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Information for authors

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EDITORIAL

Getting health back on track

‘Shoot the messenger’ is a term that has come into prominence since the new right ideology was keenly embraced in New Zealand during the ’90s. In health, a culture of competition, rather than cooperation was demanded.

A series of disasters have occurred that could well have been prevented. After each disaster, enormous amounts of money were spent to prevent a recurrence - ‘the ambulance at the bottom of the cliff rather than a fence at the top.’ Many now recognise that when several, individual, unrelated failures occur, there is something fundamentally wrong with the system. Until the new Health Strategy was announced, there was little concerted effort to address the failure of current systems.

The Ramstead case at Christchurch Hospital was an early failure. Ramstead was perceived to be ‘the villain’ and responsible alone for the deaths of patients under his care. Little mention was made of the inadequate resources at his disposal, the lack of quality control procedures, and a general environment that allowed, or even forced, him to practice as he did.

The Gisborne cervical cancer inquiry is still in progress. Dr Bottrill, like others who work alone without adequate peer review and assistance, was at high risk of failure. The recent death of a four year old boy at the hands of his stepfather, has highlighted deficiencies in support structures. The problems of mammography follow up at Healthcare Otago exemplify how a slimmed down health system leaves disposal, the lack of quality control procedures, and a general environment that allowed, or even forced, him to practice as he did.

The Gisborne cervical cancer inquiry is still in progress. Dr Bottrill, like others who work alone without adequate peer review and assistance, was at high risk of failure. The recent death of a four year old boy at the hands of his stepfather, has highlighted deficiencies in support structures. The problems of mammography follow up at Healthcare Otago exemplify how a slimmed down health system leaves disposal, the lack of quality control procedures, and a general environment that allowed, or even forced, him to practice as he did.

The Stent Report1 revealed that a local health system had deteriorated to such an extent that patient safety was imperilled. The Health and Disability Commissioner strongly criticised people in positions of power, from the local management to CCMAU. Interestingly however, many of those criticised, and their advisers remained (and remain) in their positions of power. Is it any wonder, for example, of those criticised, and their advisers remained (and remain) in their positions of power. Is it any wonder, for example, of those criticised, and their advisers remained (and remain) in their positions of power. Is it any wonder, for example, of those criticised, and their advisers remained (and remain) in their positions of power. Is it any wonder, for example, of those criticised, and their advisers remained (and remain) in their positions of power.

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The newly elected Labour Government has acknowledged responsibility, and continue their course.

When inappropriate ideology and underfunding are combined in matters such as education and health, “there will be a long slow process of attrition in which standards fall and the national interest is damaged.”1 This process is less observable than a Cave Creek tragedy, and therefore cannot even be addressed by an ambulance at the bottom of the cliff. The perpetrators of the ideology will deny responsibility, and continue their course.

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It is sufficient for us to assume that they will change their stance in a new model? Can we expect them to act for the common good? Are they not accountable for what has gone before? While they remain, they continue to appoint others to jobs, to committees and to the revised health boards, thus perpetuating their doctrine.

While it might be possible to identify those who made wasteful or damaging decisions from positions of power, there is another problem that is less easy to address. This concerns those, including many doctors, who found it easy (and often profitable) to drift with the managerialist ideology, thus allowing it to prosper. We would be foolish to consider that our recent past in this regard is something new. The situation in Germany in the 1930’s was a landmark, extreme situation, yet it had humble beginnings with faulty ideology at its roots. Many of that country’s leading health professionals left Germany when the doctrine spoke that medicine no longer had to work for the individual’s well-being, but had to serve the collective body of the German people. More stayed however, to work within the system. In 1937, SS-membership of male doctors was seven times the proportion in the general male population. This example, although extreme and without direct parallel to New Zealand, illustrates the danger when people even passively participate in an unjust cause. As Hanauske-Abel said “Not to act is to act, and not to resist is to participate”.4

The belief that it is ‘better to work within a system’ is clearly not tenable when that system is fundamentally flawed. The corporate/managerialist philosophy, as it was applied here, has been unilateral control from the top. Health professionals were deliberately excluded in decision making, because they were accused of ‘provider-capture’. Apart from being undemocratic, the folly of this is obvious. Would you exclude rocket scientists from your design team for a visit to the moon?

We propose that the following principles should underpin any future model in order to avoid the mistakes of the past. Health professionals must be included in the determination of policy, and management should facilitate and support them. The health professionals must represent the consensus of their group. The opinion of advisors appointed by management is not sufficient. There must be openness, honesty and cooperation. A team approach, devoid of secrecy and deceit, must surely be a winner. It all seems so obvious now.

The Editors

Little is known about the use made of services by sex workers to protect themselves and their health, but the importance of the issue has been recognised in New Zealand through funding of dedicated services by the New Zealand Prostitutes’ Collective (NZPC) to provide peer education, HIV/AIDS prevention, some counselling and clinical services. However, estimates of use of services by sex workers have been based on disclosures of occupation, and since it is not known how many sex workers do not disclose, the accuracy of estimates in unknown. This is the first New Zealand study to examine utilisation of medical and related services by female sex workers through a cross-sectional survey.

Methods

There is no adequate sampling frame for sex workers in New Zealand because while prostitution is not illegal, most of the activities associated with it are. The Summary Offences Act 1981 (s.26) makes soliciting an offence, discouraging explicitness about occupation. Under the Crimes Act 1961 (s. 147, s. 148, s. 149), brothel keeping, procuring and living off the earnings of prostitution are criminal offences potentially applicable to any business where sex is provided for money, and workers must therefore maintain a legal fiction of not providing sex. The Massage Parlours Act (s. 19) requires records of personal details of workers to be made available for police inspection. However, individuals cannot work in parlours if convicted of prostitution and drug crimes and considerable numbers of women choose to work outside massage parlours, either from the street, in private arrangements or in escort agencies (which charge ostensibly for time rather than type of service). The police maintain a record of names and details of prostitutes, but theirs is a cumulative record, and there is anecdotal evidence that many women avoid registering with the police. While capture-recapture methods and spatial-temporal sampling frames have been used to estimate street worker populations, non-street workers constitute the majority of the sex worker population in New Zealand.

An estimate of the female sex worker population in Christchurch was therefore made from the sum of the number working in all known sex work locations. The number of women working in all 22 parlours and escort agencies then known to be operating in Christchurch was estimated by NZPC members who visit regularly to distribute supplies and educational information and to talk to all new workers. Tallies were made at the beginning of the study and at its termination. Numbers of women working independently were estimated through systematic study of advertisements in the ‘Escort’ columns of the local daily newspaper, The Press, over several weeks, eliminating multiple advertisements by single individuals. Street worker numbers were estimated through head counts in the field, both before and after midnight, and corroborated against estimates from youth workers attached to NZPC who work solely with street workers. There appeared to be a drop in the sex worker population over the study period. The estimate of 431 in mid May fell to 375 by mid September 1999, when a number of parlours were complaining of being understaffed, and a seasonal drop in street worker numbers over winter is usual (NZPC communication). As expected, numbers of male workers were very small (15). Women were informed about the survey through flyers and some press advertising, and individual approaches were made through outreach and telephone contact. Individuals were asked to complete the questionnaire either at that time, or by visiting the drop-in centre. Participants were reimbursed $15 for the costs of transport, childcare and opportunity costs of taking part. The questionnaire was adapted for New Zealand conditions and issues from Canadian and British prototypes. To maximise a response, the questionnaire was sensitive to issues with potential to offend or alarm participants, particularly in relation to money, age, substance use and mental health. The questionnaire was piloted and administered by five members of NZPC who were given training in interview techniques. Interviews were conducted on all days of the week and at various times of the day and night. All sex work businesses were co-operative, except for three massage parlours which reportedly made efforts to dissuade women from participating.

Results

Sample size and representativeness: 303 women responded to the survey, which represents just over 80% of the estimated working population at the termination of the data collection period. No response rate can be calculated because a denominator cannot be established since participation was requested individually and through publicity. In general, the participants identified themselves as coming from the different sectors of the sex industry delineated in estimates. Just over one-quarter (26%) indicated streets as their main place of work (28% estimated), 47% indicated massage parlours (58% estimated), 23% escort agencies (14% estimated) and about 4% worked in venues like bars not familiar to NZPC and not included in estimates. Most women (87%) worked in only one venue, 7% worked also from home and 6% concurrently worked in more than one venue outside the home.

Demographic characteristics. Just over 72% of participants identified as New Zealand European and nearly 20% identified some Maori ancestry. Nearly one third (30%) of participants were aged under 21 years, just over one-third (38%) were between 22 and 29 years and another third (33%) were 30 years or more. The women had been in sex work for periods ranging from a few weeks to more than ten years. Novice workers with less than six months experience in sex work comprised 8.5% of the sample and 27% were in what NZPC regards as the ‘learning curve’ of less than two years.
Another 33% had worked two to four years and 38% had worked more than five years.

**Services used for sexual health.** Of the 302 women who answered the question, only four street workers and eight non-street workers, aged from late teens to over 30 years old, did not go for sexual health checks. Of the 251 women (83% of the sample) who reported having their own general practitioner (GP), 135 (54%) reported that they go to their GP for sexual health checks and a further 21 go to some other GP. GPs were, therefore, the most commonly used medical provider for sexual health services. Of the women under 18 years old, 50% used 198 Youth Health Service and 25% used a GP, whereas of those between 18 and 21 years, 25% used 198 and 42% used a GP. Small numbers made use of other services at this age, but 17% of older women used the Sexual Health Service and 24.7% of women 30 years and over used NZPC.

**Disclosure of occupation to medical practitioner.** Of the 251 women who had a GP, 121 (48%) disclosed they were sex workers. Of the 135 women who had their own GP and went to that GP for sexual health check ups, 84 (62%) disclosed. Older women were somewhat more likely than younger women to disclose. None of those under eighteen years who used a GP for a sexual check-up disclosed, whereas 57% of those between 18 and 21 years disclosed, 67% of those aged between 22 and 29 years, and 63% of those 30 years and older disclosed their occupation.

**Information and advice relative to physical safety.** When asked about how they currently learned about potentially bad clients, 85% of women said they got information from other workers, NZPC was important for 74%, 20% (mostly non-street workers) got information from management at workplaces and 21% (mostly street workers) got information from the police. About a quarter of participants (27%) reported they had received no information on how to deal with clients when they first began working. Nearly two-thirds (62%) had received information from co-workers. About half of the women felt that they had enough information on how to keep safe when they first began working.

**Support and redress for adverse events.** Adverse events reported ranged from verbal abuse (59% of women), refusal to pay (47.9%) and being robbed (30%); to threats of physical assault (36%), physical assault (26%) and rape (12.5%). Only 13 of the 250 women who had had such an experience said they turned to nobody afterwards. Most (73%) said they would turn to fellow workers, and just under 60% of non-street workers would tell someone involved with the management of their workplace. Over a third (36%) would turn to friends, with a quarter to family or partners. Less than 10% said they would discuss matters with a social worker or counsellor, or with a doctor or nurse, and about 12% said they would tell NZPC staff. Of the women who had had a bad experience, 230 did not report the event to the police, usually because the matter was thought ‘not serious enough’. However, just over 20% did not believe the police would help, and while 66% of women thought that ‘some’ police cared about the safety of sex workers, 15% did not believe that ‘any’ police cared about their safety.

**Discussion**

This survey of sex workers is one of the largest reported in Australasia, and addresses the difficult issue of representativeness. The extent to which Christchurch sex workers can be said to be characteristic of sex workers elsewhere, however, needs further research. The demographic and sector characteristics of the sex worker population suggested by this study are generally as suggested by key informants, but the number of women who identified some Maori ancestry is larger than anticipated in a South Island city since Maori women comprise 7.4% of the metropolitan Christchurch female population 15-44 years old. It also appears that at any one time there is a sizeable number of comparative ‘novices’ in sex work, indicating continued need for targeted services for new sex workers.

It is reassuring that almost all sex workers paid attention to their sexual health. GPs are by far the most commonly used provider of sexual health services. It is notable however, that large numbers of women do not disclose their occupation to their GP. Other qualitative research being undertaken by the authors suggests that issues of confidentiality and stigma may underlie this. Women have revealed worry about confidentiality of personal details in a practice – “they’d be passed round ... there’s receptionists. The nurse. The doctor,” as one woman said. Even where relationships with GPs were strong, women feared disclosing: “I should be able to,” said another woman. “She’s OK. But I’m a bit scared to. I’m scared it will change our relationship.” The debate among health professionals about how to deliver a ‘nonjudgemental and sympathetic’ service to patients who are also sex workers needs to continue.

The reasons for the apparently low utilisation of the NZPC clinic and the Sexual Health Centre deserve further exploration. Access issues are at least in part an issue. While GPs can be accessed during working hours all days of the week, the NZPC clinic in Christchurch is open for only two hours one evening a week, which might increase accessibility for street workers in the locality but, as these hours are popular parlour shifts, excludes others. Comparability of service is hard to gauge as GPs will make judgements for each case, but the same staff offer the same service at NZPC and the Sexual Health Service, and staff at 198 are trained by medical staff from Family Planning.

The importance of informal peer networks for advice and support is evident. Most women relied on co-workers, although NZPC was important as a source of information, confirming the picture from NZPC records which show an average of 114 office and outreach contacts per week over the study period. However, while most women reported that they used NZPC for information about bad clients, only a small minority would tell NZPC about any bad experience. There appeared to be some scepticism about the police as an avenue of redress. Social work and counselling agencies were used by only a small proportion of women to discuss bad experiences. The importance of informal networks of support and advice among sex workers in this study suggests the need for continuing health promotion activities through agencies like NZPC, with the advantage of peer relationships to maximise penetration of this milieu.

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The early experience of general practitioners using Green Prescription

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Abstract

Aim. Sedentary lifestyle is a significant risk factor for increased morbidity and mortality in many medical conditions. A Hillary Commission initiative, Green Prescription is a written exercise prescription given by general practitioners (GPs) to sedentary patients to encourage physical activity. Our aim was to establish the extent to which GPs in the North Health region in 1997 issued with Green Prescription packages had used them, the circumstances under which they were used, and barriers to their use.

Methods. 433 GPs issued with packs were faxed a one-page questionnaire for immediate completion, with follow-up of non-responders.

Results. The response rate was 73%, with 65% of respondents having written Green Prescriptions. Their main reasons for use were patient need for more exercise and presence of high-risk medical conditions such as hypertension, cardiovascular disease, obesity and diabetes. Reasons for non-use were: GP already giving advice about physical activity; concern that Green Prescription was patronising and simplistic; compliance issues and time restraints. Some requested a computerised version.

Conclusion. Non-responders may be non-users, hence we estimate that 48-65% of targeted GPs used Green Prescription. Barriers identified by GPs have assisted in Green Prescription development, which is now nationwide and assessed by independent researchers tri-annually.

The Green Prescription is a written prescription given by general practitioners (GPs) to sedentary patients to encourage an increase in physical activity. A sedentary lifestyle is a significant risk factor for increased morbidity and mortality in obesity, non-insulin dependent diabetes, coronary artery disease, stroke and fall-related bone fractures. Green Prescription specifies the number of exercise sufficiently for these benefits to accrue. The Green Prescription is a tangible reminder of an exercise plan arrived at by discussion between patient and doctor, with the expectation that it will be more effective in increasing the patient's level of exercise than verbal advice alone. In a 1995 trial, the Green Prescription increased participants' recreational physical activity significantly more than verbal advice alone at six weeks follow-up. The researchers found GPs were comfortable discussing and prescribing exercise, and they preferred giving Green Prescriptions to giving verbal advice alone. Green Prescriptions were believed to be valuable in formalising and documenting agreed exercise goals, although time constraints were a barrier to their widespread use. Appropriate training, resource materials and patient follow-up were seen as important.

In 1997/98, GPs in the North Health district were invited to participate in the Hillary Commission Green Prescription initiative. The Hillary Commission was responsible for the development of materials and GP training (with the assistance of expertise from the National Heart Foundation), and North Health met some costs of promoting Green Prescriptions to GPs and research and evaluation of the project. GP training included information on health benefits, familiarisation with the resource material, and input from Regional Sports Trust co-ordinators regarding their services and support. The Green Prescription kits were distributed at these training meetings.

Our study aim was to establish the extent to which GPs used the Green Prescriptions, the circumstances under which they were used and barriers to their use.

Method

The RNZCGP Research Unit in the Department of General Practice at the University of Auckland conducted a survey of the 433 GPs who had been distributed Green Prescription information in the North Health (Northland and Auckland) district. Hillary Commission staff were involved in the development of the survey.

Data were collected using a fax-back questionnaire with follow-up of non-responders.

Results

Response rate was 73%. 65% of the respondents had used a Green Prescription. 94% remembered receiving
The earliest recorded use of animals in scientific research was in the third century BC, when the Greek physician Erasistratus did the investigational work on animals that led him to differentiate between sensory and motor nerves and describe the heart as carrying both air and blood around the body. It was not until the late 17th and early 18th centuries, however, that this type of research gained momentum, primarily in France and England. At that time, animals were literally cut up alive (hence the term ‘dissection’) without anaesthesia, as there were no anaesthetics until the 1840s.

Even if anaesthesia had been available, it probably would not have been used on animals because there was a prevailing belief – based on the writings of French philosopher René Descartes (1596-1650) – that animals could not feel pain. Any behaviour by an animal that appeared to demonstrate pain was regarded simply as a reflex, devoid of human-like emotion. Only in the 1960s did scientists begin to ask what motivated animals and investigate whether they might have feelings such as distress, fear and anxiety. This led to the study of animal behaviour (ethology) alongside the emerging science of experimental psychology, in which animals are used as models for human behaviour.
Vitamin D is a secosterol hormone which is produced in the skin after exposure to ultraviolet light, or is ingested in the diet. The main function of metabolically active vitamin D is to facilitate the absorption of calcium, and phosphate from the intestine. The major circulating form of vitamin D measured in serum is 25-hydroxyvitamin D (25-OH-D) which reflects the vitamin D status of the body. The reference ranges quoted for 25-OH-D levels are variable, but a value of less than 10 µg/L (conversion factor to nmol/L = 2.496) is considered to be subnormal. This cut-off level is supported by data from the national nutrition survey in the UK, of children aged 1.5-2.5 years.

Rickets is characterised by defective bone mineralisation in children. Vitamin D deficiency is the commonest cause of rickets and may result from lack of sun exposure, dietary deficiency or malabsorption. Factors associated with an increased risk of rickets secondary to vitamin D deficiency include: dark skin colour, minimal exposure to sunlight, iron deficiency, prolonged exclusive breast feeding and a restricted maternal diet (eg vegetarian). Except in the first weeks when the vitamin is acquired by the foetus during pregnancy, vitamin D status in infants is determined predominantly by exposure to sunlight. Based on a study of 61 infants relating sun-exposure to serum 25-hydroxyvitamin D levels, the vitamin D status in infants is determined predominantly by exposure to sunlight.

Methods

All serum 25-OH-D levels performed on children less than five years of age, at the Auckland Hospital Endocrinology laboratory during the 1998 calendar year were reviewed. From these were selected all children less than five years of age with serum 25-OH-D levels less than 10 µg/L. A serum 25-hydroxyvitamin D level of 5 µg/L is considered to be subnormal and over half were hypocalcaemic. The common presenting features were delayed walking and bowed legs, swollen wrists or ankles, hypocalcaemic seizure, incidental radiological abnormalities and failure to thrive. There are a significant number of children in Auckland presenting with florid clinical rickets. The majority with vitamin D deficient rickets in this survey were of Indian ethnic origin. Strategies are needed to detect children at risk of vitamin D deficiency and supplement them with vitamin D.
advanced rickets. Two-thirds of the children presented during the six months from July to December (Winter-Spring). Four (22%) presented in August. All of the children had an elevated serum alkaline phosphatase, and over half had a low serum calcium (11/18), with seven also having a low serum phosphate. Four children had a low haemoglobin (<110 g/L) and two had a low ferritin. Ten children had a normal haemoglobin and two did not have a full blood count performed.

The most common mode of presentation was bone disease. Four children presented with delayed walking and bowed legs and three with swollen wrists and/or ankles. Four presented with seizures, and all of these children that responded to vitamin D therapy, six also had a proven response on repeat radiographs or serum alkaline phosphatase. Of the thirteen (72%) had proven response to therapy on repeat radiographs or serum alkaline phosphatase.

The treatment was a single-day large dose of vitamin D3. Information on other factors known to be associated with vitamin D deficiency, as there will be others in the community not admitted to hospital, and also children with vitamin D deficient rickets found in one year. This survey is likely to have included only a small proportion of children with vitamin D deficiency, as there will be others in the community not admitted to hospital, and also children with subclinical forms of vitamin D deficiency. In New Zealand, the major source of vitamin D is likely to be vitamin D3 derived from sunlight. The low 25-OH-D levels in this survey were found in the later half of the calendar year, with a peak in August. More pigmented skin is less efficient in producing vitamin D and there is also less photosynthesis of vitamin D3 in the winter months. The majority of children with rickets in this survey were of Indian ethnic origin. Interestingly, neither Asian nor European ethnic groups were represented, despite being well represented in the Auckland population. The reasons for the predisposition in Indian children is unknown, but could be due to genetic, dietary or cultural factors.

Discussion
We were surprised at the number of cases and the severity of vitamin D deficient rickets found in one year. This survey is likely to have included only a small proportion of children with vitamin D deficiency, as there will be others in the community not admitted to hospital, and also children with subclinical forms of vitamin D deficiency. In New Zealand, the major source of vitamin D is likely to be vitamin D3 derived from sunlight. The low 25-OH-D levels in this survey were found in the later half of the calendar year, with a peak in August. More pigmented skin is less efficient in production of vitamin D and there is also less photosynthesis of vitamin D3 in the winter months. The majority of children with rickets in this survey were of Indian ethnic origin. Interestingly, neither Asian nor European ethnic groups were represented, despite being well represented in the Auckland population. The reasons for the predisposition in Indian children is unknown, but could be due to genetic, dietary or cultural factors.

All children in this survey had a high serum alkaline phosphatase, which has been shown in previous studies to be a better predictor of rickets than 25-OH-D levels. Most of our children had a serum 25-OH-D of ≤5 µg/L. It is

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<td>7</td>
<td>10</td>
<td>F</td>
<td>Indian</td>
<td>&lt;2</td>
<td>Diagnosis on CXR</td>
<td>2.26</td>
<td>0.71</td>
<td>555</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>F</td>
<td>Indian</td>
<td>&lt;2</td>
<td>Hypocalcaemic seizure</td>
<td>1.42</td>
<td>1.84</td>
<td>775</td>
</tr>
<tr>
<td>9</td>
<td>12</td>
<td>M</td>
<td>Indian</td>
<td>&lt;2</td>
<td>Hypocalcaemic seizure</td>
<td>1.46</td>
<td>1.54</td>
<td>1209</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>F</td>
<td>Tongan</td>
<td>&lt;2</td>
<td>Fractured tibia</td>
<td>2.12</td>
<td>0.76</td>
<td>&gt;1000</td>
</tr>
<tr>
<td>11</td>
<td>13</td>
<td>M</td>
<td>Indian</td>
<td>&lt;2</td>
<td>CXR for bronchiolitis</td>
<td>1.87</td>
<td>0.80</td>
<td>&gt;1000</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>F</td>
<td>Fijian Indian</td>
<td>4</td>
<td>Delayed walking &amp; bowed legs</td>
<td>2.10</td>
<td>1.53</td>
<td>2570</td>
</tr>
<tr>
<td>13</td>
<td>18</td>
<td>M</td>
<td>Indian</td>
<td>4</td>
<td>Delay walking &amp; bowed legs</td>
<td>2.29</td>
<td>1.50</td>
<td>&gt;1000</td>
</tr>
<tr>
<td>14</td>
<td>18</td>
<td>F</td>
<td>Samoan</td>
<td>9</td>
<td>Bowed legs</td>
<td>2.30</td>
<td>1.20</td>
<td>529</td>
</tr>
<tr>
<td>15</td>
<td>19</td>
<td>M</td>
<td>Indian</td>
<td>5</td>
<td>Swollen wrists &amp; delayed walking</td>
<td>2.20</td>
<td>1.20</td>
<td>2008</td>
</tr>
<tr>
<td>16</td>
<td>20</td>
<td>F</td>
<td>Indian</td>
<td>9</td>
<td>Deformed wrists</td>
<td>2.51</td>
<td>1.60</td>
<td>452</td>
</tr>
<tr>
<td>17</td>
<td>28</td>
<td>F</td>
<td>Indian</td>
<td>2</td>
<td>Swollen ankles &amp; wrists</td>
<td>2.33</td>
<td>1.70</td>
<td>740</td>
</tr>
<tr>
<td>18</td>
<td>36</td>
<td>F</td>
<td>Indonesian</td>
<td>5</td>
<td>Abnormal gait &amp; bowed legs</td>
<td>1.72</td>
<td>1.34</td>
<td>747</td>
</tr>
</tbody>
</table>

ND=not done

Reference Ranges
14-76 2.25-2.75 1.2-2.0 80-350

ND=not done
possible that other children with nutritional rickets have levels in the lower end of the normal range and were missed by this survey.

Bone problems such as swollen wrists and bow legs were the most common presenting features of rickets. Most of the cases in our series had florid symptoms, suggesting that improved awareness of rickets and vitamin D deficiency as an entity would be useful.

This study is descriptive and limited since the information was incomplete for factors associated with rickets. Three mothers were documented to be vitamin D deficient, but this is likely to be an underestimate. It is also likely that other associated factors such as vegetarian diet, low sun-exposure and prolonged breast-feeding are underestimated or not measured, as they were often not recorded in clinical notes.

Most of the children had a response to therapy with vitamin D alone or with calcium. A recent randomised controlled trial found that calcium supplementation alone, or calcium plus vitamin D, was better than vitamin D alone for treatment of rickets in Nigerian children. The possible contribution of dietary calcium deficiency to rickets in our children was not assessed.

The major finding of this survey is that severe vitamin D deficient rickets is currently a problem in Auckland. Similar studies over the last few years have described cases of florid rickets in the UK and Canada. Our sample contained a predominance of Indian children. A recent nutritional survey of 618 Asian children (Bangladeshi, Indian or Pakistani) in the UK found 20-34% of children aged 1½-2½ years had suboptimal levels of vitamin D, and this was also associated with iron deficiency. This study confirmed the previously described association between vitamin D and iron deficiency. Iron deficiency impairs fat and fat soluble vitamin absorption. The high prevalence of iron deficiency in New Zealand children may be an important risk factor for vitamin D deficiency here, and could potentially be used to identify a group of children at increased risk of vitamin D deficiency.

In addition to causing rickets, vitamin D deficiency has other adverse effects on health. In a study of Ethiopian children <5 years of age, nutritional rickets (due to either vitamin D or calcium deficiency) was associated with a thirteen-fold increase in the risk of pneumonia after correction for confounders (family size, birth order, crowding and breast-feeding). It is interesting to note that the seasonal variability in incidence of vitamin D deficiency in our series is very similar to that reported for pneumonia hospitalisations in children. In a recently published study of paediatric pneumonia hospitalisations in Auckland from 1993 to 1996, 77% of the children were hospitalised during the six months from July to December. 27% of the children hospitalised with pneumonia were admitted in August.

In New Zealand, low serum vitamin D levels that are clinically apparent are associated with an increased risk of disease in adults. Serum vitamin D levels are inversely associated with relative risk of myocardial infarction and of diabetes and impaired glucose tolerance. The vitamin D status of adult New Zealanders varies with ethnicity. Serum 25-OH-D levels are significantly lower in adult Pacific Islanders, and to a lesser extent in adult Maori compared to adult Europeans. No data exist on the vitamin D status of New Zealand children. Based on the known associations between vitamin D status and a number of adverse health outcomes in both children and adults, it seems important that the true importance of this prevalence of micro-nutrient deficiency should be defined in New Zealand children, and its role in health status need to be determined. Those children at high risk of nutritional rickets need to be identified, and these children and their breast-feeding mothers supplemented with vitamin D.

Acknowledgements. Data on the vitamin D content of human and cows milk is reproduced with the permission of the Controller of Her Majesty’s Office.

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Extracorporeal shock wave lithotripsy for difficult common bile duct stones: initial New Zealand experience

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Abstract

Aim. Common bile duct (CBD) stones can usually be managed by open surgery, endoscopic retrograde cholangiopancreatography (ERCP) or radiological intervention. At times, however, these methods are either unsuccessful or inappropriate. We report our initial experience of extracorporeal shock wave lithotripsy (ESWL) for CBD stones that had either been unsuccessfully managed by conventional techniques, or in cases where these techniques were associated with a high level of risk.

Methods. A retrospective review of medical records of cases receiving ESWL for CBD was undertaken. The aspects reviewed were: indications, outcome and complications from the procedure.

Results. ESWL was used in the management of eight patients (three male, five female, age range 24-83, mean 54 years). The indications in five cases were failure of open surgery, ERCP or radiological techniques to clear the duct. In the other three cases, ERCP was unsuccessful and there was significant coincidental medical illness (morbid obesity with diabetes, and severe ischaemic heart disease). CBD clearance was achieved in seven cases. In one unsuccessful case, the duct was cleared after two open procedures.

Conclusions. ESWL can be used to clear CBD stones. It should only be used, however, where prior CBD drainage has been achieved, preferably by endoscopic sphincterotomy. Morbid obesity is a relative contraindication to the use of ESWL. If ESWL fails, a period of time should be allowed to elapse before open surgery because of distortion of soft tissue planes. ESWL can be a useful technique in dealing with some difficult CBD stones.

Table 1. Treatment attempts to clear CBD stones.

<table>
<thead>
<tr>
<th>Patient gender/age</th>
<th>Medical problems</th>
<th>Surgery exploration</th>
<th>ERCP</th>
<th>Radiological manipulation</th>
<th>ESWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.F29</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2.M79</td>
<td>IHD</td>
<td></td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>recent CVA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.M64</td>
<td>morbid obesity</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>diabetes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.F24</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5.M71</td>
<td>IHD</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6.F49</td>
<td>recent CVA</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7.F37</td>
<td>morbid obesity</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8.F73</td>
<td>CORD</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>IHD</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IHD: ischaemic heart disease; CVA: cerebrovascular accident; CORD: chronic obstructive airways disease; RA: rheumatoid arthritis.

The initial experience of extracorporeal shock wave lithotripsy (ESWL) treatment of cholecystolithiasis has been variable1-4 and laparoscopic cholecystectomy is now the treatment of choice.5,6 In patients with choledocholithiasis, surgical bile duct exploration (open or laparoscopic) or endoscopic retrograde cholangiopancreatography (ERCP) is the conventional treatment.7,8 Surgery has considerable associated morbidity (11-46%) and mortality (2%), especially in the elderly and cases with serious medical co-morbidity.7,8 In these cases, ERCP would be the procedure of choice. It is unsuccessful, however, in 10% of cases.7-9 At other times, surgical exploration may fail to clear the duct. These stones may be removed by radiological manipulation down a mature T-tube tract, but the technique is not always successful.10 When these conventional treatment options have failed, or when significant co-morbidities render the risks of their use too high, ESWL may have a role.11-13 This paper reviews the early New Zealand experience with ESWL in the treatment of ‘difficult’ CBD stones.

Methods
This study is a retrospective case series. The cases were identified by reviewing the records of Mobile Medical Technology, a system which moves around the country on a mobile bus platform to various hospital sites, primarily treating renal stones. A review of case notes was undertaken of patients who received ESWL for common bile duct (CBD) stones from January 1995 to April 1999. All cases treated by Mobile Medical technology anywhere in New Zealand were included. The aspects reviewed were indications, outcome and complications from the procedure. The lithotripsy system used was a Dornier Lithotripter DU/50, a system which generates its shock waves with electromagnetic technology, and timing is controlled by the patient’s own ECG.

Results
A review of the records identified eight cases (three male, five female, age range 24-83, mean 54 years) where ESWL was used to treat choledocholithiasis (Table 1). The indications in five patients were: failure of conventional techniques such as surgery, ERCP, or radiological techniques to clear the duct (Table 2). In all cases, the duct was cleared of stones by ESWL. One of these cases, however, required repeated treatments.

In the other three cases, there was significant medical co-morbidity (morbid obesity with diabetes, severe ischaemic heart disease and severe rheumatoid arthritis). In all cases, ERCP was used as first line management, but failed to clear the duct. In seven of the eight cases, ESWL successfully cleared the duct of stones. In the remaining case, ESWL failed to have any demonstrable effect on the CBD stones. This may have been due to the patient’s morbid obesity. A laparotomy was performed soon after. Here it was found that the planes of dissection were difficult to define due to the soft tissue trauma from the ESWL. A cholecystectomy was performed and a T-tube inserted in the CBD, but duct exploration was abandoned as it could not be undertaken safely. A second exploration was performed three months later, at which time the duct was cleared of stones. There were no procedure related complications or mortality from ESWL in this series.
Table 2. Indications for ESWL, presence or absence of gallbladder at time of ESWL, and success of treatment.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Reason for failure of conventional treatment</th>
<th>Gallbladder in-situ</th>
<th>Duct clearance achieved by ESWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Multiple intrahepatic stones</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td>2.</td>
<td>Failure at 2 operations</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td>3.</td>
<td>Unfit for GA</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td>4.</td>
<td>High risk for GA</td>
<td>absent</td>
<td>required operation</td>
</tr>
<tr>
<td>5.</td>
<td>Impacted stone at operation</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td>6.</td>
<td>Failure of ERCP</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td>7.</td>
<td>Failure of ERCP</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td>8.</td>
<td>Failure of operation</td>
<td>absent</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>Failure to ERCP</td>
<td>present</td>
<td>yes</td>
</tr>
</tbody>
</table>

NB: Patient 8 required two attempts to remove stones from her gallbladder percutaneously, as they continued to empty into the common bile duct.

Discussion

CBD stones continue to cause significant morbidity. The development of non-operative techniques to manage this difficult problem has helped reduce the morbidity and mortality of duct exploration. ERCP with basket extraction, with or without endoscopic sphincterotomy, has become the treatment of choice for CBD stones, and can clear up to 90% of such retained stones. Where operation and ERCP have failed, radiological manipulation down a matured T-tube tract can clear remaining stones in 60-70% of cases. There is a small group of laparoscopically experienced surgeons undertaking laparoscopic exploration of the CBD, and in some institutions producing excellent results (95% clearance). In New Zealand, however, the experience of laparoscopic CBD exploration is limited to a few protagonists.

The first report of the use of lithotripsy to treat gallstones was in 1975. Here, it was applied directly to stones through CBD catheters. In 1986, extracorporeal treatment of biliary tract stones was shown to be possible in the management of both CBD and gallbladder calculi. The role of ESWL in the management of calculi biliary disease still remains to be defined. At present, its greatest promise is an adjunctive measure in the management of complications of biliary disease, such as CBD calculi.

In other countries, ESWL has been used to clear difficult CBD stones with variable results. An Australian study reported that, of 47 patients who underwent ESWL for CBD stones, complete stone clearance was possible in only thirteen patients and in a further 23 after endoscopic extraction of fragments. In five patients, only partial duct clearance was achieved. Surgical intervention was required in the remaining four cases. A report from Sheffield, United Kingdom indicated that duct clearance was possible in only 17 of 27 patients where ESWL was used for CBD stones. In a report from Switzerland however, of 54 cases of CBD stones treated by ESWL, complete duct clearance was achieved in 45 patients. The variability of the results appears to relate to case selection (with fewer stones producing a better result), prior sphincterotomy to allow stone fragments to pass, and the number of treatments/dose used to produce a fragment. Overseas experience has particularly supported the use of ESWL for CBD stones where there is disparity between stone size and duct anatomy, with large stones in small ducts being most suitable for ESWL.

In most cases undergoing ESWL for CBD stones, it is recommended that prior endoscopic sphincterotomy is performed for drainage of the CBD. It may be possible in future that, following initial percutaneous, transhepatic access to the CBD, a ‘slippery wire’ (as used in the treatment of kidney stones) can be guided down the bile duct, past the stones to the ampulla of Vater, and a balloon passed over it to undertake sphincter dilation. This would avoid the need for two procedures (ERCP and proximal drainage).

There has been considerable experience with ESWL in some overseas centres, but this has been limited in New Zealand. ESWL was initially used here in complicated cases, where there were few alternative options, and only after discussion with specialist biliary surgeons. The decision to use this technique should be made jointly between surgeons, endoscopists, radiologists and patients. With time however, the technique has been used in a wider range of cases and earlier in management, especially of high risk patients.

We make the following suggestions based on our early experience:

1. CBD drainage should be established prior to treatment.

This can be achieved percutaneously.

2. ERCP sphincterotomy should be performed prior to ESWL to allow passage of fragments.

3. Morbid obesity is a relative contraindication to ESWL.

4. If ESWL fails to clear the stones, six to eight weeks should be allowed to elapse before open surgery because of the effect of ESWL on the soft tissues.

5. Patients with multiple stones still in the gallbladder should have these cleared prior to clearing the duct.

ESWL, with or without the use of dissolution therapy, is unlikely to find a major role for the management of primary gallbladder calculi. In the highly selected patient group with difficult CBD calculus, however, there appears to be a place for ESWL. This is the group where conventional treatment options may have been tried and failed, or where conventional treatment options may be associated with too high a risk. The procedure-related complication and mortality rates for ESWL were both nil in this series, as has been reported elsewhere.

ESWL is a technique worthy of consideration in some difficult clinical situations.

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Follow up testing of hyperglycaemia during hospital admission: combined use of fasting plasma glucose and HbA1c

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Abstract

Aim. To follow up patients without known diabetes, but with hyperglycaemia in hospital for diabetes at one year.

Methods. 159 patients with a random plasma glucose ≥7.8 mmol/L recorded during hospital admission were sent a questionnaire and invited to have the following test one year following discharge: fasting plasma glucose, HbA1c and fasting lipid profile. Those with a fasting plasma glucose ≥5.5 and <7.0 mmol/L, and/or those with a HbA1c ≥ 6.0%, were asked to have an oral glucose tolerance test. Those with a fasting plasma glucose ≥ 7.0 mmol/L were defined as having diabetes.

Results. There were 88 full responses. Nineteen (21.6%) had diabetes and nine impaired glucose tolerance. HbA1c was ≥6% in five subjects with a fasting plasma glucose <5.5 mmol/L. Two had impaired glucose tolerance and one diabetes. If a random plasma glucose in-hospital of 10 mmol/L is used as a threshold for later testing, as suggested by previous studies, then 25% of those with an abnormal result would have been missed.

Conclusions. A high proportion of those with hyperglycaemia in hospital have diabetes or impaired glucose tolerance at one year. Initial testing with fasting plasma glucose and HbA1c avoided oral glucose tolerance test in 76% of cases. Use of HbA1c detected otherwise missed diabetes and impaired glucose tolerance. A random plasma glucose of ≥8.8 mmol/L in hospital targets patients who should be tested for impaired glucose tolerance or diabetes following discharge.

Diabetes mellitus is under-diagnosed. In particular, up to 50% of type 2 diabetes remains undetected. Hospital admission provides an opportunity for identification of individuals at risk of future diabetes, as well as those with undiagnosed disease.

Previous studies have shown a high proportion of individuals with a random plasma glucose ≥10 mmol/L in hospital develop type 2 diabetes. Thompson et al showed that almost 50% of individuals with in-hospital glucose levels ≥10 mmol/L admitted to surgical wards from a high risk community, developed diabetes by three years. Husband et al reported that individuals admitted to coronary care who had a random glucose >10 mmol/L were more likely to have undetected existing diabetes (63%), than so called ‘stress hyperglycaemia’ (37%).

Glycated haemoglobin (HbA1c) has an important clinical role in predicting risk of microvascular complications of diabetes. There is controversy regarding the use of HbA1c as a screening or diagnostic tool, largely because of a lack of laboratory standardisation, but also because of wide intra-individual variability.

It is not clear whether the findings of the investigators above can be extrapolated to all patients admitted to hospital, regardless of the reason for admission or service to which they are admitted. Furthermore, it is not clear whether a random plasma glucose of 10 mmol/L is the best cut off for follow up testing, or whether other risk factors may be helpful in identification of a group at greater need of follow up testing for diabetes. The aims of this study were: 1) to establish the proportion of adults admitted to a general hospital who record a random plasma glucose ≥7.8 mmol/L who have diabetes or impaired glucose tolerance at twelve months following discharge, 2) to use a stepwise testing technique in order to minimise the number of unnecessary oral glucose tolerance tests; 3) to use HbA1c together with fasting plasma glucose to select those requiring an oral glucose test.

Methods

A cohort of 159 patients identified in an audit of hyperglycaemia during hospital admission during the month of November 1997, were contacted to take part in a follow up study one year after admission. These subjects, all older than fifteen years, had a random plasma glucose of ≥7.8 mmol/L at some time during their hospital admission, and had no previous history of diabetes.

Subjects were asked to complete a mailed questionnaire and to have a fasting blood test. Information was sought on family history of diabetes, previous gestational diabetes, coexisting medical problems and medication, height, weight and self reported ethnicity. Those diagnosed with diabetes since discharge from hospital, prior to this study, were not required to have further blood tests. The remainder were asked to have a fasting blood test for glucose, HbA1c, total cholesterol, HDL cholesterol and triglycerides.

Diabetes was diagnosed on the basis of a fasting plasma glucose of ≥7.0 mmol/L. Those subjects with a result of 5.5-7.0 mmol/L were asked to have an oral glucose tolerance test. These subjects were then classified as being normal, or having impaired fasting glycaemia, impaired glucose tolerance, or diabetes as per the current WHO criteria. An HbA1c of 6.0% was chosen as a rounded number approximating the local upper limit of the normal range of 6.2% using the Biorad Diomat assay.

After two months, those who had not replied to the initial letter were contacted by phone, and/or by a further letter. After five months, a final attempt was made to contact those who had not responded. The study was approved by the Wellington Ethics Committee.

Glucose and lipid levels were measured with standard methods on a Hitachi 717 analyser (Boehringer Mannheim).

Results

Of the 159 subjects, 25 had died, we were unable to contact seventeen after multiple attempts, and five who were contacted and agreed to have the blood test, failed to do so. 23 declined consent for follow up testing, and one woman was pregnant making results invalid. In total, 88 completed both the questionnaire and blood test. Excluding those who died and the woman who was pregnant, the response rate was 66%.

Those who died and those who declined consent were significantly older than remaining subjects (73 vs 59 years p<0.05). There was no significant difference between responders, those who declined consent, those who were unable to be contacted, or those who died for mean random plasma glucose in hospital.

Nineteen (21.6%) had developed diabetes since discharge. Ten of these had been diagnosed by their family doctor.
prior to being contacted for this study, five by a fasting blood glucose ≥7.0 mmol/L, and the remaining four were detected after an oral glucose tolerance test. A further nine (10.2%) had impaired glucose tolerance on oral glucose tolerance testing. Eight subjects (9.1%) had impaired fasting glycaemia (6.6-6.9 mmol/L) according to the American Diabetic Association and WHO criteria, based on the initial follow up fasting glucose. These eight subjects had an oral glucose tolerance test which showed two had diabetes on the two hour criteria, three impaired glucose tolerance and three had normal results. No subjects retained the impaired fasting glucose classification from the oral glucose tolerance test results. Figure 1 shows the results of the fasting plasma glucose and the final diagnosis against the in-hospital random plasma glucose.

HbA1c was ≥6% in seventeen of 76 (22.3%) subjects in whom it was performed. It was ≥6% in five subjects whose fasting blood glucose was <5.5mmol/L. Of these, one had developed diabetes and two had impaired glucose tolerance. The results of HbA1c with respect to fasting plasma glucose are shown in Figure 2.

Analysis of known risk factors for diabetes included family history, past history of gestational diabetes mellitus, ethnicity, body mass index and dyslipidaemia (from the fasting lipid profile). There was no significant difference between those with diabetes, impaired glucose tolerance, and those with normal glucose tolerance, for any of these risk factors.

Discussion

A significant proportion of adult patients without known diabetes who are admitted to a general hospital, in whom a random plasma glucose level ≥7.8 mmol/L is recorded, have or develop diabetes or impaired glucose tolerance within one year. In this study, if all patients with a random plasma glucose ≥7.8 mmol/L were tested, then the proportion with diabetes after one year was 21.6%. If only those with a glucose ≥10 mmol/L were tested, the proportion testing positive would be 41%, at the expense of missing 25% of those with either diabetes or impaired glucose tolerance. That is, the sensitivity drops to 0.84 for detecting diabetes and 0.59 for impaired glucose tolerance. For subjects with an in-hospital random glucose of 7.8-10.0 mmol/L, the number needed to test to detect one individual with either impaired glucose tolerance or diabetes mellitus was seven.

Previous studies have identified a high rate of progression to diabetes in those with hyperglycaemia during a hospital admission. Thompson et al showed that in a high risk community, 40.7% of those admitted to a surgical ward who had a random plasma glucose ≥10.0 mmol/L had developed diabetes by three years, and a further 35.2% had impaired glucose tolerance. Diabetes was defined by the previous 1985 WHO criteria of a fasting glucose level of ≥7.8 mmol/L. In comparison to the present study, the follow up period was three years rather than one year, and the subjects were selected only from a surgical service. Despite this difference, our study produced the same proportion of patients being diagnosed with diabetes, although there were fewer with impaired glucose tolerance.

When looking at the group with a random plasma glucose in-hospital of 8.0-9.9 mmol/L, the present study found 7.0% had developed diabetes, compared with 15.2% in the Thompson study, and 7.0% had impaired glucose tolerance, compared with 36.4%. This comparison shows that many who do progress to diabetes, do so soon after discharge, or as Husband et al suggested may have undiagnosed disease at the time of admission. For this reason, early follow up after discharge is recommended. It also shows that there is a continued progression to diabetes and impaired glucose tolerance over time, and even if the initial follow up result is normal, individuals are still at risk of diabetes in the future and should be followed.

This study employed a stepwise testing technique to minimise the number of oral glucose tolerance tests performed. By doing an oral glucose tolerance test in only those with a fasting plasma glucose 5.5-7.0 mmol/L, and/or those with an HbA1c ≥6%, the number of tests was reduced by 76%. HbA1c is one of the best guides to glycaemic control in patients with diabetes. It has particular value in predicting risks of developing complications. However, for several reasons HbA1c has not been validated for use as a screening or diagnostic tool. Firstly, there is variability in laboratory method and lack of a standardised reference range. Secondly, biological variability, and haemoglobin variants creates error in HbA1c values and reduces sensitivity and specificity. Thirdly, the test is not universally available. Despite this, the inherent value of a single test for screening or diagnosis, and one which has direct clinical implications, has great appeal. Several authors have examined HbA1c as a sole test or in combination as an alternative to the oral glucose tolerance test. The chosen cut off for HbA1c depends on desired sensitivity and specificity, laboratory method and local reference range. In the literature, this varies from a HbA1c level of 5.5%-7.0%.
In the present study, HbA1c was used in combination with the fasting plasma glucose as the initial follow up test. An HbA1c ≥6.0% was used as the cut-off for requesting an oral glucose tolerance test. There were twelve subjects with an HbA1c ≥6%, but a fasting plasma glucose <7.0 mmol/L. Of these, three had developed diabetes and four impaired glucose tolerance. These subjects would have been missed if a fasting plasma glucose ≥7.0 mmol/L alone was used as the criterion for diagnosing diabetes. From this we can say that HbA1c is a valuable adjunct to fasting plasma glucose. It may be useful as the primary single test for detecting diabetes, especially in those who are at much greater risk of diabetes than the general population. Wiener et al showed that Hb1Ac >6.2% for their assay had a high diagnostic specificity in their population.5

It was surprising that known risk factors for diabetes did not appear to be helpful in predicting subjects who would go on to develop diabetes or impaired glucose tolerance. This may relate to the small numbers in the study, but is more likely to reflect a hierarchy of risk. That is, hyperglycaemia in a stressed state is more predictive of risk for diabetes than any other risk factor. It is not possible from this study to say how many age and weight matched controls would go on to develop diabetes if the same random sampling of blood sugar was performed in the community. The blood sugar level in response to stress (as also occurs in response to pregnancy) is a means of identifying individuals at risk of diabetes and identification within hospital should not have an effect on prevalence of the disease – just the timing of diagnosis. On the other hand, diabetes and even impaired glucose tolerance is associated with marked increase in risk for macrovascular disease, so such subjects will be over represented in the hospital inpatient community.

The small numbers of subjects limits the conclusions of this study, particularly regarding use of HbA1c in combination with fasting plasma glucose as a follow-up testing approach. Larger studies may be worthwhile. By not doing oral glucose tolerance tests on all subjects, we may have missed some with diabetes or impaired glucose tolerance who had a fasting blood glucose <5.5 mmol/L. This was made less likely by the adjunctive use of HbA1c.

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SPECIAL ARTICLE

Coronary angioplasty in New Zealand 1995-1998: a report from the National Coronary Angioplasty Registry

Peter N Ruygrok, Cardiologist, Green Lane Hospital; John A Ormiston, Interventional Cardiologist, Mercy and Green Lane Hospital; Barbara O’Shaughnessy, Senior Medical Radiation Technologist, Green Lane Hospital, Auckland.

Abstract


Method. Information on all patients undergoing attempted coronary angioplasty in eight New Zealand institutions was recorded on datasheets at the time of, or soon after, the procedure. These were forwarded to the registry at Green Lane Hospital.

Results. Over the four-year period, 8395 angioplasty procedures were performed by 26 cardiologists in eight coronary interventional facilities, with a procedural success rate of 94%. Procedural numbers grew steadily, with 55% more coronary angioplasties performed in 1998 than in 1995 (p=0.02). The New Zealand national angioplasty rate, which rose from 459/million population in 1995 to 684/million in 1998, remains lower than that of Australia and Western European countries. Excluding those that underwent angioplasty for acute myocardial infarction, the number of peri-procedural deaths was similar, with six in 1995 and four in 1998 (p=0.30), and the requirement for emergency bypass surgery fell from 22 cases in 1995 to three in 1998 (p<0.001). The use of stents increased dramatically, with 85% of patients receiving a stent in 1998, compared with 23% in 1995 (370% increase, p<0.001). This was associated with a reduction in the number of patients requiring repeat percutaneous interventions for restenosis (10.7% in 1995 to 6.4% in 1998, p<0.001)

Conclusion. There has been a steady growth in the numbers of patients with coronary artery disease treated by coronary angioplasty, and in the number treated by intracoronary stents from 1995 to 1998. The need for urgent coronary bypass surgery has fallen. Continued submission of complete and accurate data to the coronary angioplasty registry is vital for ongoing audit.

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Since the introduction of percutaneous transluminal angioplasty by Andreas Greuntzig in 1977, there has been an extraordinary growth in the use of this technique to treat patients with coronary artery disease. With refinements in equipment, the introduction of intracoronary stents by Jacques Puel and Ulrich Sigwart in 1986, and increased operator experience, coronary intervention has become safer, faster, and has resulted in almost as many angioplasty procedures being performed per annum as coronary bypass operations.

Percutaneous balloon angioplasty was introduced in New Zealand in both Dunedin and Auckland in 1981, the first procedures in these centres being performed by Dr Michael Ablett and Dr Antony Roche respectively. Dr Gerry Wilkins implanted the first intracoronary stent in 1989.

The interventional community saw the need for audit, accountability and accurate record keeping, and in 1994 established a national coronary angioplasty registry, endorsed by the Cardiac Society of Australia and New Zealand.

Methods

Patient population. Since July 1994, information on all patients undergoing attempted coronary angioplasty in eight New Zealand institutions has been recorded onto a single sided datasheet at the time of, or soon after, the procedure. Datasheets were forwarded to the National Coronary Angioplasty Registry at Green Lane Hospital and entered into a dedicated database, the hardware and software for which was provided by Dr John Ormiston. Data collected included patient and centre demographics, clinical, angiographic, procedural and outcome information. A list of definitions is presented in Table 1.

Table 1. Definitions.

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable angina</td>
<td>Graded Class I-IV according to the Canadian Cardiovascular Society functional classification</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>Graded Class I-III according to the Braunwald classification</td>
</tr>
<tr>
<td>Primary angioplasty</td>
<td>Coronary angioplasty undertaken as primary management of an acute myocardial infarction</td>
</tr>
<tr>
<td>Rescue angioplasty</td>
<td>Coronary angioplasty undertaken after medical intervention, usually with thrombolysis, has failed to achieve reperfusion and cardiovascular stability</td>
</tr>
<tr>
<td>Procedural success</td>
<td>Reduction of luminal narrowing to &lt;50% in at least one lesion dilated without major complication</td>
</tr>
<tr>
<td>Lesion success</td>
<td>Reduction of the luminal narrowing to &lt;50% without major complication</td>
</tr>
<tr>
<td>Emergency CABG</td>
<td>Need for urgent operation due to ongoing myocardial ischaemia, despite (or because of) attempted angioplasty</td>
</tr>
<tr>
<td>Major complication</td>
<td>Death, non-fatal myocardial infarction or emergency bypass surgery</td>
</tr>
</tbody>
</table>

Angioplasty procedure. A coronary angioplasty procedure was defined as a procedure in which a guide catheter is introduced into a coronary artery with the intention of subsequently opening and dilating an obstructive coronary lesion using a balloon catheter. Coronary angioplasty was performed according to standard methods with minor variations according to the devices employed and local practice. Patients were generally receiving optimal antianginal medication, and unless there was a contraindication, all were pre-treated with aspirin. All patients received a 5000-15 000 IU bolus of heparin at commencement of the procedure. Following angioplasty, patients were monitored in a coronary care unit or intermediate care ward where the sheath was removed two to six hours later, or the following morning after overnight heparinisation. Most patients in whom the procedure was elective were discharged home the day following the procedure.

Statistical methods. Continuous variables are expressed as means ± standard deviation. Discrete variables are expressed as counts or percentages, and are compared in terms of relative risks with 95% confidence intervals calculated by the formula of Greenland and Robins. Comparison of trends was done using standard linear regression and comparison of slopes (GB-STAT software). A p value of ≤0.05 was considered significant.

Results

Patients and procedures. From January 1995 to December 1998, 8395 coronary angioplasty procedures were performed by 26 cardiologists in eight New Zealand institutions (Table 2), with an average of 271/year per institution. In 1995, 1673 procedures were performed, compared with 2592 in 1998, giving a growth of 55% over the four-years (p=0.019). The national rate grew from 459/million population/year in 1995 to 684/million/year in 1998. The mean waiting time for all patients, including both acute inpatients and waiting list outpatients was 19.4 days. The shortest average waiting time per centre was two days, and the longest was 63 days. The longest a patient waited over the study period was 1031 days. We were unable to identify from the database which patients were admitted for angioplasty from waiting lists, as opposed to those treated as ‘hospital cases’. The mean waiting time for those patients with stable angina was 33.8 days in 1995 and 933 days in 1998. For those with unstable angina, waiting times increased from 5.3 days in 1995 to 9.5 days in 1998.

The mean waiting time for public hospitals was 25 days compared to ten days for private institutions. Patient demographics and symptoms are displayed in Table 3. Angiographic information is shown in Table 4.

Table 2. Number of coronary angioplasty procedures performed in New Zealand 1995-1998.

<table>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Green Lane</td>
<td>596</td>
<td>496</td>
<td>660</td>
<td>610</td>
</tr>
<tr>
<td>Dunedin</td>
<td>409</td>
<td>452</td>
<td>486</td>
<td>364</td>
</tr>
<tr>
<td>Christchurch</td>
<td>35</td>
<td>49</td>
<td>36</td>
<td>192</td>
</tr>
<tr>
<td>Auckland</td>
<td>1145</td>
<td>1075</td>
<td>1160</td>
<td>1005</td>
</tr>
<tr>
<td>Waikato</td>
<td>268</td>
<td>287</td>
<td>302</td>
<td>330</td>
</tr>
<tr>
<td>Wakefield</td>
<td>57</td>
<td>75</td>
<td>154</td>
<td>156</td>
</tr>
<tr>
<td>Wellington</td>
<td>131</td>
<td>171</td>
<td>292</td>
<td>421</td>
</tr>
<tr>
<td>Total</td>
<td>1673</td>
<td>1382</td>
<td>1229</td>
<td>2592</td>
</tr>
</tbody>
</table>

Table 3. Patient demographics and symptomatic status.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>59.2±10.3</td>
<td>59.3±10.5</td>
<td>60.4±10.8</td>
<td>60.6±10.8</td>
</tr>
<tr>
<td>Gender (Male%)</td>
<td>73.2</td>
<td>75.0</td>
<td>73.5</td>
<td>73.6</td>
</tr>
<tr>
<td>Stable %</td>
<td>57.5</td>
<td>53.5</td>
<td>53.3</td>
<td>43.0</td>
</tr>
<tr>
<td>Unstable %</td>
<td>34.2</td>
<td>37.0</td>
<td>38.3</td>
<td>51.3</td>
</tr>
<tr>
<td>Acute MI %</td>
<td>8.3</td>
<td>9.5</td>
<td>8.4</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Table 4. Angiographic data.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Lesion site %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left main</td>
<td>1.2</td>
<td>1.2</td>
<td>1.0</td>
<td>1.7</td>
</tr>
<tr>
<td>LAD</td>
<td>35.8</td>
<td>36.3</td>
<td>31.7</td>
<td>33.4</td>
</tr>
<tr>
<td>Circumflex</td>
<td>26.9</td>
<td>25.5</td>
<td>27.4</td>
<td>25.4</td>
</tr>
<tr>
<td>RCA</td>
<td>32.0</td>
<td>31.4</td>
<td>33.5</td>
<td>34.1</td>
</tr>
<tr>
<td>Bypass graft</td>
<td>4.0</td>
<td>5.7</td>
<td>4.4</td>
<td>5.4</td>
</tr>
<tr>
<td>No of lesions treated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per procedure</td>
<td>1.44</td>
<td>1.49</td>
<td>1.50</td>
<td>1.50</td>
</tr>
<tr>
<td>Stent procedures %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DCA %</td>
<td>3.5</td>
<td>1.0</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>RA %</td>
<td>1.0</td>
<td>0.2</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td>Procedures for restenosis %</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.7</td>
<td>10.5</td>
<td>7.3</td>
<td>6.4</td>
</tr>
<tr>
<td>Instant</td>
<td>0</td>
<td>3.6</td>
<td>3.7</td>
<td>5.3</td>
</tr>
</tbody>
</table>

LAD=left anterior descending artery; RCA=right coronary artery; DCA=directional coronary atherectomy; RA=rotational atherectomy.
Technique. Over the four-year period, most procedures were undertaken via the femoral artery approach (99.2%), with a small number via the radial (0.7%) and brachial (0.2%) arteries. With refinement in both balloon and stent technology, the use of eight French size guiding catheters decreased from 82% in 1996 to 38% in 1998, with a corresponding increase in the use of six French catheters from 15% to 61%. Seven French catheters were used in only 0.6% of patients.

The use of coronary stents increased dramatically over the four year period (Table 4, Figure 1). In 1995, 23% of procedures involved stent implantation, increasing to 85% in 1998 (p=0.006). For stent procedures, the antiplatelet agent ticlopidine, in combination with aspirin, was employed in 93% of patients in 1996 and in 97.6% of patients in 1998 (1995 not recorded). The use of abciximab, a IIb/IIIa glycoprotein inhibitor, increased from 0 procedures in 1995 to 57 (3%) in 1996, 149 (6%) in 1997 and 289 (11%) in 1998. The use of other devices remained infrequent, with directional atherectomy (DCA) declining from 3.5% to 0.2%, and rotational atherectomy (RA) used in less than 1% of procedures in any year.

Immediate outcome. Excluding patients who underwent angioplasty for acute myocardial infarction, treatment of a total number of 11 792 lesions was attempted in the 7863 procedures (mean of 1.50 lesions per procedure). Of these, 10 991 were successfully treated, giving a lesion success rate of 93.2%. The lesion success rate increased from 92.0% in 1995 to 94.5% in 1998. The percentage of lesion failures attributed to an inability to successfully open an occluded vessel (TIMI flow 0) over the study period was 51%. There was no significant fall in peri-procedural deaths over the study period, with six in 1995 and four in 1998 (0.38% to 0.16%, p=0.30) whilst the need for emergency coronary artery bypass surgery fell from 22 to 3 (1.5% to 0.12%, p<0.001). Data on peri-procedural myocardial infarction were incomplete because of differing institutional policies on measurement of cardiac enzymes. The length of hospital stay, from the time of angioplasty, decreased from a mean of 2.94 days in 1995 to 1.83 days in 1998 (p<0.001). The number of procedures in public hospitals increased from 1439 in 1995 to 1917 in 1998 (33% increase), whereas in private hospitals, the increase was from 234 (14% of total) in 1995 to 675 (26% of total) in 1998 (188% increase). Over the four year period, 530 interventions were performed for acute myocardial infarction (111 in 1995, 131 in 1996, 139 in 1997, 149 in 1998).

Discussion

Cardiovascular disease remains the major cause of mortality (41% of all deaths) and morbidity in New Zealand.6 Whilst primary prevention remains the ultimate goal, we are confronted with an increasing number of patients with significant obstructive coronary artery disease requiring revascularisation to relieve angina, and in some situations to prolong life. Since its introduction in 1977, coronary angioplasty has become established as a safe and effective revascularisation strategy. At least as many patients are now being treated by angioplasty as by coronary bypass surgery. In Europe, 278 982 coronary interventions were performed in 1995, compared with 184 330 CABG operations.7 In New Zealand, the growth of angioplasty has paralleled that of other Western countries, although the number per million population has lagged behind. For example in 1995, 629 angioplasties were performed per million population in Australia, compared with 459 in New Zealand.5 In the same year, 310 were performed per million in the United Kingdom, 866 in the Netherlands, 926 in France and 1600 in the United States of America.8

Regional variations in angioplasty rates may relate to differences in the prevalence of coronary disease, variation in healthcare spending priorities and whether healthcare is predominantly government funded or insurance based. Over the four year period, the New Zealand angioplasty rate rose to 684/million/year, but increases have occurred world-wide and it is likely that we retain our comparative ranking.

Since publication of the Benestent and STRESS studies,9,10 intracoronary stenting has grown considerably and has revolutionised the practice of angioplasty. Most angioplasty centres now stent 70-90% of coronary artery lesions, with corresponding reduced rates of restenosis and acceptably low rates of subacute stent thrombosis. As well as clinical and angiographic data, the Benestent II study prospectively collected cost-effectiveness information.11 It was concluded that event-free survival at twelve months was significantly greater in the stented group than in the balloon angioplasty group, although costs of a stent procedure were greater. The price of stents, which are most commonly stainless steel meshes, has more than halved over the last five years, tipping the cost benefit balance in favour of the stent procedure.11 The OPUS study has confirmed that a strategy of primary stenting results in fewer major adverse events than stenting for a suboptimal balloon angioplasty procedure, namely provisional stenting (6.1% versus 14.9% combined death, myocardial infarction and target vessel revascularisation at six months).12 Additionally, it was shown that a primary stenting strategy was more cost-effective.

Over our four-year audit period, the proportion of stent procedures has increased from 23% to 85%. The percentage of repeat procedures for clinical restenosis (approximately half the angiographic restenosis rate) has reduced from 10.7% to 6.4%, which seems directly related to the increased use of intracoronary stents (Figure 1). The use of other devices, such as directional and rotational atherectomy, has involved fewer than 1% of procedures in 1998. It is likely that these will remain niche techniques. Rotational atherectomy has been advocated in both diffuse calcified lesions and instent restenosis, the latter increasing significantly over the four year study period as the use of stents has increased.

There was a significant reduction in the number of major complications over the study period. Improved stent technology, familiarity with the technique, acquired knowledge and newer antiplatelet agents have undoubtedly been major contributors to the reduced number of deaths and decreased need for emergency coronary bypass surgery.
In conclusion, there has been a progressive increase in both the numbers of patients with coronary artery disease treated by angioplasty and in the use of stents, which has coincided with a reduction in major complications. Continued submission of complete and accurate data to the registry is vital to the on-going audit of coronary angioplasty in New Zealand.

New Zealand Interventional Cardiology Group. Dr Malcolm Abernethy, Dr Hamish Charlestone, Dr Gerry Devlin, Dr John Elliott, Dr Raewyn Fisher, Dr Denis Freidlander, Dr Spencer Heald, Dr Tim Hull, Dr Peter Leslie, Dr Clive Low, Dr Hugh McAlister, Dr Andrew Maslowski, Dr Phil Matsis, Dr Chris Nunn, Dr John Ormiston, Professor Mark Richards, Dr Peter Ruygrok, Dr Douglas Scott, Dr David Smythe, Dr Mark Simmons, Dr Jim Stewart, Dr Ralph Stewart, Dr Mark Webster, Professor Harvey White, Dr Gerry Wilkins and Dr Michael Williams.

 Acknowledgements. We thank Dr Toby Whitlock and Teena West for statistical assistance.

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MEDICOLEGAL DIARY

Re-using ‘single-use’ medical devices

Jonathan Coates, Associate, Simpson Grierson, Wellington.


Recent publicity concerning a locum anaesthetist who re-used syringes to introduce drugs into an intravenous drip during an anaesthetic, raises the general issue of whether used syringes to introduce drugs into an intravenous drip.

The provider must take reasonable actions to give effect to the consumer’s rights within the provider’s resource constraints. So the fact that resources are limited will be an issue that can be taken into account in determining whether it is appropriate to re-use devices.

Re-using devices will clearly not ‘minimise harm’ to a patient. The onus of proving that it was reasonable to re-use a device which does not ‘minimise harm’ will fall on the provider. In addition to evidence of resource constraints, clear scientific data identifying a negligible increased risk to the patient is likely to be needed to prove that re-using a device was justified.

The starting point for determining whether the practice complies with professional standards, will be a comparison with the practice of ‘reasonable’ practitioners. Whilst colleagues’ opinions of acceptable practice in the re-use of devices will be persuasive, they will not be determinative. Clear data identifying the relevant risks is likely to be determinative. Practitioners should also be aware of any guidelines issued by the specialist Colleges which warn against the re-use of devices.

Right 6 of the Code is also relevant. This provides that a health consumer has the right to information that a reasonable consumer would expect to receive, including an explanation of the options available and an assessment of the expected risks, side effects, benefits, and costs of each option. A consumer could expect to receive an explanation of any material increased risk. Whether the increased risk to a particular consumer is material will largely depend on the scientific data. If the actual risk is infinitesimal, then a provider may be able to argue that there was no obligation to disclose it.

In conclusion, health providers need to show that, due to resource constraints, re-use of devices is reasonable. In the absence of reliable scientific data suggesting that the risks associated with re-using ‘single-use’ devices is negligible,
practitioners should be very wary about re-use without obtaining the patient's consent. What amounts to a material risk or a negligible risk will be open to debate. However, if a patient is injured by the re-use of a device without having been informed of its re-use, it would be very difficult for a provider to argue that they were justified from withholding that information.

Correspondence. Jonathan Coates, Simpson Grierson, PO Box 2402, Wellington. Email: jpc@sglaw.co.nz

2. EUCOMED statement. The case against reuse of single medical devices http://www.eucomed.be/eucomed/publications/reuse.htm
3. Code of Health and Disability Services Consumers' Rights, cl.3.
4. Code of Health and Disability Services Consumers' Rights, cl.3(2).