falls (24%), the leading causes of these injuries. However, due to the scarcity of recently published national epidemiological information, it must be noted that some of this cited demographic information is drawn from a study published over 20 years ago, which may be no longer accurate.

Until the mid-twentieth century, the life expectancy of people with SCI was relatively short, with people commonly dying as a result of renal failure and infection. In recent years, however, life expectancy, mortality, and morbidity have changed dramatically for the majority of people with...
SCI. With appropriate care and support many can expect to live an ‘almost normal’ lifespan.\textsuperscript{1,6,7} Although many people with SCI enjoy increased longevity, it is recognised and accepted that they live and age in ways that differ from their able-bodied counterparts.\textsuperscript{8-10} Once regarded as a relatively stable condition, SCI is now seen as dynamic and changeable over time. People living and ageing with SCI, depending on the age that the initial injury occurred, seem to have a period of relative stability post injury of 20 or so years before they develop a variety of physical secondary conditions (eg, shoulder pain, stenosis, musculoskeletal deterioration). These secondary conditions are often associated with medical complications which can seriously compromise a person’s lifestyle and even be life threatening.\textsuperscript{1,8,9}

Very little is known on a population level about people living with SCI, their ageing, and their growing importance in health service delivery and society at large within New Zealand. Indeed, the most basic questions such as population size and demographic composition are absent from almost all literature.\textsuperscript{11} Given the growing importance and impact of this population, both for individuals and for society, it is necessary that these issues be better understood. However, fundamental to any population-level understanding is the ability to reliably sample from those eligible members of the population of interest. Increasingly, population registries have been advocated and established as one mechanism for providing clinical support, improving understanding, and facilitating research.\textsuperscript{12}

For people with SCI, a functioning, well-maintained registry would seem both a logical and appropriate vehicle to negate the current paucity of evidence. Indeed, such SCI registries have been established in other countries, such as the Rick Hanson Spinal Cord Injury Registry (RHSCIR) in Canada.\textsuperscript{13} Launched in 2004, the RHSCIR is now a nationwide database of patients with acute traumatic SCI admitted to major trauma centres and rehabilitation centres.\textsuperscript{13} Australia also has a national SCI register, the Australian Spinal Cord Injury Register (ASCIR); first mooted in 1987 and established in 1995.\textsuperscript{14} Managed by the Research Centre for Injury Studies at Flinders University, the ASCIR collates information from six specialised SCI units in Australia. Both the RHSCIR and ASCIR hold information for people living with traumatic SCI, but omit a significant sub-population—namely, people living with non-traumatic SCI. Currently, no SCI registry exists in New Zealand, although good examples of other registries exist, such as the New Zealand Cancer Registry (NZCR).\textsuperscript{15} The NZCR has successfully collected information since 1948, with cancer registration becoming a legal requirement with the passing of the Cancer Registry Act 1993.\textsuperscript{15,16}

Motivated by a programme of epidemiological research aimed at describing and understanding ageing amongst the New Zealand population who sustained a traumatic or non-traumatic spinal cord injury (SCI) before 1990, it quickly became apparent that no reliable national database or comprehensive single knowledge source existed. The purpose of this paper is three-fold: (i) to describe the development of a New Zealand SCI research database of people who sustained SCI prior to 1 January 1990 used for our programme of research; (ii) to quantify and describe the people ageing in New Zealand who incurred a SCI before 1 January 1990; and (iii) to provide evidence and support for the establishment and ongoing maintenance of a SCI registry within New Zealand.

Method

Study design

A retrospective audit and compilation registry of New Zealand people living and ageing with SCI sustained prior to 1 January 1990.

Target population

All people residing in New Zealand with SCI that had occurred before 1 January 1990. People identified as being deceased or residing outside New Zealand were excluded.

Ethics

Multi-region Ethics Committee (MEC) locality assessments were sought and gained from each participating organisation. MEC clearance was obtained for the establishment, secure transmission, and retention of the research database (MEC/09/06/061).
Setting and process

Multiple organisations within New Zealand hold various forms of information about people with SCI. These include the Auckland Spinal Rehabilitation Unit (ASRU), the Burwood Spinal Unit (BSU), the New Zealand Spinal Trust (NZST), and The Association of Spinal Concerns (TASC). In brief, established in 1977, the ASRU is based in South Auckland and administered by the Counties Manukau District Health Board (CMDHB). It is responsible for providing rehabilitation services to people who incur SCI and live north of New Plymouth across to Hastings (see Figure 1). The BSU, established in 1965 initially at Christchurch Hospital and then relocated to Burwood Hospital in 1980, is based in Christchurch and administered by the Canterbury District Health Board (CDHB). The BSU provides services for people with spinal cord impairments caused by accident, illness or congenital abnormalities, and is responsible for providing acute and rehabilitative care for those people who reside under the geographic line shown in Figure 1. Based in the Allan Bean Centre, Burwood Hospital, Christchurch, the NZST is a nationwide, consumer-focused charitable trust that provides a variety of support services for spinal cord impaired people. It works in close association with staff from both spinal units, concentrating on providing post discharge support and assistance—eg, information, vocational advice, peer support. TASC is a consumer-led, non-profit organisation based at the ASRU which concentrates on providing a ‘buddy support’

Figure 1: Admission boundary areas between the Auckland Spinal Rehabilitation Unit (ASRU) and Burwood Spinal Unit (BSU).
system for those with a spinal cord injury in the Auckland area (http://www.tasc.org.nz/).

Each of these organisations generates and utilises various in-house databases. The ASRU and BSU both hold detailed records of people with SCI admitted to their units. However, they do not as yet provide systematic follow-up of all people, once discharged. Consequently, some records may become inaccurate or obsolete over time as individual circumstances change, or as people relocate, opt out, or die. The NZST has a national database, known as ‘Kaleidoscope’, which is used by its vocational assessment team. Developed in 2003, it built on a pre-existing database established and was funded by a New Zealand Racing Board grant. Unfortunately, the contract for this pre-existing database concluded in 2000, and no funding was secured in the interim, leaving a gap in records between 2000 and 2003. The original database was designed to include records of all BSU and ASRU admissions, obtained from their Patient Information Management Systems (PIMS). From 2003, data were only held for inpatients who enrolled in Kaleidoscope’s vocational programmes (ie, a relatively small subset of the total number of actual inpatients during that time).

TASC has developed an in-house, Auckland-focused database of people with SCI. While supportive of the proposed research and indicating a willingness to assist the researcher (RS) in contacting people in the Auckland area, direct access to the TASC database was not permitted.

Extensive consultation with key stakeholders, including senior administrative and clinical personnel, at the ASRU, BSU, NZST, TASC, and the Accident Compensation Corporation (ACC) was undertaken to identify the coverage, completeness, format, and reliability of the information contained on their databases. It was decided that a minimum dataset should include a person’s name, contact details, National Health Index (NHI) number, date and type of injury, gender, age (or date of birth), and neurological level of injury. It was accepted that there would be some information overlap from the different sources which would need to be addressed. The organisations were also consulted on ways to contact people outside these four databases (eg, prior to the establishment of the ASRU or BSU, a person could incur a SCI and be treated and discharged from a local general hospital). Suggestions included making contact through word-of-mouth, and organisational network magazines. TASC also worked with the ASRU to supply additional names of people not identified on the CMDHB’s PIMS.

As the focus of this research was those ageing with a SCI, in October 2009 the NZST Kaleidoscope database was reviewed, with the assistance of the Trust’s Chief Executive Officer (CEO). Over 1,400 people were identified as having incurred a SCI before 1 January 1990. Due to the large population identified, it was decided that subsequent efforts should concentrate on refining this database, although there were known gaps in its coverage, and questions about both the scope and its quality. This strategy was considered advantageous as the database clearly identified which spinal unit a person had been admitted to, and therefore enabled further checking and verification.

As part of the MEC approved locality assessment, RS was given temporary approval to work with DHB staff and patient information for the duration of the project. In the first instance, the NZST Kaleidoscope database was partitioned into two, based on spinal unit admission (henceforth referred to as the BSU and ASRU databases). Each component was then considered by the appropriate unit.

At the BSU, a temporary clerk, supervised by the Unit’s Research Nurse, employed the following process:

1. After referring to the unit’s ‘deaths book’, deceased individuals were removed from the BSU database. (The ‘deaths book’ was handwritten, and in use since the mid-1960s, recording details of individuals known to have died). In recent years, the book had ceased to be used, replaced by the CDHB’s PIMS.

2. Individuals’ details were then checked on the CDHB’s PIMS. Potentially eligible individuals not on the initial BSU database were added; those people recorded as being deceased or residing overseas were removed. Contact details were updated using the most recent
PIMS information. Some individuals’ contact details were missing or invalid.

3. As a further check, individuals’ contact details were then compared to Telecom’s “White Pages” address and phone listings. (Note: Now rebranded as Spark New Zealand, New Zealand’s largest telecommunications company).

At the ASRU, its Administration Coordinator was contracted to undertake the following process:

1. Individuals identified as being deceased on the ASRU’s ‘R’ drive patient folders were removed from the ASRU database. (The ‘R’ drive was an old computer record database no longer used for basic patient details).

2. Patient admissions from the ASRU log-book dated from 1987 to 1989 were collated, and any duplicated information or people identified as being deceased were deleted.

3. Individuals’ details were then checked on the CMDHB’s PIMS. Potentially eligible individuals not on the ASRU database were added; those people recorded as being deceased or residing overseas were removed. Contact details were updated using the most recent PIMS information. Some individuals’ contact details were missing or invalid.

The two spinal units then independently contacted people on their list to request consent for the unit to pass their contact details onto RS. Given the time delay between establishing the original list and conducting the survey, due to the Christchurch earthquake sequence,17 patients contact details were re-confirmed using the DHB’s PIMS prior to conducting the survey. Consistent with MEC approval, the individual BSU and ASRU databases were retained and held by the relevant spinal unit, not the research team.
Table 1: Demographic and injury characteristic profile of survey participants (n=284).

<table>
<thead>
<tr>
<th>Demographics and injury characteristics</th>
<th>Mean (SD)</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>57.2 (10.0)</td>
<td></td>
</tr>
<tr>
<td>Age at injury (years)</td>
<td>25.7 (9.8)</td>
<td></td>
</tr>
<tr>
<td>Time since injury (years)</td>
<td>31.6 (7.5)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>225 (79.2)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>59 (20.8)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>European/Pākehā</td>
<td>233 (84.4)</td>
<td></td>
</tr>
<tr>
<td>Māori</td>
<td>33 (12.0)</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>5 (1.8)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5 (1.8)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/de facto or civil union</td>
<td>169 (61.2)</td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>51 (18.5)</td>
<td></td>
</tr>
<tr>
<td>Separated</td>
<td>48 (17.4)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>8 (2.9)</td>
<td></td>
</tr>
<tr>
<td>SCP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetraplegic</td>
<td>98 (34.6)</td>
<td></td>
</tr>
<tr>
<td>Paraplegic</td>
<td>112 (39.4)</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>72 (25.4)</td>
<td></td>
</tr>
<tr>
<td>Neurological level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1-C7 Complete</td>
<td>93 (35.4)</td>
<td></td>
</tr>
<tr>
<td>C1-C7 Incomplete</td>
<td>29 (11.0)</td>
<td></td>
</tr>
<tr>
<td>T1-T12 Complete</td>
<td>85 (32.3)</td>
<td></td>
</tr>
<tr>
<td>T1-T12 Incomplete</td>
<td>19 (7.2)</td>
<td></td>
</tr>
<tr>
<td>L1-L5 Complete</td>
<td>22 (8.4)</td>
<td></td>
</tr>
<tr>
<td>L1-L5 Incomplete</td>
<td>11 (4.2)</td>
<td></td>
</tr>
<tr>
<td>S1 Complete</td>
<td>1 (0.4)</td>
<td></td>
</tr>
<tr>
<td>S1 Incomplete</td>
<td>3 (1.2)</td>
<td></td>
</tr>
<tr>
<td>Cause</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor-vehicle</td>
<td>103 (37.6)</td>
<td></td>
</tr>
<tr>
<td>Motorbike</td>
<td>34 (12.4)</td>
<td></td>
</tr>
<tr>
<td>Sport</td>
<td>38 (13.9)</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>23 (8.4)</td>
<td></td>
</tr>
<tr>
<td>Diving</td>
<td>19 (6.9)</td>
<td></td>
</tr>
<tr>
<td>Falling object</td>
<td>11 (4.0)</td>
<td></td>
</tr>
<tr>
<td>Medical misadventure</td>
<td>11 (4.0)</td>
<td></td>
</tr>
<tr>
<td>Medical condition</td>
<td>11 (4.0)</td>
<td></td>
</tr>
<tr>
<td>Work injury</td>
<td>10 (3.6)</td>
<td></td>
</tr>
<tr>
<td>Aviation</td>
<td>9 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>10 (3.6)</td>
<td></td>
</tr>
</tbody>
</table>

*8 (2.8%) values missing; *2 (0.7%) values missing; *21 (7.4%) values missing; *10 (3.5%) values missing.

Results

By the end of December 2009, after exhaustive checking and verification, the initial 1,400 people identified on the NZST’s Kaleidoscope database had been refined to 1,174 people; 600 through the ASRU, and 574 through the BSU. Checking the contact details of those on the BSU database against their “White Pages” address and phone listings yielded only 159 (28%) concordant matches. This relatively low concordance generated considerable discussion with senior personnel at the two spinal units. One suggestion to redress this was to seek MEC approval to run the two datasets through the national PIMS, held by Ministry of Health, as a way of ensuring currency. However, following extensive methodological consideration and ethical discussion, and given people’s increasing reliance of different technologies and telecommunication companies outside of Telecom, the most appropriate agreed way forward was to use the DHB PIMS contact details. The “White Pages” matching was therefore not undertaken for the ASRU database.

Of the 574 people initially identified on the BSU database, by June 2011 (the time of the survey) a further 20 had died, 6 were living overseas, and 1 (RS) was excluded, leaving 547. Similarly for the 600 identified on the ASRU database, by July 2011 (the time of the survey), 55 had died, 5 were living overseas, and 52 were not found on the CMDHB PIMS (suggesting relocation), leaving 495 people. Of the combined sample of 1,042 people, 284 (27.3%) completed the questionnaire; Figure 2 presents the participant recruitment flow diagram. Most respondents were male (79.2%), the mean age was 57.2 years (range: 28–83 years), the mean age when injured was 25.7 years (range: 2–57 years), and so the mean time that people had lived with their injury was 31.6 years (range: 21–59 years). Table 1 summarises the key demographic characteristics of the participants.

Discussion

Primary results

Aim (i) was to describe the development of a New Zealand SCI research database of people who sustained their SCI prior to 1...
January 1990. Despite significant support from key stakeholders, including the NZST, BSU, and ASRU, this development was a complex, technical, time-consuming task. Most sources reviewed were no longer in use, were ad hoc, or had incomplete population coverage and information. Therefore, eligible people may have been missed, introducing important non-sampling biases and threats to external validity. Without any reference or registry population, the magnitude and direction of these biases is unknown. Essential information, such as identifying the number of people who had died since the onset of their SCI and the reasons for their death, was not reliably available. Moreover, without continuous oversight and updating, this database immediately becomes obsolete, and future researchers are required to repeat the preliminary work of establishing a reliable sampling frame.

Aim (ii) was to quantify and describe the people ageing in New Zealand who incurred a SCI before 1 January 1990. The number of people ageing with SCI in New Zealand was unknown to spinal specialists, DHBs, ACC, researchers, and the Ministry of Health. This was the first time that a comprehensive national database of people ageing with SCI had been compiled. Initially 1,400 people were identified, then reduced to 1,174 after exhaustive checking and verification. This number exceeded the expectations of everyone involved, leading to the discovery of a ‘hidden population’, similar to that which has been made elsewhere.

Lastly, aim (iii) was to provide evidence and support for the establishment and ongoing maintenance of a SCI registry within New Zealand. With many more people found than anticipated, it does raise questions as to why these people were not readily identified and part of a PIMS whereby people ageing with SCI were monitored and periodically medically reassessed. Without a reliable registry, a population is potentially marginalised or worse, hidden from policy makers and health managers, the scale of conditions and related issues are also likely to be underestimated, and potentially misunderstood and neglected. Furthermore, it may denigrate the patient experience, and increase costs. This lack of reliable information severely limits effective economic evaluation of the long-term impact people with SCI have on health and social support services in New Zealand. A high priority has been placed on establishing mutual agreement among the key stakeholders (eg, spinal specialists, ACC, Ministry of Health, DHBs, health researchers, and policy makers) to develop a national registry of people with SCI.

Limitations of study

Establishing a complete sampling frame de novo is fraught with challenges and limitations, which may threaten the internal and external validity of any database. Patient coverage and inclusion, retention or known exit, accurate, complete and current information collection are all pivotal. Yet, each of these domains in our database development encountered difficulties. Ultimately, those we omitted or excluded due to missing or erroneous information cannot be determined and may further still undercount those enumerated here.

What potentially makes a good SCI registry?

Population registers have salient advantages, but also challenges. However, with modern technologies, effective registries have the capability to enhance the patient experience, and serve clinical teams, managers and systems, organisations and funding agencies, and researchers. Through data matching and integration, predictive analytics for risk stratification, combining predictive modelling with algorithms for financial risk management, identification of care gaps, automated messaging for patient outreach, engaging patients with alerts and educational campaigns, care management tasks, and using analytics to measure performance of organisations and providers are all now possible.

A number of spine and SCI registries have already been established and maintained internationally, and a body of published best practice for SCI is emerging. For a successful SCI registry, it is important that all key stakeholders commit to maintaining and using its information. Appropriate governance and project management is essential in ensuring that any SCI registry is safe and well implemented, with appropriate Information Technology Services (ITS) resources to
ensure effective ongoing data collection and review. Also fundamental is the commitment to adequate ongoing funding. Key stakeholders such as clinicians, policymakers, and researchers need to be identified and agree on dataset inclusion criteria and associated elements. All dataset variables and elements need to be clearly defined. Using NHI numbers, the SCI registry should be linked to other key databases, including the Ministry of Health’s PIMS and Mortality Collection (MORT) databases—the latter classifies the underlying cause of death for all deaths registered in New Zealand. Participant consent and privacy issues need to be addressed to ensure appropriate access to the information collected.


In 2014, the New Zealand Spinal Cord Impairment Action Plan 2014–2019 was produced by ACC and the Ministry of Health. It recognises that “the current model of care for medical interventions and lifelong support is fragmented and needs better coordination.” Establishing a SCI Registry was seen as one solution (Objective 3). Since the plan’s publication a feasibility pilot study (funded by ACC, CDHB, Canterbury Orthopaedic Services and Medtronic) has been undertaken by a Burwood Academy of Independent Living (BAIL) researcher looking at the Canadian-based RHSCIR and Australian-based SpinalCARE registries.

The feasibility pilot study, including recommendations, was submitted and considered by the New Zealand Spinal Cord Impairment Action Plan Governance Group in September 2015. This group supported the recommendations, and a business case was subsequently developed which sought sustainable funding for the RHSCIR model. The business case was accepted, and funding established, effective 1 January 2016. A set-up phase is now underway, and the first meeting of the registry governance group was in April 2016.

It is crucial for the future health and well-being of people with SCI that appropriate resources are devoted to establishing a well-coordinated, contemporaneous SCI registry that can provide accurate information.

**Conclusion**

Due to the fragmented and compartmentalised information sources, an unexpectedly large, hidden population of people ageing with SCI was discovered. A single well-managed and coordinated national SCI registry is urgently needed in New Zealand for planning and delivery of services, especially for those developing age-related complex interwoven secondary conditions. We argue that it is in both patients’ and society’s best interest to firmly support the recommendations of the New Zealand Spinal Cord Impairment Action Plan Governance Group for the establishment of a SCI registry.
Competing interests:
Richard Smaill is on the Board of Trustees, New Zealand Spinal Trust. Pauline Barnett and Richard Smaill are members of the Board of Trustees of the Burwood Academy of Independent Living (BAIL).

Acknowledgements:
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REFERENCES:


Gallbladder torsion: a rare indication for acute laparoscopic cholecystectomy

Laila Sheikh, Katherine Broughton, Melanie Lauti, David Moss, Garth Poole

The most common indications for acute laparoscopic cholecystectomy (ALC) are biliary colic, cholecystitis, cholangitis and gallstone pancreatitis. ALC is now the standard of care in established acute care general surgery units. Gallbladder torsion represents a much rarer indication for ALC. Since first described in 1898, there have only been approximately 500 cases of gallbladder torsion reported in the literature. A total of 105 cases have been reported since the first successful ALC was performed for a case of gallbladder torsion in 1994. Of these, 29 (28%) were treated laparoscopically, and eight (8%) patients were converted from a laparoscopic approach to open surgery. ALC in the 10th decade remains a rare event. Not only is surgical intervention for this age group itself rare, but patients are also more likely to have an open procedure. Pre-operative diagnosis of gallbladder torsion remains challenging, with the majority of torsion cases diagnosed intraoperatively. We present a further case of acute gallbladder torsion with a view to expanding upon the current literature.

Case:

A 97-year-old woman presented to the emergency department with 2 days of right-lower quadrant pain, fevers and vomiting. Her comorbidities included chronic renal...
impairment, a large complex hiatus hernia, osteoporosis and hypothyroidism. She had had no previous abdominal operations. Her laboratory investigations demonstrated a mildly raised C-reactive protein (CRP) of 49mg/L, but were otherwise unremarkable. Specifically, her bilirubin and liver enzymes were normal, and she had no disturbance of hepatic synthetic function. She went on to have a non-contrast computerised tomography scan that demonstrated a thick walled, distended gallbladder, with a soft tissue density projecting into its lumen. Further ultrasonographic evaluation showed a thin walled (2mm) gallbladder with sludge and a 2cm avascular polypoid lesion. There was no evidence for the presence of calculi in either imaging modality.

She continued to have significant pain over the next 24 hours associated with worsening inflammatory markers (CRP 259). The clinical impression was that of necrotic acalculous cholecystitis. She was prepared for a diagnostic laparoscopy with cholecystectomy, if appropriate. Intraoperative findings were consistent with a gallbladder torted around its mesentery resulting in gangrenous cholecystitis (Figure 1). The gallbladder was untorted and a routine cholecystectomy performed. She recovered without complication and was discharged home on Day 5. Histology was consistent with gangrenous cholecystitis.

**Discussion**

Gallbladder torsion remains a rare cause for acute upper abdominal pain. While the incidence is low, with increasing life expectancy we would expect this to be on the increase. Demographically, it is more common in older females with a recent review showing a 3:1 female-to-male predominance, with a median age at presentation of 77 years. The pathophysiology remains poorly understood, although an anatomical variant of the gallbladder attachment to the liver, with either a longer mesentery or an incomplete mesentery attached to the cystic duct, and artery alone facilitates torsion. Further predisposing factors like liver atrophy, spinal deformities, and chronic airway disease have been postulated.
Clinical diagnosis of a torted gallbladder remains challenging. History (right upper quadrant pain and nausea), examination (right upper quadrant tenderness) and laboratory investigations (raised inflammatory markers, occasionally deranged liver function tests) do not help distinguish this from the more common biliary presentations. Recent advances in radiology have meant that rates of preoperative diagnosis have improved. An older review reported pre-operative diagnosis in 9% of their cases, compared with 26% more recently. However, overall preoperative diagnosis remains challenging. In our case, the diagnosis was very much an intraoperative one. On retrospective review of the radiology, the gallbladder was lying more inferiorly and posteriorly than normal (Figure 2). However, a definitive diagnosis of torsion could not be made.

When managed effectively with timely cholecystectomy, the prognosis remains good with a mortality rate of 4–6%. However, delayed diagnosis and attempted non-operative management could lead to necrosis and poor outcomes. Given the diagnostic challenges of this condition, it is imperative that clinicians remain wary of gallbladder torsion as a potential diagnosis. This is particularly important in the elderly population. As discussed previously, torsion is much more common in the elderly population. However, the elderly, particularly the comorbid elderly, are more likely to be managed non-operatively for presumed cholecystitis. While percutaneous drainage has had good results for high-risk patients with acute gallstone cholecystitis, it would not be appropriate for patients with torsion. With our aging population clinicians will inevitably be faced more frequently with elderly patients with gallbladder disease. Operative management of gallbladder disease has been shown to be effective and safe in the elderly population and should be considered early.

Gallbladder torsion is a rare condition which remains difficult to diagnose clinically and radiologically. While outcomes are good when managed effectively, delayed diagnosis can lead to gallbladder necrosis and peritonitis. With our aging population clinicians need to remain wary of this as a potential diagnosis for elderly patients with gallbladder pathology. Furthermore, early operative management should be considered even in the elderly.

Competing interests:
Nil

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REFERENCES:
4. Dubecz A, Langer M,


Cranial polyneuropathy caused by varicella zoster reactivation

James Mitchell, Katherine Baguley, Michelle Balm, Annemarei Ranta

In May 2015, a 69-year-old woman presented to our hospital with a history of 1 week of dysphagia and dysphonia, 5 days of right sided otalgia, and electric shock-like pains from her right ear to forehead. Two days prior, she had been assessed at a different hospital, and diagnosed with trigeminal neuralgia. Aside from the neuralgia, neurological examination at that time was reported as normal, and no cause for her dysphagia was identified. She had no prior neurological deficits or reasons for immunocompromise. She had varicella infection during childhood.

On arrival at our hospital, nasendoscopy identified reduced right vocal fold movement, but no foreign body. The following day, she developed a right facial droop and vesicles were observed on her right palate. Neurological examination identified several signs, all right-sided: a lower motor neuron facial palsy, decreased facial sensation to light touch (V1–V3 distribution), uvula deviation to the left, reduced hearing and abducens palsy. The right corneal reflex was preserved. She had mild gait ataxia, but otherwise the remaining neurological examination was normal.

Head CT and MRI with gadolinium enhancement showed no evidence of stroke or cranial nerve abnormality. CSF examination revealed moderate lymphocytic pleocytosis with 71 x 10⁶/L white blood cells, all mononuclear, and VZV was detected by PCR. CSF glucose was 3.4mmol/L and total protein 0.46g/L. Flow cytometry and anti-nuclear antibody testing was normal. An audiogram confirmed right-sided, mild-to-severe sensorineural hearing loss. Videofluoroscopic swallow showed global reduction in the pharyngeal phase of swallowing.

We diagnosed VZV-induced cranial polyneuropathy, involving cranial nerves V, VI, VII, VIII, IX and X. The patient was commenced on intravenous acyclovir 10mg/kg, 3 times daily and prednisone 60mg daily for 2 weeks. We managed her right ocular symptoms with topical lubrication and an eye-patch. Given ongoing dysphagia, she required nasogastric feeding. One week later, repeat CSF analysis showed a decrease in white cells to 24 x 10⁶/L and VZV was negative by PCR.

She had significant hearing loss in the right ear and her post herpetic neuralgia persisted with diminished severity. Her post herpetic neuralgia persisted with diminished severity. Her gait normalised prior to discharge.

Discussion

The most common cranial nerve manifestation of VZV infection is Ramsay Hunt Syndrome (RHS). This characteristically involves herpetic skin lesions in the auditory canal, or auricle and unilateral peripheral facial palsy with or without auditory or vestibular symptoms.1 While RHS is the most common presentation, VZV infection in the head or neck can result in various combinations of cranial mono- or polyneuropathies.2,3

VZV infection of the larynx or pharynx with multiple associated cranial neuropathies frequently starts with a mononeuropathy, the initial manifestations of which are typically dysphagia, odynophagia or dysphonia.4 In this case, the patient’s dysphagia was originally considered in isolation from her other problems. While her infection remained untreated, she developed additional symptoms that indicated a clear progression of unilateral cranial nerve involvement, starting with CN IX and X.
extending to include CN V–VIII. Identifying palatal vesicles helped focus our investigations towards detecting VZV infection, but vesicles are not always present.4 Brain imaging was useful in excluding key differential diagnoses, such as brainstem stroke or malignancy.

This case is highly atypical. The last cranial nerve affected, the abducens nerve, is very rarely associated with VZV infection2,5 and we found no prior reports of the particular combination of cranial neuropathies observed in our patient.5 Diagnostic uncertainty and delayed presentation to the neurology service led to late initiation of treatment.

Evidence regarding the optimal treatment of cranial neuropathy caused by VZV is derived from treatment studies of RHS. Despite a lack of randomised control trials, clinicians generally favour combined treatment with acyclovir and corticosteroids.6 The lack of significant improvement in our patient at 2-month follow-up supports published evidence that treatment within 72 hours is more effective.7

This case highlights the importance of considering atypical presentations of common diseases when a patient presents with an unusual constellation of neurological symptoms. A high index of suspicion is required to detect early signs of other pathology. Early neurological consultation is suggested to assist with these steps.

Competing interests:
Nil

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REFERENCES:

1. Hoshino C, Akane Y. Where is reactivation after a long latency?. BMJ Case Reports. 2012; 10. 1136/bcr.01.2012.5538. Published online 9 July 2012.


Menstrual difficulties in adolescents with intellectual and physical disabilities represent yet another challenge to be addressed in what is invariably a life-long partnership between the individual, their carers and the health system. Indeed, menarche is often the first signal to caregivers that their child is approaching adulthood, representing the first step in transition to adult services.

Menarche brings with it new challenges, from hygiene and behavioural difficulties, through to exacerbation of pre-existing medical conditions and vulnerability to abuse.\(^1,2\)

Fortunately, menarche can be anticipated, and ideally counselling should occur pre-menarche. For the clinician, this can be difficult, as there is a paucity of data to inform management, and counsel appropriately.\(^1,4\)

With this in mind, we share our experience at Counties-Manukau Health (CMH), and present data from a retrospective cohort study conducted within our gynaecology service examining the referral pathway, management, and common complications for these patients which reviewed 40 cases over a period of 2004–2012. It is hoped that this provides others in New Zealand some local context to an important issue.

We advocate a proactive approach to better prepare caregivers to face these issues. Therefore, initial counselling is ideally performed within the familiar confines of a paediatric clinic prior to consultation in the adult world of a gynaecology clinic. Following this, patients or their carers may then contact our gynaecology clinic directly and arrange further follow-up, typically following menarche. At CMH, 21 (50%) adolescents received pre-menarchal counselling via this route.

It is a well-recognised and genuine concern for caregivers that this population is vulnerable to both physical and sexual abuse and menarche often has the effect of crystallising these fears. Contraception, therefore, in part drives the desire for menstrual suppression. Certainly, the issue of reproductive rights is complex, and in some circles taboo,\(^1,4\) therefore reversible forms of menstrual suppression address these issues without compromising future fertility. In the study population, sexual abuse was reported in 4 patients, likely an under-estimation, and is an intended component of future research.

Worldwide the most common first line agent for managing menstrual difficulties in adolescents with physical and/or intellectual disabilities is Depo-Provera (DMPA),\(^1,4,9\) particularly in those concurrently on anti-epileptic medications where oral contraceptives are less effective. Concerns exist over the (albeit reversible) effects on bone mineral density (BMD) in these patients, where reduced mobility and nutritional compromise are commonplace.\(^5-10\) As such,
alternative strategies, like the Mirena IUCD, are becoming more common.⁶

Long-term Mirena IUCD use has been shown to be safe and highly effective in reducing menstrual bleeding and dysmenorrhea, with minimal impact on BMD and body composition, with a low risk of drug interactions due to its small systemic dose.⁷⁻¹⁰ Coupled with its long duration of efficacy, it is an attractive alternative to the oral contraceptive pill (OCP) and DMPA.

At CMH, the Mirena IUCD was employed for menstrual suppression in 31 (78%) adolescents, with 50% reporting amenorrhea. Where DMPA and OCP was used as first-line therapy, we experienced a high rate of failure, with 5 of 8 on DMPA and 3 of 4 on OCP transitioning to the Mirena IUCD as second line. While we cannot comment on patient and carer satisfaction, it is inferred as there were no requests for removal over the 8-year study period.

Previous studies have commented on the need to investigate heavy menstrual bleeding and dysmenorrhea prior to initiating treatment.¹⁻⁵ We feel this is unnecessary since for many, performing an ultrasound or phlebotomy may require general anaesthesia or sedation and in adolescents the most common cause of menstrual issues are anovulatory cycles, and so investigations are unlikely to change management.

In our experience, the most common menstrual difficulties related to hygiene and behavioural issues (30 patients), while 10 patients reported heavy menstrual bleeding. For those with physical disabilities, improving hygiene is a massive quality-of-life improvement.

Four patients underwent investigations based on history, without positive findings. While 4 Mirena’s were expelled, all uterine cavity lengths were over 6cm, well within the adult range. No other adverse events related to the Mirena or its placement was noted. All insertions were performed under general anaesthetic. While not without risk, insertions are required infrequently and can be combined with other procedures, ie, dental examinations.

Mirena IUCD’s were typically sourced via the DHB rather than on special authority, as the majority of patients do not meet the special authority criteria.

We advocate using the Mirena IUCD for managing menstrual difficulties in this population. While its use is more common at CMH than reported globally,¹⁻⁶ this variance in practice is supported by its greater efficacy, duration of action and safety profile.

We feel that a proactive approach using the Mirena IUCD forms a safe, effective, long-term solution for what is an important but oft-overlooked problem.

Competing interests:
Nil

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Edward Alfred Harris

19 July 1923 – 24 May 2016

MBChB (Liverpool 1945), MD (Liverpool 1966), PhD (Edinburgh 1957), FRCP (London 1971), FRACP 1970

Edward Alfred Harris died at home on 24 May 2016, aged 92 years. He had been unwell for several years. He is survived by his wife, Barbara, and their two daughters, Gillian and Rosemary. We write to acknowledge his huge contribution to medical science, and his wonderful legacy as a teacher and mentor of young clinicians, including doctors, nurses, and cardio-pulmonary technologists.

Dr Harris (Ed) was born in St Helens, Lancashire, in 1923. He received a scholarship to study medicine at Liverpool University, graduating in 1945. He spent the next 5 years as a house physician and registrar in the Liverpool area, including 2 years in the Royal Air Force Voluntary Reserve. Between 1951 and 1964, Ed worked in Edinburgh as a medical registrar and as an MRC Fellow, completing his PhD (entitled The Measurement of Exercise Tolerance) in 1957. He spent time in Auckland between 1964 and 1968, first as a physician in the Acute Respiratory Unit and then as physician in charge at the Clinical Physiology Department, at Green Lane Hospital.

He returned to Edinburgh as a consultant physician in the Respiratory Unit at the Northern General Hospital, between 1968 and 1970. During this time, he made a substantial contribution to two text books which became widely used in medical teaching world-wide: A Companion to Medical Studies, R Passmore and JS Robson (1968), and The Principles and Practice of Medicine, Davidson (1968).

Sir Brian Barratt-Boytes, Professor Jack Sinclair, and others worked to persuade Ed to return to Green Lane in 1970, and he continued his career in the Clinical Physiology Department until his retirement.
in 1988. He provided measurement skills and resources to the Respiratory Medicine and Cardiology Departments, and to the Cardio-Thoracic Surgical Unit. He published over 100 articles on medicine, physiology, laboratory methods and medical ethics; some of these are listed in Nigel Wilson’s volume *Publications from Green Lane Hospital 1942–2003* (PCCS Publication, Auckland 2003). He was in the vanguard of an explosion in knowledge about cardio-pulmonary physiology. He had many collaborators, but arguably the most important were his dear friends, Eve Seelye and Toby Whitlock.

Ed tutored, mentored and supervised hundreds of young students—both medical and technical. He was caring and generous. He helped many to advance their careers by lifting their expectations and involving them in research. He used his contacts to find places for his students in important departments overseas.

Ed met Barbara in a hospital in Cheshire in 1949. Barbara was born in Whakatāne, and trained as a dietician in Auckland. They married in 1950; Gillian was born in 1954, and Rosemary in 1958. They share their father’s love of music and both are professional musicians. Ed played the piano, and musically, was largely self-taught. He also had a great love of the English language and was a fine wordsmith with a refined sense of humour. He was a stickler for correct grammar, at times to the point of splitting hairs. Fowler’s *Modern English Usage* and *Chambers Dictionary* had pride of place on the bookshelves and were consulted at every turn. He always had a current copy of the *Manchester Guardian Weekly*, and was adept at the cryptic crosswords.

We held a memorial gathering at Green Lane Hospital, attended by many of his family and colleagues, when we celebrated and paid our respects to a great man.

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Rate control versus rhythm control for atrial fibrillation after cardiac surgery

Atrial fibrillation after cardiac surgery is associated with increased rates of death, complications and hospitalisations. This trial involved 523 such patients who were randomised to receive rhythm control by cardioversion or rate control with amiodarone. The primary end point was the total number of days of hospitalisation within 60 days after randomisation.

Both strategies were found to produce an equal number of days of hospitalisation, similar complication rates, and similarly low rates of persistent atrial fibrillation at 60 days after onset.


Effect of age and sex on efficacy and tolerability of β blockers in patients with heart failure with reduced ejection fraction

Although clinical guidelines recommend the use of β blockers in such patients, there is some evidence that they are underused in women and the elderly.

This meta-analysis involved individual data from 13,833 patients, including 3,283 women, and more than 4,000 adults aged 70–80 whose heart failure was treated with β blockers. Compared with placebo, β blockers reduced all-cause mortality in all age groups and both sexes, with an adjusted hazard ratio of 0.70. Drug discontinuation was similar for both β blockers and placebo, irrespective of age or sex.

The researchers recommend that patients with heart failure and reduced ejection fraction and sinus rhythm should not be deprived of treatment with β blockers regardless of age or sex.

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Safe and effective analgesia for management of renal colic in the emergency department

The excruciating pain of patients with renal colic on presentation to the emergency department requires effective analgesia to be administered in the shortest possible time. The authors of this report believe that previous trials comparing intramuscular non-steroidal anti-inflammatory drugs with intravenous opioids or paracetamol have been inconclusive.

They randomly assigned patients with moderate to severe renal colic to receive diclofenac (75mg/3mL intramuscular), morphine (0.1mg/kg intravenous), or paracetamol (1g/100mL intravenous). The primary outcome sought was at least a 50% reduction in pain at 30 minutes. Over 500 patients were included in each group.

The primary outcome was achieved in 68% of the diclofenac group, 66% in the paracetamol group, and 61% in the morphine group. The reduction of pain was significantly more sustained in the diclofenac group. The conclusion reached was that intramuscular non-steroidal anti-inflammatory drugs offer the most effective sustained analgesia for renal colic in the emergency department and seem to have fewer side effects.


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A great deal of nonsense was talked in the House yesterday about the Wellington branch of the British Medical Association, and we are sorry to see that the Minister for Public Health, who ought to know better, joined in an outcry which was evidently got up by certain self-advertising members for electioneering purposes. The position is stated very accurately, and, as we think, fairly by ‘A Doctor’, whose letter appears in another column. The Wellington doctors who take friendly society practice have refused to continue their work at what they consider the very inadequate rate fixed many years ago, when the cost of living and the wages of the working classes were much lower than they are now. After some months of fruitless negotiation the lodges, it is stated, have engaged four doctors to come out to do the work at a guaranteed salary of not less than £700 a year. In making this arrangement the Friendly Societies are, of course, perfectly within their rights, but the members of the British Medical Association, who look upon the doctors bought in to ‘undercut’ them in the same light as unionists regard ‘blacklegs,’ say that they will not meet these gentlemen in consultation. In taking this stand the Wellington doctors are acting just as much within their rights as are the members of the Friendly Societies in importing the undercutting practitioners. Nor is it easy to see how the interests of the lodge patients are so seriously affected as to call for the intervention of Parliament. If the imported doctors are qualified to do the work for which they are engaged they are surely qualified to consult with each other and to assist each other in operations. If they are not so qualified, then the lodge members are taking a step of very doubtful prudence in committing the care of their own health and that of their families to practitioners in whose skill and experience they have not
full confidence. But, at any time, in cases of emergency or exceptional difficulty they will be able, as private patients, to avail themselves of the skill of the established Wellington doctors whose services they prefer. Skill in medicine and surgery, as in any profession, is entitled to adequate remuneration at the current rates fixed either by custom or law of supply and demand. For Parliament to interfere in a dispute like that which has occurred in Wellington, for the purpose of compelling medical men to give the benefit of their skill to less competent rivals imported to undercut their rates, and to patients perfectly able, but unwilling to pay the very moderate fee of 24s. a year for attendance on themselves and their families, would be an act of monstrous injustice, and would certainly fail to achieve the object aimed at. Mr Russell talks about establishing a State medical service “so that poor persons might have their ailments attended to apart from their means.” He seems to forget that this is already provided in the hospitals under his control, and that the ablest surgeons and physicians in the Dominion give their services absolutely without fee or reward in order that the poor people may have the most skilled treatment either at no cost at all or at a very trifling cost well within their means. How long does any reasonable person suppose that this arrangement will be continued if Parliament sets out upon the high-handed course of procedure which unthinking members of the House so glibly recommend?